



Nordic Council  
of Ministers

# Better and harmonized statistics on plastic

Nordic Workshop



# Contents

<b>1. Summary</b>	<b>4</b>
KeyTake-backs	6
<b>2. Background</b>	<b>8</b>
2.1. A global treaty to end plastic pollution	8
2.2. The Nordics leading the way	8
<b>3. The big picture</b>	<b>10</b>
3.1. Plastics in the world	10
A global challenge	10
3.1. Plastics in Europe	11
3.3. Global and regional needs for improved plastics statistics	13
3.4. Plastics in the Nordics – experiences from mapping plastic flows	14
3.5. UNITARs Plastic KEYS – a step in the right direction	15
<b>4. Results from the workshop</b>	<b>16</b>
4.1. Workshop in Oslo, February 2024	16
4.2. Important statistical information to include in national inventories	16
4.3. Key knowledge gaps	17
4.3.1 Waste export (information need)	19
4.3.2. Waste export (control and inspection)	20
4.3.3 Product plastic shares, additives, and polymers	21
4.3.4. Lacking data on large waste sources	22
4.3.5. Lack of frequently updated data on plastic products and waste	23
4.3.6. Lack of data to enable closed loop recycling	24
4.3.7. End of life fates	25
4.3.8. Double counting semi-finished/finished products.	26

<b>Recommendations for further work</b>	<b>27</b>
Enhanced cooperation of Nordic customs authorities to ensure:	27
Enhanced Nordic cooperation for statistical methodology:	28
Enhanced Nordic cooperation on environmental agency level to ensure:	28
<b>Attachments</b>	<b>29</b>
Participants in the workshop	29
<b>About this publication</b>	<b>30</b>



# 1. Summary

The UN negotiations for a global plastic treaty are ongoing with a mandate to address the full life cycle of plastic products. There is a clear need for improved data on plastic material flows to design effective policies and measure their impact. The Nordic Council of Ministers have financed this project, *Better and harmonized statistics on plastic material flows* to support Nordic countries in developing best practices for creating national inventories of plastics. By bringing together technical experts from statistics bureaus, customs offices, and environmental agencies in the Nordic countries – this project aims to identify the most important statistical information to include in national inventories and critical knowledge gaps that need to be overcome in data collection and quality.

The group of technical experts collaborated to list nine clear challenges when creating national plastic inventories (not ranked):

1. Waste exports information need
2. Waste export control and inspection
3. Waste export end-of-life fates
4. Product plastic shares, additives and polymers
5. Lacking data on large waste sources and therefore overall plastic waste generation.
6. Lack of frequently updated data on plastic products and waste
7. Lack of data to enable closed loop recycling
8. End of life fates
9. Double counting semi-finished/finished products

Potential solutions include close follow-up of the implementation of the new waste shipment regulation with active involvement to guide technical standards, capacity building and technical gear for surveillance officers and searchable waste shipment documentation. The Nordic countries can actively collaborate with UNITAR to further develop the Plastic KEYs work that help harmonize plastic products and waste. The technical experts also saw potential in forming a Nordic working group to standardize methods for waste analysis to get better insight into large waste streams like the construction sector and industry. Public-private collaboration along with reporting requirements can also help current manual reporting through standards for data formats and automated data flows.

Armed with more detailed knowledge about the content and composition of plastic products and waste, and with harmonized statistical categories, codes and definitions, the UN negotiations can more precisely target the critical areas for policy development and reduce harmful and mismanaged plastics.

## KeyTake-backs

Main challenges	Barriers	Suggested solutions
Waste export (information need)	Insufficient HS codes and searchable accessibility to annex 7 information for statistical and surveillance purposes.	Amended in new regulation of waste shipment, however it is crucial (for a Nordic custom-authorities working group) to closely follow up the implementation to ensure that common digital solutions enable sufficient searchable information and efficient, structural data.
Waste export (control and inspection)	lack of standardized capacity, knowledge, and contents of supervisions of waste shipments.	Amended in new regulation of waste shipment, however it is crucial (for a Nordic custom-authorities working group) to closely follow up the implementation to ensure increased knowledge and capacity on and standards for supervision. The working group should also ensure collaboration within the EEA/EU on technology investments (Scanners, weights and AI)
Waste export (end-of-life-fates)	Unsatisfying content control of waste shipments out of the EEA/EU	Partly addressed through the new regulation of waste shipment, however it is crucial (for a Nordic custom-authorities working group) to closely follow up the implementation and ensure that experiences from the frontline and unfortunate deviations are addressed by measures or new underlying legal acts.
Product shares, additives, and polymers	Insufficient information and large variations in assumptions on products plastic shares, additives, and polymers.	Addressed in UNITARs work on Plastic-KEYs on finished products (plastic and plastic containing products), however the Nordic countries can assist in developing the keys in general and Nordic-specific adaptations.

Lack of frequently updated data on plastic products and waste	Insufficient incentives to report on desired format and constraints on data collection in European Statistics Code of Practice	Reporting requirements and industry initiatives for software integrations and agreeing on standard reporting format
Enabling closed-loop recycling	Insufficient information and link between supply and demand. Insufficient access to quality feedstock, infrastructure for sorting and recycle technology.	Linking feedstock of plastic waste, secondary raw material, and producers. Increasing economic incentives for increased flow throughout the value chain, from waste to recycled material into products designed for recycling.
End of life fates	Difficult and expensive to undertake comprehensive and frequent mapping, as well as harmonised recycling rates of different waste streams	Strengthening reporting on waste to controlled waste treatment. Mismanaged waste can be calculated as residual in the material flow.
Double-counting semi-finished/finished products.	Lacking guide on common methodology to use CN codes to separate semi-finished and finished products.	1) Only include either primary plastics or finished products or 2) create an international standard for instance based on the methodology followed by Norway and Denmark



## 2. Background

### 2.1. A global treaty to end plastic pollution

In 2022, the UN initiated negotiations for a global agreement to end plastic pollution. The mandate for the negotiations calls for addressing the full life cycle of plastic products. However, statistics and data on plastics production, composition and recyclability is currently fragmented or lacking altogether. To design policy tools and measure their effects it is crucial to have a better overview of how plastics flow through our economies – from primary production to waste management.

### 2.2. The Nordics leading the way

The Nordic Council of Ministers have initiated a collaborative vision project between the Nordic countries called "*The Nordics as a driving force to reduce marine plastic pollution regionally and globally.*" As part of this initiative, the Nordic Council of Ministers have funded this project, *Better and harmonized statistics on plastic material flows*. The goal for this project is to identify both the most important statistical information that plastic statistics should contain and the most critical knowledge gaps in current statistics in this field. Best practices for mapping plastic flows in the Nordics could be of great value in the continued UN negotiations.

As a central part of the project, technical experts from the statistics offices, customs offices and environmental agencies in the Nordic countries have worked together in a workshop held in Oslo in February 2024 to identify barriers in data collection and quality and potential solutions to rectify them. Specifically, we explored the following:



1. What kind of statistics are useful for global, regional, and national policy development and monitoring?
2. Given the above, what data do we already have that can be included in a plastic inventory?
3. To identify data and knowledge gaps, what and how can we obtain data, and what will it require?

This report summarises the main challenges from preliminary material flow analyses of plastic, the statistical information that Nordic technical experts list as most important to include in national inventories and potential solutions to build down barriers against improved data collection and quality.

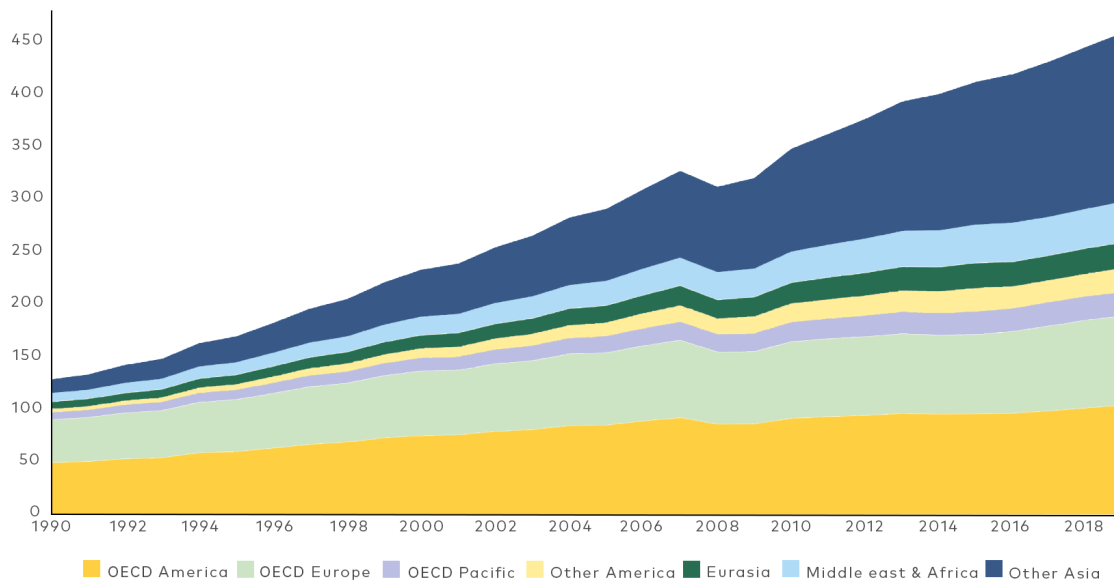


## 3. The big picture

### 3.1. Plastics in the world

#### A global challenge

Attempts at mapping global plastic flows with available data suggests that ending plastic pollution is a massive undertaking. In their Global Plastics Outlook, the OECD estimate that plastic production has doubled from 234 Mt in 2000 to 460 Mt in 2019 and is expected to increase threefold by 2060<sup>[1]</sup>, as shown in figure 1.

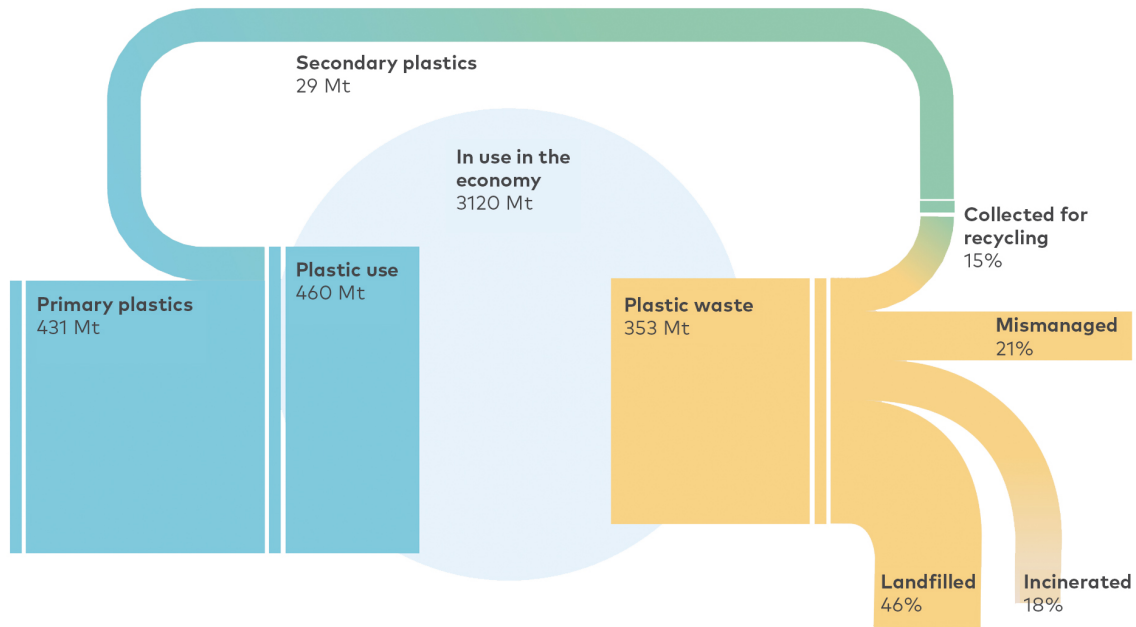


**Figure 1:** Plastics use by region globally in million tonnes.

Source: OECD – Global Plastics Outlook (2022)

1. OECD (2022) – Global Plastic Outlook. Plastic flows were modelled by the OECD using ENV-Linkages; their in-house dynamic computable general equilibrium mode. Read more. <https://doi.org/10.1787/5jz2qck2b2vd-en>

Figure 2 presents a global material flow of plastics, which suggests that globally, efforts should be focused on addressing management of plastic waste at the bottom of the waste hierarchy; 21% of plastic waste is assumed to be mismanaged ending up at dump sites, in open pit burning or leaking into the environment. Almost half of plastic waste globally is landfilled.



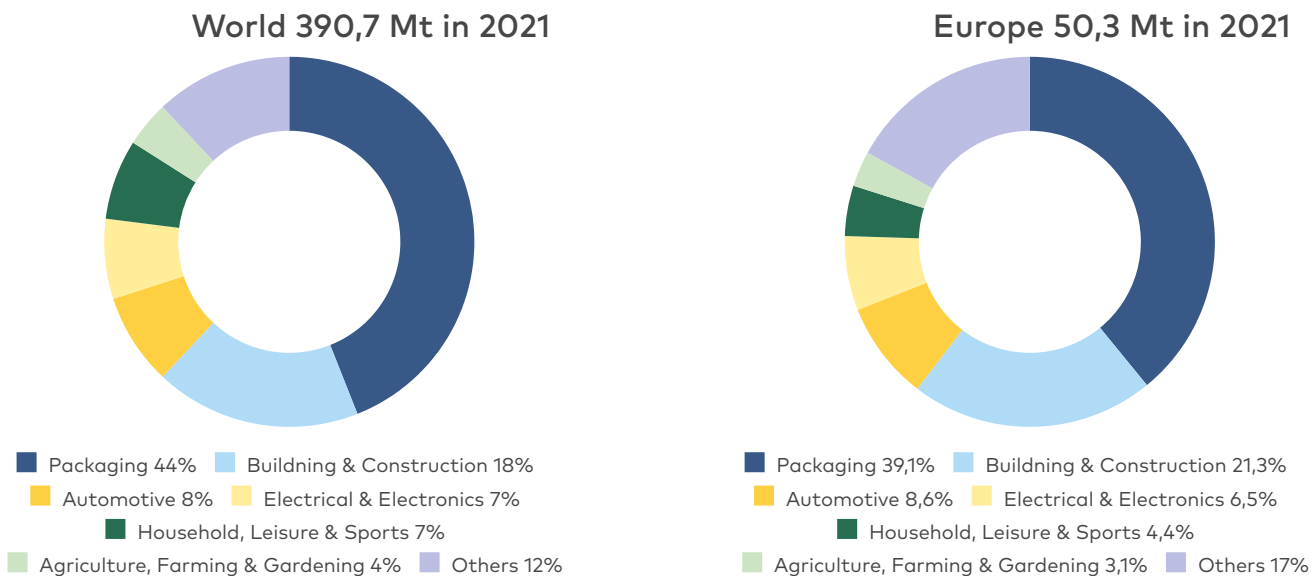
**Figure 2:** Global flow of plastics as modelled by OECD using their model ENV-Linkages.

Source: OECD – Global Plastics Outlook (2022)

### 3.1. Plastics in Europe

If we narrow the scope to the regional level, specifically Europe, analyses suggest a total plastics converters demand in 2021 of 50,3 Mt<sup>[2]</sup>, as shown in figure 3. The main categories of use for that plastic closely resembles the global result, with packaging as the main application followed by building & construction, automotive and electronics.

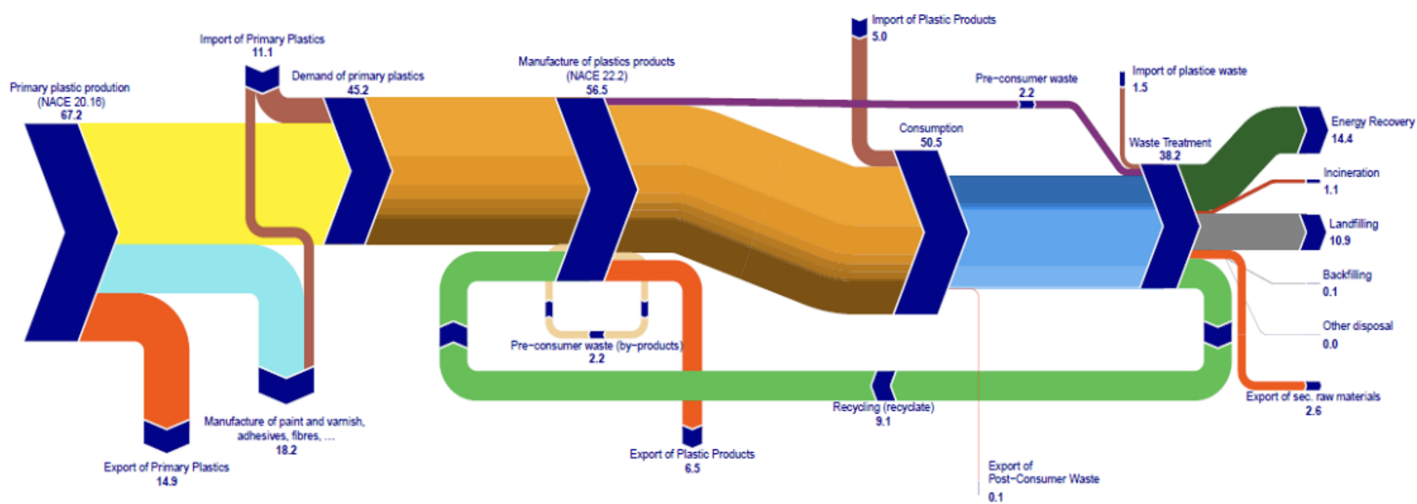
2. Plastics Europe (2021) – including 2,3 % bioplastics and 10,1 post-consumer recycled plastics



**Figure 3:** Total plastics converters demand in 2021.

Source: *Plastics Europe*

Eurostat has attempted to map a complete material flow of plastics in Europe as shown in figure 4, with data from a variety of sources including *Plastics Europe*, production statistics and the relatively extensive reporting done under directives regulating plastic packaging waste, end-of-life vehicles and electronics. Unofficial results<sup>[3]</sup> point to lower levels of landfilling and more to energy recovery compared to the global results from the OECD.



**Figure 4:** Plastic flow from production to treatment and recycling through the EU27, 2016.

Source: *Eurostat*

Leader of the team Circular Economy and Waste Statistics in Eurostat, Oscar Gomez, presented the

results of this analysis to the Nordic technical experts during the workshop, and supported the message that there is a great need for better and harmonized data, especially on the production side of the value chain.

### **3.3. Global and regional needs for improved plastics statistics**

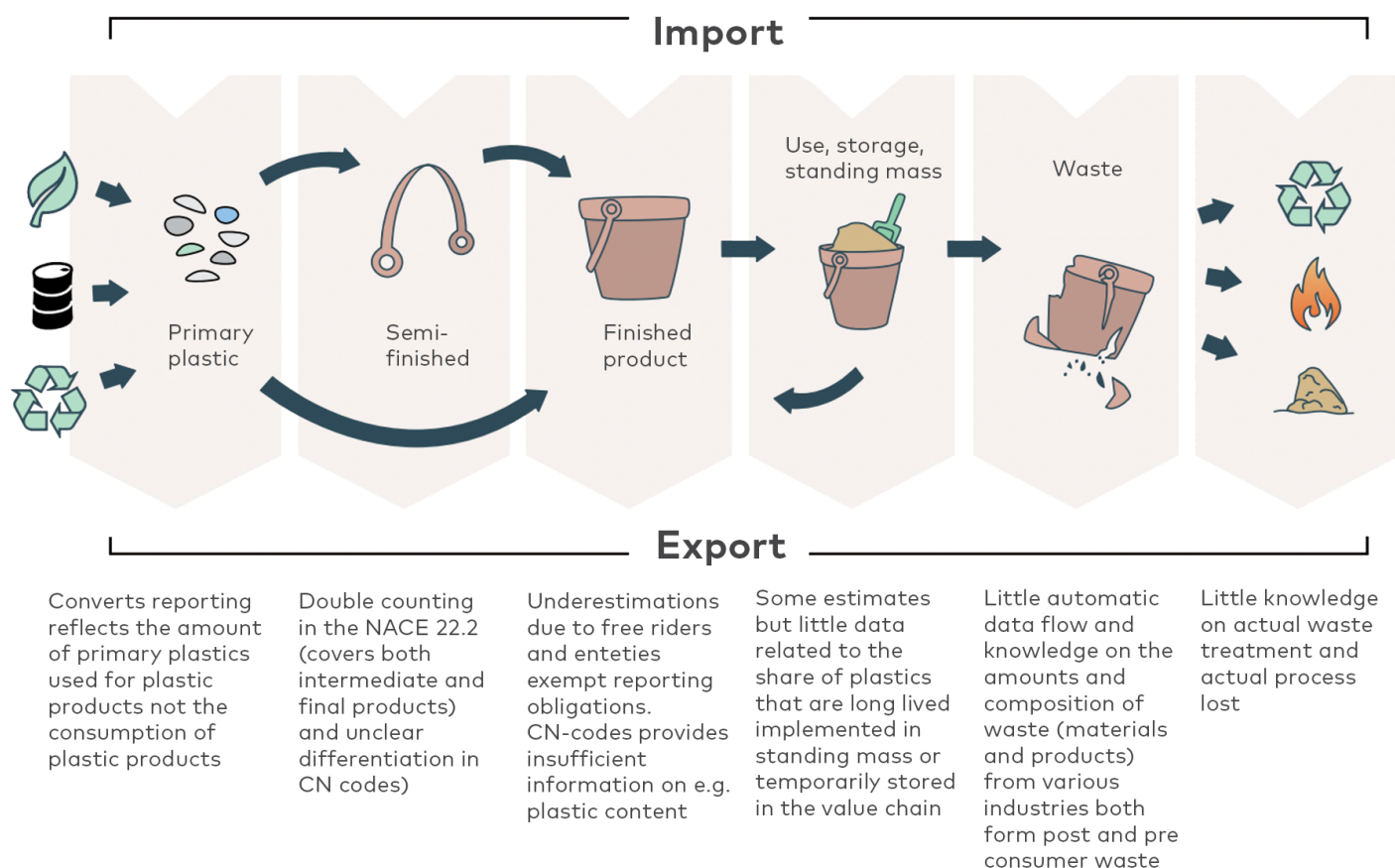
Material flow analyses of plastics globally and in Europe highlight the need for more detailed national inventories of plastic flows to create more reliable statistics for regions and in the world economy. This is also the clear message from parties involved in the negotiations of the UN plastic treaty. Global Plastics Policy Manager in WWF, Eirik Lindebjerg, and International Relations Officer in the Directorate-General for the Environment of the European Commission, Christoffer Vestli, presented at the workshop in Oslo and underscored the crucial role of statistics in the ongoing negotiations for a binding, global treaty to end plastic pollution.

Lindebjerg emphasized the current unique opportunity to address the global plastic pollution crisis by establishing a regulatory framework at the global level. He highlighted the importance of reliable data on plastic flows, composition, and waste treatment for effective policy design, implementation, and impact assessment. The focus includes global bans on high-risk, harmful, and highly-leakage plastic products, as well as harmful chemical additives, materials, and polymers. Lindebjerg also stressed the need for product requirements to ensure that all plastic products are designed for reuse and recycling with minimal plastic usage, excluding harmful plastics. The success of a global treaty, he argued, hinges on the availability of robust data to identify targeted plastic products and assess the impact of policy measures.

Christoffer Vestli, representing the European Commission, reiterated the significance of data in identifying feasible policies. The EU early warning system on packing waste targets shows that especially on plastic packing, most of the member states are at risk of missing the target. He pointed out the current discrepancies in studies estimating plastics consumption, waste generation, and recycling, emphasizing the need for accurate and comprehensive data. Vestli highlighted potential data needs for technical negotiations on the global treaty, including information on products put on the market (polymers and chemicals of concern), high-impact consumption sectors, and trade flows for both plastic products and waste. The call from both WWF and the European Commission resonates: a global treaty to combat plastic pollution requires a solid foundation of accurate and standardized statistics to inform and evaluate effective policies.

### 3.4. Plastics in the Nordics – experiences from mapping plastic flows

The current lack of standardized methodology for mapping plastic flows in different countries makes comparisons less useful and aggregation to regional and global inventories burdened with uncertainty. Several Nordic countries have attempted to map the flow of plastics in their countries<sup>[4]</sup>. These attempts to map plastic inventories revealed critical knowledge gaps along the value chain described in figure 5. The gaps include double counting, large data gaps, variation in conversion factors from items to plastic fraction and polymer composition, and little transparency on the process losses along the value chain.



**Figure 5:** Summary of identified knowledge gaps and challenges found in attempts to map the national inventories of plastics in the Nordic countries.

Source: Danish, Swedish and Norwegian statistical agencies

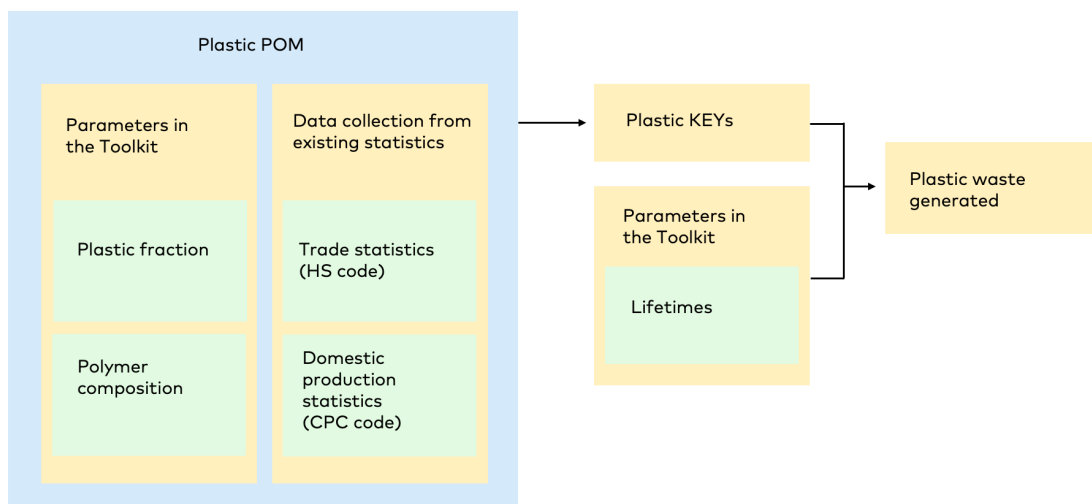
4. Norway, 2023, Statistics Norway, Report: Plastic Account for Norway: ([ssb.no](https://ssb.no))  
 Sweden, 2020, Naturvårdsverket, Report: Kartläggning av plastflöden i Sverige: Rapport 7038. Kartläggning av plastflöden i Sverige 2020. ISBN 978-91-620-7038-0 ([naturvardsverket.se](https://naturvardsverket.se))

Denmark, 2021, Statistics Denmark, Report: Accounts and indicators for Danish plastic flows: Microsoft Word - Final report 2021\_Master.docx ([dst.dk](https://dst.dk))

### 3.5. UNITARs Plastic KEYS – a step in the right direction

Ongoing work by the UN could greatly help with several of the issues that the Nordic countries pointed out in their plastic flow analyses. The United Nations Institute for Training and Research (UNITAR) is currently developing statistical guidelines for plastic flow and plastic monitoring within the sustainable cycles programme (SCYCLE<sup>[5]</sup>). Their Plastic-KEY is a classification system that contains information about the plastic content and polymer composition of a range of products. It is also made to help map the links between plastic consumption and waste management. The Plastic-KEYs include finished plastic products and plastic *containing* products in which plastic is used as a component together with other non-plastic materials, such as in vehicles and electronics. The keys can be aggregated into eight groups: packaging, transport, building and construction, electrical and electronic equipment, consumer and institutional products, industrial machinery, textiles, and other. Statistically, Plastic-KEYs can be used to collect and compile the statistical data from different sources on plastic flows along the life cycle, to model and assess the plastic waste generated, and to estimate the amount of different polymer types in plastic products from different economic sectors.

UNITAR has created a plastic toolkit based on Plastic-KEYs, as shown in figure 6, with built-in models to calculate plastic put on the market and plastic waste generated, by polymer type and by economic sector. The necessary parameters embedded in the toolkit include plastic fraction, average weight, polymer composition, and expected lifetime for products.



**Figure 6:** The basics of the Plastic-KEYs toolkit to help estimating plastic waste amounts generated

Source: UNITAR



## 4. Results from the workshop

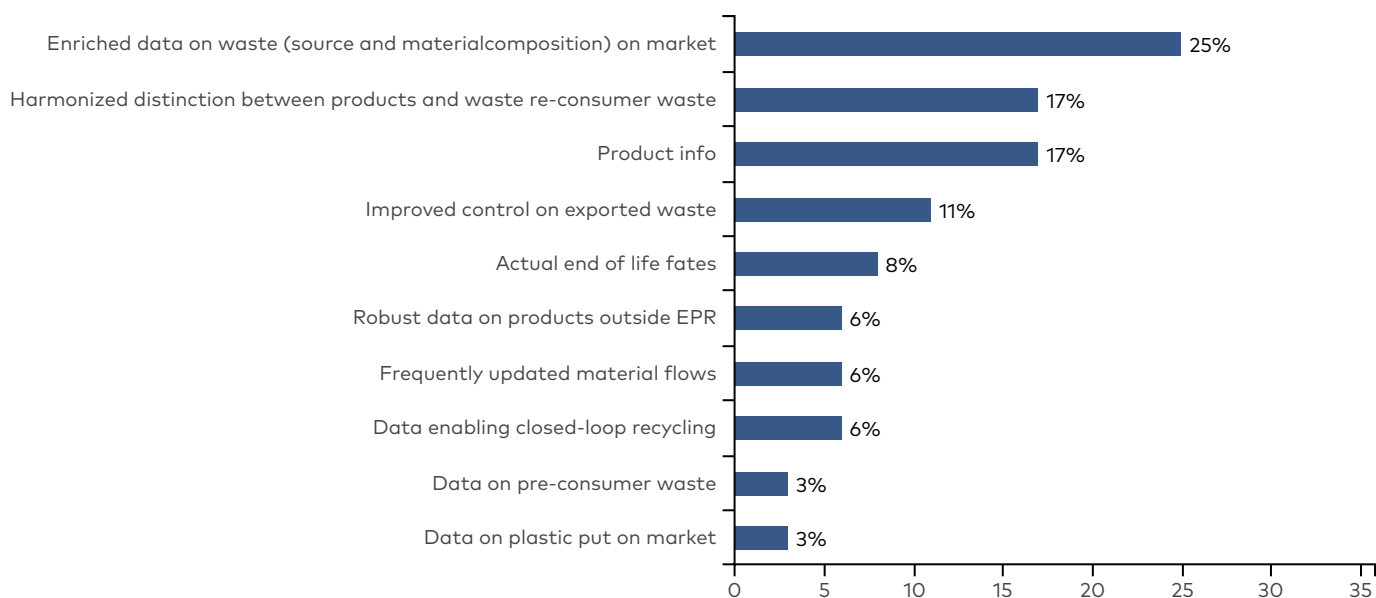
### 4.1. Workshop in Oslo, February 2024

On February 6<sup>th</sup> and 7<sup>th</sup>, technical experts from the statistics agencies, customs offices and environmental agencies in the Nordic countries were invited to a workshop in Oslo. The aim of the workshop was to 1) identify the most important statistical information to include in national inventories and 2) critical knowledge gaps and potential solutions to barriers against improved data collection and quality. Representatives from WWF, OECD, the European Commission, Eurostat, UNITAR and Statistics Norway gave short presentations to the group. This was to highlight global needs for improved data, ongoing work to strengthen product information regarding plastics, and experiences from preliminary analyses of plastic flows globally, in Europe and in the Nordics.

### 4.2. Important statistical information to include in national inventories

During the workshop the technical experts collaborated in groups to identify the most important statistical information to include in national plastic inventories. The group of technical experts that participated in the workshop were asked to list and prioritise what they saw as the most important statistical information to include in national inventories. Following this, the suggestions underwent a group-wide voting process to determine their perceived importance. The results of the vote were as presented in figure 7.





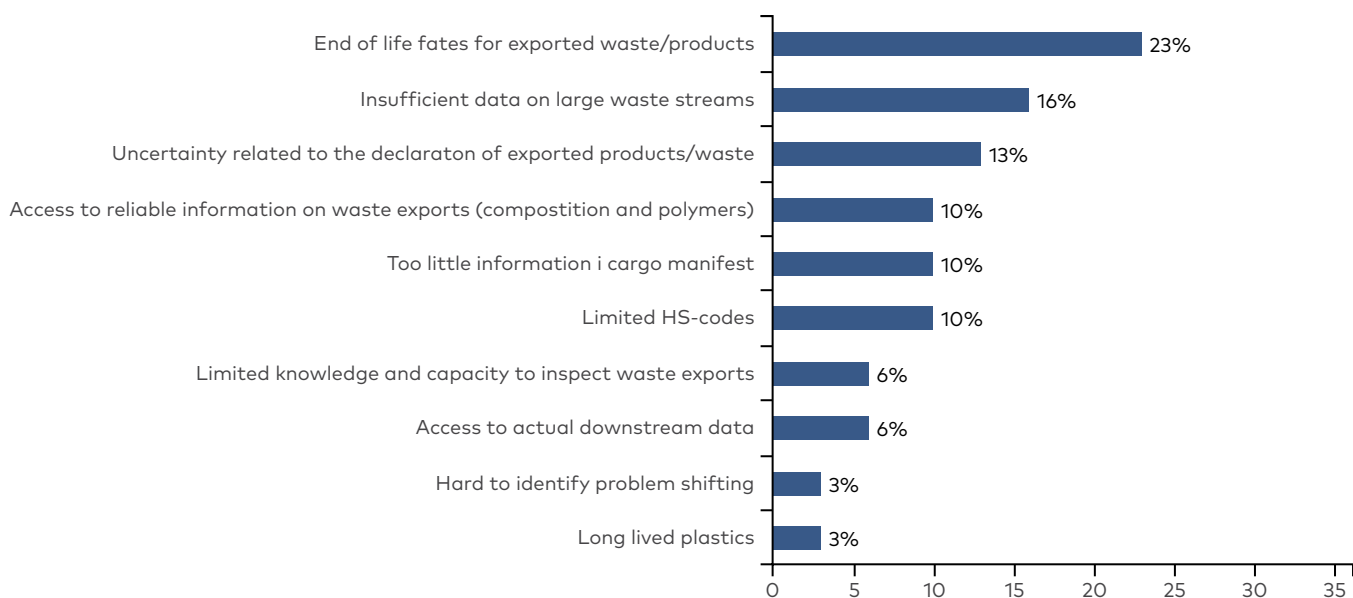
**Figure 7:** Most important statistical information to include in plastic inventories.

Source: *Prioritization among the workshop participants (06.02.24)*

The elements they highlighted coincided well with the data needs globally as expressed by the WWF and the European Commission; global plastics statistics that *enable design of effective policies and data to measure their effects* require reliable information about the composition and plastic shares of products that eventually become waste, standards to connect products and waste, and shared information so we know what exported waste consists of and its actual end-of-life fate. Harmonised product and waste codes, statistical definitions and categories are central to achieving that vision.

### 4.3. Key knowledge gaps

With a clearly defined vision for global plastics statistics, we continued to pinpoint critical knowledge gaps and issues related to data collection and quality that need to be solved to achieve the vision. Participants collaborated in groups to identify the most critical challenges based on their work with various parts of the plastic value chain. Again, the group as a whole voted to prioritise the problems by the importance of solving them. The results of the vote were as presented in figure 8.



**Figure 8:** Most critical challenges based on their work with various parts of the plastic value chain.  
*Source: Prioritization among the workshop participants (06.02.24)*

These identified main challenges were grouped into nine, clearly defined problems.

1. Waste exports information need
2. Waste export control and inspection
3. Waste export end-of-life fates
4. Product plastic shares, additives and polymers
5. Lacking data on large waste sources
6. Lack of frequently updated data on plastic products and waste
7. Lack of data to enable closed loop recycling
8. End of life fates
9. Double counting semi-finished/finished products

The workshop participants were lead through a dedicated problem-solving exercise to break these main problems into more clearly defined sub-problems, define barriers to solving them along with potential solutions.

### 4.3.1 Waste export (information need)

The information on transboundary waste shipments is insufficient and not easily accessible for analysis. This leads to uncertainties on actual waste export for statistical purposes, but it also makes it more difficult to ensure sufficient supervision of waste transports.

It is hard for exporters to classify plastic waste and plastic containing waste shipments of which most consists of mixed materials, within the limited HS-codes for plastic waste<sup>[6]</sup>. While exported products and waste are followed by notification documents,<sup>[7][8]</sup> these are not digital nor searchable. This makes them unsuited for statistical purposes.

Another issue arises when waste is intentionally or unintentionally misclassified as products<sup>[9]</sup>. While competent staff can reclassify the shipment, this requires thorough inspections.

The key to improved shipment classification is collaboration within the EU, which is partly achieved through new regulation on waste shipments<sup>[10]</sup> and common digital solutions<sup>[11]</sup>. The collaboration should also include guidelines on how to use HS-codes for different waste shipments to ensure comparable and more accurate registrations within the limitations of existing HS-codes. There is a potential for enriching the data within the EU/EEA with content, composition, source, and structural Annex 7 data. Currently, the European Union Joint Research Center (JRC) is drafting harmonized end-of-waste criteria for plastics. The goal is to establish a clearer distinction between products and waste. The new regulation on waste shipments can be supported by legal acts addressing specific categories of concern. The Nordic countries should ensure that Nordic customs authorities can actively participate in consultations to provide insights on current challenges.

#### Waste export (information need)

**Barriers:** Insufficient HS codes and searchable accessibility to annex 7 information for statistical and surveillance purposes.

**Solution:** Amended in new regulation of waste shipment, however it is crucial (for a Nordic custom-authorities working group) to closely follow up the implementation to ensure that common digital solutions enable sufficient searchable information and efficient, structural data.

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6. PE (39151000), PE (39152000), PVC (39153000) and other polymers (39159000).

7. [Notif-Form-EN-28-6-07.pdf \(waste-move.eu\)](#)

8. <https://www.miljodirektoratet.no/sharepoint/downloaditem/?id=01FM3LD2XDFZ7LNZL4SFH3QFYAW6ARK5DK>

9. This applies to a variety of problematic products, such as textiles, used fishing-equipment, artificial turf and electronic products.

10. [Proposal for a new regulation on waste shipments - European Commission \(europa.eu\)](#)

11. WSR Central System

### 4.3.2. Waste export (control and inspection)

To ensure legal cross-border movement of waste, effective supervision is key. There is enhanced surveillance of shipments, channels and times that are flagged as high-risk. However, customs authorities often indicate that they lack sufficient capacity, knowledge, and tools to ensure that the content of the shipments corresponds to the shipment registrations. Customs authorities believe that more standardization on timing and content for control and inspections within the EEA/EU would ensure sufficiently thorough and consistent inspections.

Actors that intentionally undeclare goods or provide false declarations, may also use unregistered modes of transport that evade customs. An unknown number of such transports may pass through channels that are surveyed, such as passenger ships. To address this, additional measures and effective international cooperation is needed. There is also a potential for collaboration with the private entities that provides the shipments, creating risk profiles and stopping orders for customs based on passenger lists, type and weight of vehicle, and frequency of border-crossings.

Effective supervisions are standardized, unannounced and unpredictable to those being checked. To achieve this, it is essential to have sufficient surveillance capacity. This includes available training for the supervision officers in the frontline to ensure their capability to detect product and waste types, polymers, contamination, and threshold values for classification. Methods and entities should be aligned for reporting illegal exports between the Nordic countries or within the EEA/EU, with jurisdiction for filings within the customs authorities. Radiation scanners, weights, and NIR-scanners (for detecting polymers) could greatly help surveillance officers. There is also great potential in AI image recognition and handling of big data. All should be subject to collaboration on EU-level. The Nordic countries should ensure that Nordic customs authorities can actively participate in consultations to provide insights on current challenges.

#### **Waste export (end-of life fates)**

**Barriers:** Unsatisfying content control of waste shipments out of the EEA/EU

**Solution:** Partly addressed through the new regulation of waste shipment, however it is crucial (for a Nordic custom-authorities working group) to closely follow up the implementation and ensure that experiences from the frontline and unfortunate deviations are addressed by measures or new underlying legal acts.

### 4.3.3 Product plastic shares, additives, and polymers

A key knowledge gap is that there is insufficient data on product plastic shares, weight, additives, and polymers. This implies that there is a great uncertainty attached to estimated material flows on plastics, and large and unknown variations in which assumptions estimates are built upon. For comparable data we would need the assumptions to be harmonized on an international level. However, data would need to be dynamic over time and regions to ensure that the effect of measures and policy tools are measurable.

Common standards would make statistical efforts more efficient and statistics more comparable. Securing funding and allocating responsibility are essential for this effort. Reporting schemes and methodologies that address region- and product-specific characteristics at an appropriate level need to be established. These measures collectively contribute to creating an effective management tool.

UNITARs Plastic-KEYs address the problem by defining a common classification system that would make international comparable estimations on plastic put on the market and plastic waste generated. The key would also help to estimate plastics embedded in different products such as textiles. Additionally, the new product pass, required under the new EU eco-design regulations may provide continuously updated information on materials, polymers, and additives in different products.

A collaboration between UNITAR, EEA/EU and the Nordic countries could provide valuable synergies that could provide a foundational database and harmonized assumptions that the rest of the world to build upon.

The Nordics should follow closely the work done in UNITAR and identify where additional work on the Nordic level would be needed. The designated collaboration should include statistical agencies and custom authorities to work in close cooperation with UNITAR and the EEA/EU to ensure funding and insights for developing the Plastic-KEYs in general, with also information on additives and Nordic/EU-specific adaptations.

#### **Product shares, additives, and polymers**

**Barriers:** Insufficient information and large variations in assumptions on products plastic shares, additives, and polymers.

**Solution:** Addressed in UNITARs work on Plastic-KEYs on finished products (plastic and plastic containing products), however the Nordic countries can assist in developing the keys in general and Nordic-specific adaptations.

#### 4.3.4. Lacking data on large waste sources

The OECD's Global Plastic Outlook clearly shows the global dominance of packaging as the primary application for plastic use, followed closely by construction products<sup>[12]</sup>. This pattern aligns with the findings from Eurostat's material flow analysis in Europe<sup>[13]</sup>. Packaging is subject to relatively heavy regulation and reporting in Europe, benefiting data collection and quality. However, a critical knowledge gap persists concerning plastic use and waste from other significant sources, such as construction and industry.

Participants in discussions identified reliable data for large waste sources as a substantial knowledge gap. The technical experts pinpointed three subproblems: insufficient knowledge on tonnages, waste treatment and waste composition. It was pointed out that while estimates of total volumes exist, uncertainties arise, especially in tonnages for small industries. The group focused on waste composition as the most critical knowledge gap, as knowing what the waste streams contains is critical to know more about the status and potential for improved waste treatment.

A significant barrier to improving knowledge lies in the absence of a harmonized methodology for waste analyses and lacking reporting requirements. Participants emphasized the success of collaborative efforts in addressing similar issues when reporting on municipal waste and recycling rates. A proposed solution involves establishing a Nordic working group to harmonize methodologies for waste analyses, with a specific focus on large waste streams.

##### **Data on large waste sources (industry and construction)**

**Barrier:** Insufficient data on composition, tonnages, and waste treatment due to a lack of common standard for waste analysis method

**Solution:** Nordic working group with mandate to harmonize method.

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12. OECD 2022 – Global Plastic Outlook (2022). Plastic flows were modelled by the OECD using ENV-Linkages; their in-house dynamic computable general equilibrium model. Read more: <https://doi.org/10.1787/5jz2qck2b2vd-en>.  
13. Interview with Oscar Gomez, February 2024.

### 4.3.5. Lack of frequently updated data on plastic products and waste

The effort to enhance plastics statistics faces a critical challenge in the lack of detailed and frequently updated national data on plastic products and waste. The participants pointed to a sub-problem of constraints on data collection facing national statistics agencies operating under the European Statistics Code of Practice<sup>[14]</sup>.

The Code necessitates a careful balance between non-excessive burden on respondents and a commitment to quality where statistical authorities *systematically and regularly identify strengths and weaknesses to continuously improve process and output quality*. To achieve this, statistics offices are encouraged to promote, share, and implement standardized solutions that enhance effectiveness and efficiency in data collection.

While automation and data integrations can streamline reporting for businesses and industries, the group pointed to barriers in the lack of incentives and interest for private companies to build automated data flows with the purpose of strengthening national statistics. Another barrier is that different user groups require different data quality and content. An example was brought up where reporting is done in data format of own choice, also as attachments, leading to time consuming data cleaning for statistics agencies before the information could be used to meet quality requirements for national statistics. This also affects comparability of data.

A potential solution involves reporting requirements that are explicit about data format and data types allowed, and that private-public collaboration could help by providing integrations with business systems to eliminate the need for imputing data manually. Emphasizing the use of electronic means for data return, as suggested by the Code of Practice, can significantly improve the efficiency of data collection processes.

#### **Lack of frequently updated data on plastic products and waste**

**Barrier:** Insufficient incentives to report on desired format and constraints on data collection in European Statistics Code of Practice

**Solution:** Reporting requirements and industry initiatives for software integrations and agreeing on standard reporting format

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14. European Statistical System Committee (2017) – *European Statistics Code of Practice – revised edition 2017*. Link: <https://ec.europa.eu/eurostat/web/products-catalogues/-/ks-02-18-142>

#### 4.3.6. Lack of data to enable closed loop recycling

Most of today's recycling of plastic materials is downcycling. High quality recycling requires high quality information, sorting, and recycling technology. Currently we have a restrained willingness to invest in sufficient infrastructure and capacity throughout the value chain to sort out and recycle different polymers, due to lack of predictable and robust framework conditions, leading to an insufficient access to and quality of the feedstock and secondary raw material. There are also issues with unnecessarily low quality of the feedstock due to mixed materials, low levels of sorting, contamination, and lack of design for recyclability of products.

The material flow faces obstacles due to a market that still has significant room for improvement. Strengthening the link between supply and demand should ensure that secondary plastic of right quality can be provided as raw material to manufacturers with corresponding quality requirements. The lack of information on source, use and material characteristics related to different waste streams makes it difficult to secure the value chain where the quality of the feedstock is sufficient.

To improve the prerequisites for a functional market, we need to improve the product design for high quality recycling through guidelines developed through collaboration among actors throughout the value chain. We suggest for a designated taskforce on EU/EEA-level to ensure that the different part of the value-chain may share insight, information, and needs. This collaboration may also assess whether EPR can be a tool for improved closed-loop recycling for bigger industries or other product group. Additionally ensuring the link between feedstock to potential recyclers and potential producers with a need or opportunity for the use of secondary raw materials, should be better linked through EU/EEA-cooperations.

Regulatory incentives should be in place to ensure that high quality recycling is not treated equally to downcycling. Such incentives could include, for example requirement for mandatory minimum content of recycled plastic, high taxes on fossil fractions sent to incineration, removing barriers and aligning regulatory framework for cooperation between industry and municipal waste, as well as within the EU/EEA borders. The product passes might also be a valuable part of the solution on the information needs for closed loop recycling if information of polymer composition, source and former use are included.



### Enabling closed-loop recycling

**Barrier:** Insufficient information and link between supply and demand. Insufficient access to quality feedstock, infrastructure for sorting and recycle technology.

**Solution:** Linking feedstock of plastic waste, secondary raw material, and producers. Increasing economic incentives for increased flow throughout the value chain, from waste to recycled material into products designed for recycling.

### 4.3.7. End of life fates

Data on the end-of-life fate of exported waste is notably scarce. However, there is also a general lack of methods and comparable data for the end-of-life fates of plastic waste for non-exported waste. The Global Plastics Outlook indicates that as much as 21% of plastic waste is mismanaged, but in general, data on mismanaged waste are very uncertain. This is true also in the OECD and in the Nordics, where for instance data on littering lacks systematic and comprehensive collection and reporting.

Workshop participants highlighted two major issues: the widely varying reporting methods on recycling rates and challenges in collecting and ensuring the quality of data on littering. The Nordic countries are now collaborating on harmonized methods for reporting on municipal solid waste, including recycling rates<sup>[15]</sup>. The mapping of mismanaged plastic waste, however, faces a clear barrier in financial constraints and methodological challenges. One proposed solution is to enhance reporting on both products put on the market and waste streams. By doing so, the application of material flow analysis principles can estimate the residual plastic leakage from the system, offering a more comprehensive understanding of mismanaged plastic waste.

### End of life fates

**Barrier:** Difficult and expensive to undertake comprehensive and frequent mapping, as well as harmonised recycling rates of different waste streams

**Solution:** Strengthening reporting on waste to controlled waste treatment. Mismanaged waste can be calculated as residual in the material flow.

#### 4.3.8. Double counting semi-finished/finished products.

Accurately mapping the material flow of plastics in a country poses a challenge due to the potential double-counting of semi-finished and finished products. The categorization of plastic at the product level relies on three overarching categories, derived primarily from the structure of the CN nomenclature:

- Primary plastics
- Semi-finished and finished plastic products.
- Plastic-containing products

However, the total plastic consumption in a country cannot be simply calculated as the sum of these categories. The boundaries between the three categories are often ambiguous. Zhjie Li from Unitar highlighted this complexity, illustrating that if a country produces plastic sheets from primary plastics and then manufactures laptops from those sheets, it results in double-counting when summing up the plastic sheets and plastic embedded in laptops to estimate the plastic consumption.

Denmark and Norway have addressed this challenge by categorizing CN codes as follows<sup>[16]</sup>:

- 39.01.00-39.14.99: Primary plastics
- 39.15.xx: Waste plastics (not relevant for products)
- 39.16.00-39.99.99: Semi-finished and finished plastic products

There is a clear need for an international standard to address potential double-counting or guidelines on utilizing the scope in Unitars' plastic KEYS, where only finished products are considered.

Standardization in categorization methods would greatly enhance the accuracy and comparability of plastic material flow assessments on a global scale.

#### **Double-counting semi-finished/finished products**

**Barrier:** Lacking guide on common methodology to use CN codes to separate semi-finished and finished products

**Solution:** 1) Only include either primary plastics or finished products or 2) create an international standard for instance based on the methodology followed by Norway and Denmark

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16. 39.12 and 13.13 are excluded as they comprise natural polymers or cellulose, not synthetic polymers.



# Recommendations for further work

## Enhanced cooperation of Nordic customs authorities to ensure:

- implementation of useful, enriched, and structural data on waste shipments in common digital system for European customs
- that experiences from the customs frontline is addressed during implementation of new regulation waste shipments and underlying legal acts, including sharing of risk profiles, unwanted incidents, and current problematic shipments.
- harmonization of supervision, risk profiles, categorization, data registration, investigation, and legal enforcement.
- collaboration on efficiency through implementation investments in technology, such as:
  - NIR-scanners and scanners
  - Data analysis and machine learning on structural data to improve the efficiency of inspections combining cargo-weight, information on exporters, data on waste photo recognition and radiographs etc.

## **Enhanced Nordic cooperation for statistical methodology:**

- to follow up on UNITARs work on plastic-keys and decide on how the Nordics best can contribute with data in general and Nordic-specific information.
- ensuring that the Nordics follow a common methodology on data reporting on
  - primary-, semi-finished- and finished-, waste- plastics.
- contributing to developing harmonized waste reporting, including common and fact-based recycling rates and rates on process-loss in the value chains.
- to map what data on waste from large industries that are easily available on what format to implement cost-effective, automated reporting schemes with sufficient data collection and reporting requirements.
- to standardize methods for waste analysis to get better insight into large waste streams like the construction sector and industry.

## **Enhanced Nordic cooperation on environmental agency level to ensure:**

- product passes provide more information on polymer composition, additives, source and use throughout the value chain to enable closed loop recycling.
- measures are implemented to improve information flow and connect providers and demanders of plastic feedstock and recycled plastic with matching needs.
- supporting the need of improved incentives for recycled plastics



# Attachments

## Participants in the workshop

Country	Authority
Sweden	Environmental authority
	National supervisory coordinator for cross-border waste transports
	Customs
Denmark	Environmental authority
	Customs
Finland	Environmental authority
	National statistical agency
Norway	Environmental authority
	National statistical agency
	Customs
Others	Mepex Consult AS
	Eurostat
	UNITAR
	OECD Environment Directorate
	European Commission
	WWF

# About this publication

## Better and harmonized statistics on plastic material flows

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Carl Frederik Mørch-Kontny and Elise Narum Amland, Mepex Consult

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The Nordic Council of Ministers  
Nordens Hus  
Ved Stranden 18  
DK-1061 Copenhagen  
pub@norden.org

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