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Textile waste management in Europe's circular economy

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1 Introduction

This report is a continuation of the work on textiles in a circular economy by the European Environment Agency (EEA) and its European Topic Centre on Circular Economy and Resource Use (ETC CE), which started with the 2019 EEA briefing and underpinning ETC CE reports on textiles and the environment in a circular economy and was followed up by other reports and briefings, most recently the 2022 briefings and reports on design for circularity and microplastic from textiles consumption in Europe, the 2023 EEA briefings and ETC CE papers on bio-based textiles and exports of used textiles and the 2024 EEA briefing and ETC CE report on the volumes and destruction of unsold and returned textiles. Together, these reports provide necessary knowledge for the transition to a circular textiles' economy in the EU.

This report provides an overview on the current state of textile waste generation, collection systems, treatment capacity and trade, and serves as a preview in terms of the preparatory measures undertaken by the various EEA member countries in response to the forthcoming legislation. It largely builds upon information received from the EEA member countries to a questionnaire sent in June 2023 via the Eionet network to 30 countries and to which 27 countries responded[1]. The questionnaire, developed by the EEA and ETC CE, can be found in Annex 4. A draft of this report was sent for review to the EEA member countries in December 2023. 24 countries[2] provided feedback and additional information, which was incorporated into the report.

1.1 Key messages

- In 2020, a total of 1.95 million tonnes of textile waste was separately collected in the EU27. This corresponds to 4.4 kilograms per capita. On average, 11.6 kilograms of textiles and shoes per capita are present in the mixed household waste in the EU27. The estimated total amount of textile waste generated in 2020 in the EU27 is 6.95 million tonnes, corresponding to 16 kilograms of textile waste per capita.
- Post-consumer textile waste coming from household sources is the main source of textile waste generation in most countries. On average, post-consumer waste accounts for 82 % of all textile waste generated, household and non-household sources combined, followed by post-industrial waste (17 %) and pre-consumer waste (1 %).
- The collection of used textiles and textile waste occurs predominantly via bring points, regardless of the collector. Collection is often complemented with collection at civic amenity sites.
- The average capture rate for textile waste in Europe is only 12 %, which means that there is room for a lot of improvement of the separate collection system for textiles. Countries with the highest capture rate are Luxembourg (50 %) and Belgium (50 %), followed by the Netherlands (37 %) and Austria (30 %). Most of these countries provide a variety of collection systems across all levels of urbanization.
- In more than half of the responding countries the separate collection of textiles is already mandatory. However, in most countries separate collection is mainly aimed at the collection of the reusable fraction. Several countries await the outcome of the currently ongoing revision of the Waste Framework Directive concerning textile waste and have raised the ambiguities concerning the definition of textile waste. In some countries, the unmanned collection of used textiles is considered as waste collection, while in others, collection that is primarily focused on reuse is not defined as waste collection, regardless if this collection occurs via bring banks, drop-off locations or charity shops.

[1] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, Türkiye

[2] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Greece, Iceland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Romania, Slovakia, Slovenia, Sweden, Türkiye

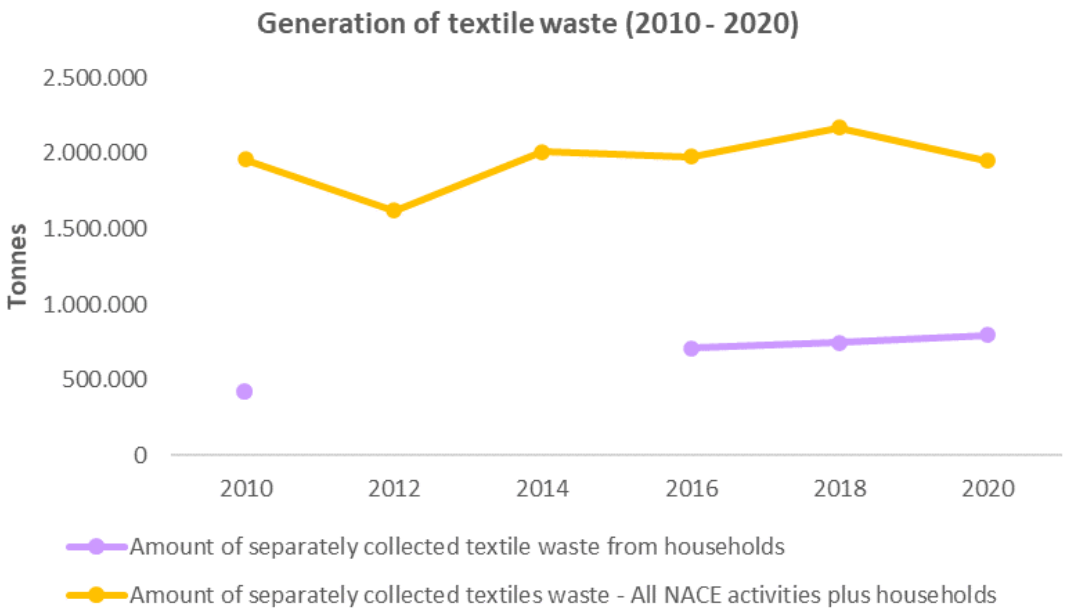
- Considering the prospects of collecting more lower-quality textiles, which might compromise the quality of the reusable fraction, it becomes increasingly more important to implement some form of sorting at the source, which is currently already implicitly implemented by some countries. This pre-sorting may occur through citizen education or by other means, however, the quality of reusable textiles needs to be safeguarded.
- By the end of 2023, EPR systems for textiles are only mandatory in France, Hungary and the Netherlands and voluntary in the region of Flanders (Belgium). Many responding countries indicate that they are conducting preparatory studies or drafting an EPR scheme, while other countries are awaiting the amendment of the WFD.
- In 2020, 1.41 million tonnes of textile waste were treated within the EU27, of which 72 % was recovered, e.g. recycled. While the amount of separately collected textile waste going to landfills decreased from 21 % in 2010 to 11 % in 2020, the amount of textile waste being redirected towards energy recovery increased from 9 % to 16 % during the same period.
- Receiving EU countries of exported used and waste textiles, exhibit a noteworthy share of textile waste going to landfills which emphasizes the concern that without timely capacity scaling, there is a risk of the undesirable scenario where substantial amounts of separately collected textile waste end up being sent to landfills or are incinerated.
- The variations in interpreting the definition of textile waste, emphasize the necessity for precise guidance to the Waste Framework Directive (WFD) regarding the differentiation between used textiles and textile waste. This clarification would foster a more uniform implementation and yield more accurate data on the generation of textile waste.
- Data inconsistencies arise due to varying interpretations of waste definitions, particularly concerning textiles. These discrepancies are largely attributed to the absence of specific reporting requirements for used textiles that are not considered as waste. While reporting on municipal waste amounts is mandatory, this obligation extends to municipal textile waste only if it falls under the waste classification. If used textiles are not regarded as waste, there is no corresponding reporting requirement. Secondly, reporting on treatment such as energy recovery and recycling etc. is mandatory, however, the reporting on separate collection and preparation for reuse, up till now, is voluntary. Standardizing and mandating reporting on these flows, would facilitate the identification of improvement potential in textile management across Europe and the individual countries.

2 Textile waste generation in Europe

In 2020, a total of 1.95 million tonnes of textile waste were separately collected in the EU27 (Figure 2.1). This corresponds to 4.4 kilograms per capita (Eurostat, 2023b). The data source used is the Eurostat dataset "Generation of waste by waste category, hazardousness and NACE Rev. 2 activity (ENV_WASGEN)". It is important to note that these data include all economic activities and waste generated by households in the EU27. In 2020, approximately 800 000 tonnes of textile waste were collected solely from households[3], which corresponds to 40 % of the total textile waste separately collected. These numbers, however, only consider separately collected textiles. Figure 1.2 provides a graphical overview of the used textiles and textiles waste flow, the scope of textile waste generation and the scope of the ENV_WASGEN dataset. This figure shows that only a part of total textile waste generation is covered by this dataset.

Although the amount of separately collected textile waste has remained quite stable since 2010, a drop can be observed in 2020 (Figure 2.1). It is to be expected that in response to the COVID-19 pandemic, which resulted in an overall decrease in the production and consumption of textile related products (ETC CE, 2022), the amount of separately collected textile waste also decreased. Without this drop, the separate collection of textile waste increased by 11 % between 2010 and 2018.

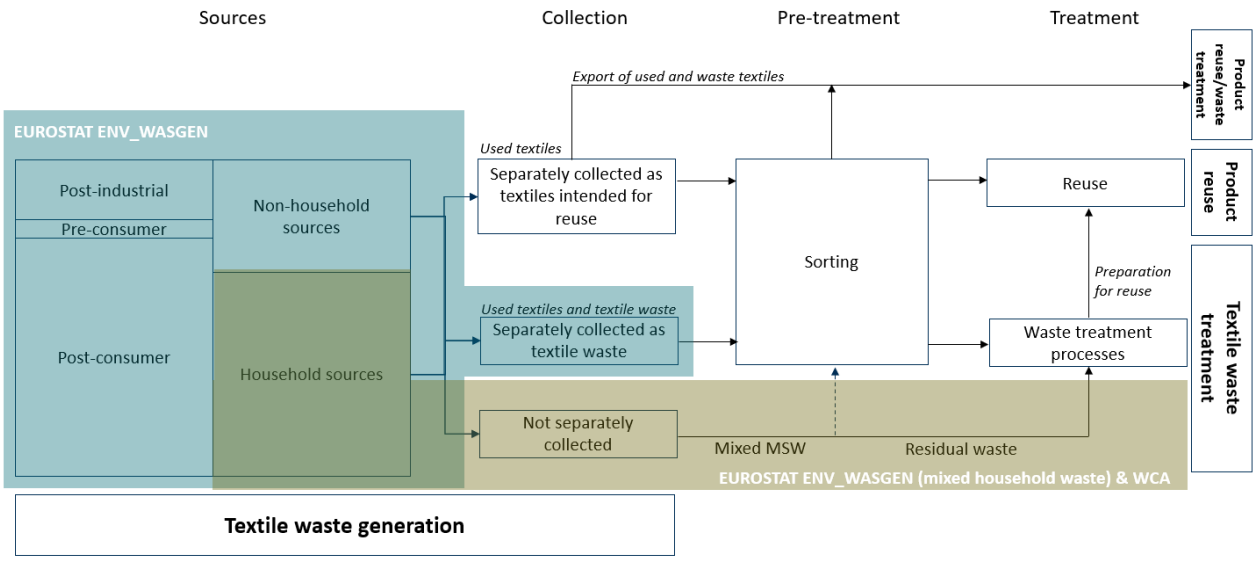
Figure 2.1 Amounts of separately collected textile waste (all NACE activities plus households) in the EU27 between 2010 and 2020, in tonnes



Source: Eurostat (2023b)

[3] Textile wastes from households are clothing, household textiles (e.g. bed linen, towels, curtains), accessories (e.g. scarf, belt) and footwear.

Figure 1.2 Material and product flows, scope of textile waste generation and existing datasets

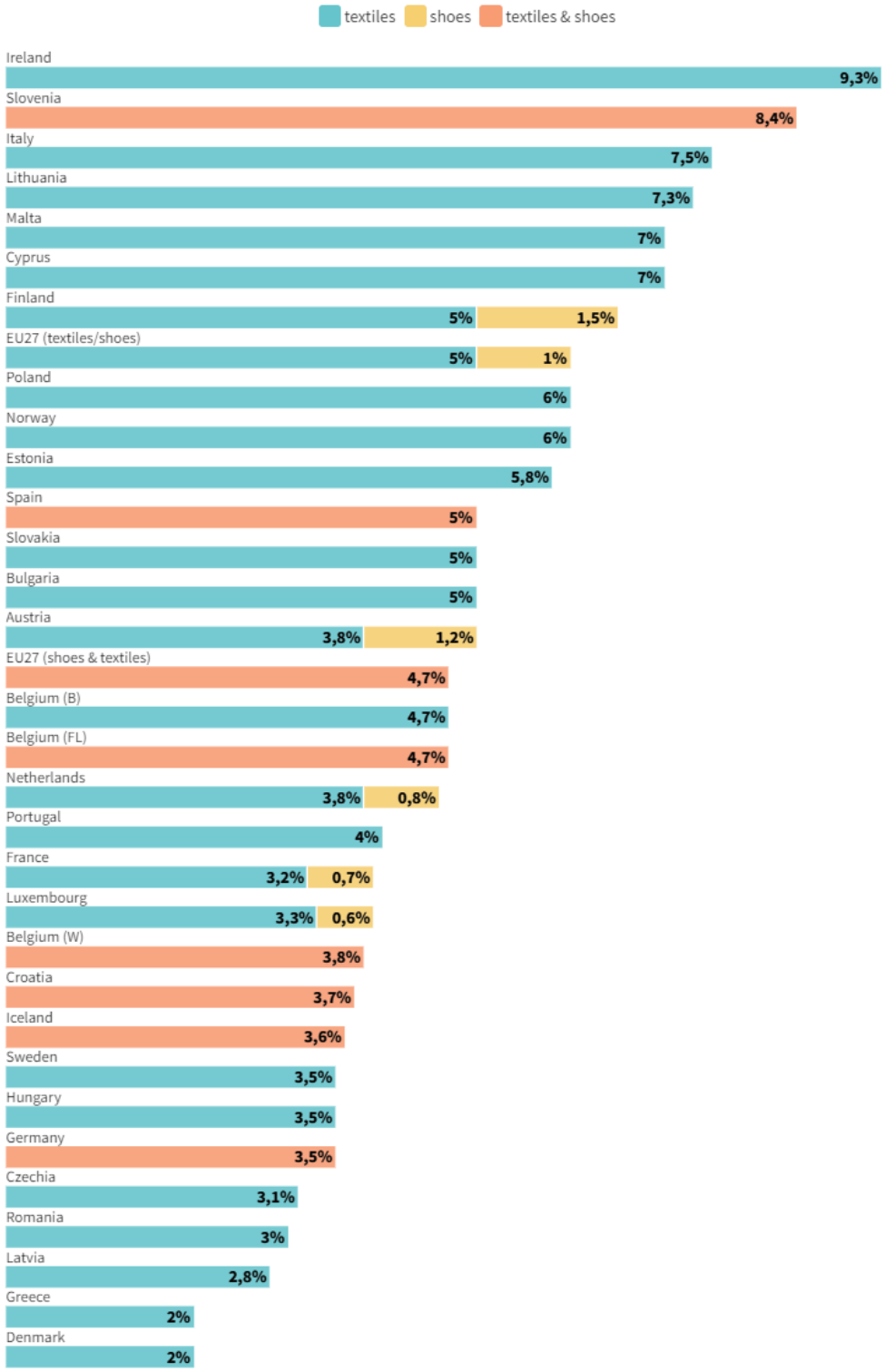


Source: ETC CE

In addition to the textile waste separately collected as textile waste and reported as generated to Eurostat, there are also textiles that end up in the mixed municipal waste (MSW) fraction. These textiles are not separately collected and are processed as residual waste (Figure 2.2). To get a more complete overview of the total amount of textile waste generated, the amount of textiles in the mixed municipal waste fraction also needs to be taken into account.

Figure 2.3**Error! Reference source not found.** gives an overview per country on the shares of textiles and shoes present in the mixed municipal waste fraction, based on a waste composition analysis (WCA) performed by the respective countries. Some countries report the shares of textiles and shoes separately or clearly indicate that the share includes both textiles and shoes, or that the share of shoes is unknown. In all other cases it is assumed that the share only comprises textiles. The highest shares of textiles in the mixed municipal waste fraction are found in Ireland (9.3 %) and Slovenia (8.4 %), the lowest shares in Denmark (2 %), Greece (2 %) and Latvia (2.84 %). On average, the share of textiles in the mixed municipal waste fraction is 4.7 %, for shoes this is 1 %. For the countries that combine textiles and shoes in the residual waste composition analysis, the average is 4.7 %. Note that the methodology of WCA is not standardized across countries. For example, the fraction to which this analysis is applied often varies between countries and the analysis is not done on a regular basis (Annex 1 – Overview of textiles and shoes in residual waste and calculation of capture rate). Hence, these numbers should be considered with caution and are merely estimates.

Figure 2.2 Share of textiles and shoes in the mixed municipal waste fraction



Source: information provided by the countries in the ETC CE questionnaire; graphic created with flourish.studio (https://flourish.studio).

Notes: 1) Türkiye did not provide numbers concerning the textiles waste fraction (based on WCA) in residual or household waste, therefore no amounts are depicted for this country.

2) WCA based on different reference years. Annex 1 indicates the reference year used per country.

Figure 2.4 illustrates the waste generation in 2020 per country, differentiating between separately collected textile waste from economic activities and households, together with the textile waste fraction contained in the mixed municipal waste from household sources, expressed in kilograms per capita. The data on the amounts of separately collected textile waste show a great difference between the countries, from as low as 1 kilogram per capita in Sweden, Finland, Hungary, Latvia, Greece and Ireland, to up to the separate collection of 15.5 kilograms of textile wastes per capita in Belgium (Eurostat, 2023b). Although the average in the EU27 is 4.4 kilograms per capita, the median is 3 kilograms per capita, indicating that the high numbers of Luxembourg, Czechia and Belgium impact the average collection of textile waste per capita. A general explanation for the large discrepancies between countries could originate from differences in the flows that are captured. For example, textiles collected for reuse might not be characterised as waste but as products. Furthermore, separate collection of textile waste will only become uniformly mandatory at the EU level from 2025 onwards. Hence in some countries, this has been an obligation for several years, while for others, like Finland, it is only recently implemented by national legislation. As the most recent data available primarily cover 2020 or 2021, this transition has not yet been reflected in Eurostat figures.

The amount of textile waste separately collected per capita in Belgium stands out in comparison to other the countries. A possible explanation given by OVAM, the Flemish public waste agency, could be a double counting of textile waste. Firstly counted as separately collected from households and, secondly, part of this fraction could be recounted as (secondary) textile waste generated during processing (e.g. sorting) and is reported as separately collected under NACE category 38[4]. Belgium reports a separate collection of textile waste of 3 kilograms per capita under this NACE category 38, while nine[5] other countries report only 1 kilogram per capita in this category and all the other reporting countries none.

In line with this, differences in numbers of separately collected textile waste could also result from the fact that there is no generally applicable definition of 'textile waste' laid down in EU legislation. This means that the stage at which used textiles are considered textile waste differs between Member States. Due to the voluntary nature of reporting on non-waste textiles, there are inconsistencies and gaps in datasets regarding reusable textiles. Moreover, this also results in a lack of comprehensive data on textile waste.

According to the definition of waste in the Waste Framework Directive (Article 3 paragraph 1), textiles become waste when the holder in fact discards, intends to discard, or is required to discard the textile product. However, when or at what stage textiles become waste can differ due to a different interpretation or implementation of this definition into national legislation. In line with this, the Commission and its Joint Research Centre (JRC) are currently working on the development of end-of-waste criteria for textiles.

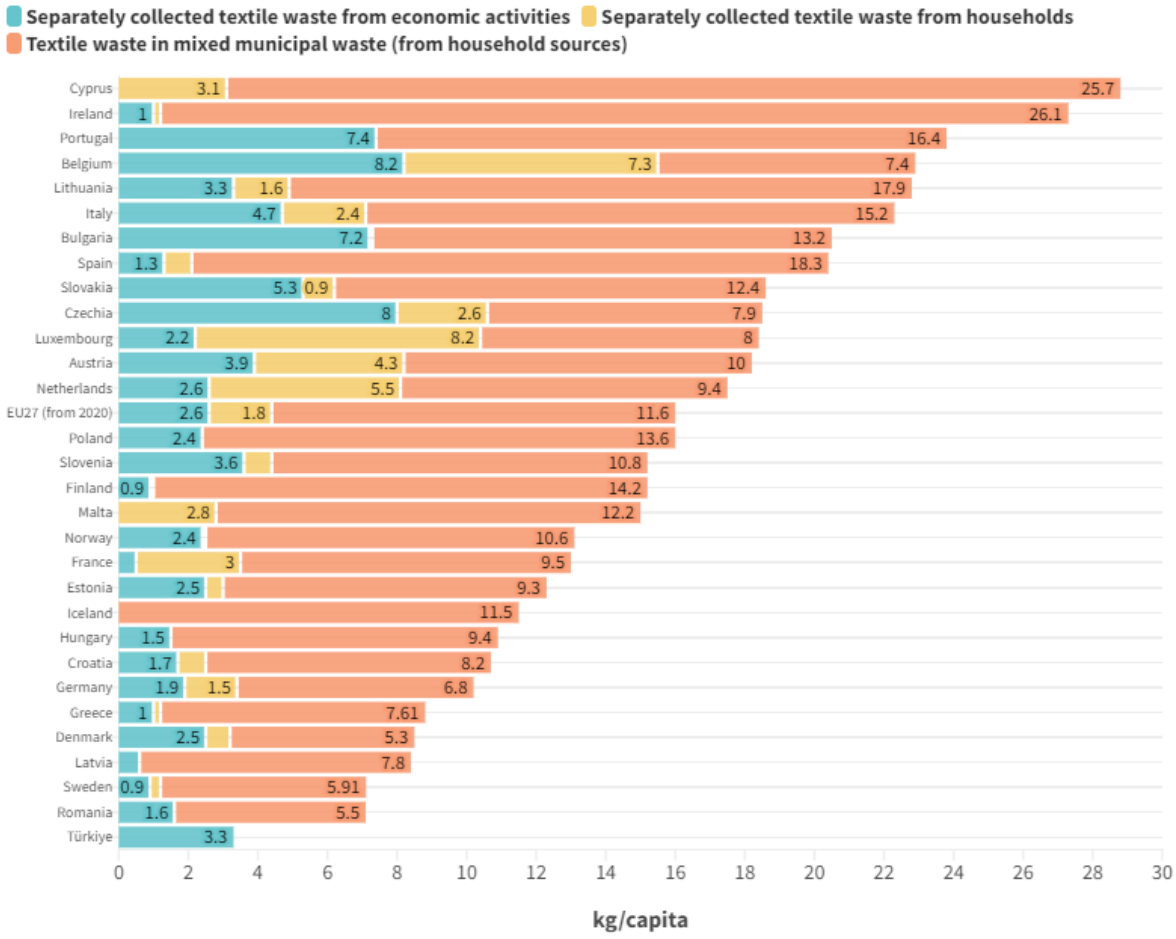
Based on the responses given in the ETC CE questionnaire, most countries consider textiles as waste when they end up in a collection container on the street, when they are (door-to-door) collected or when they are collected at a civic amenity site. After preparing for reuse activities, sorted waste could become a product again if it is considered suitable for reuse. Textiles donated directly to a non-profit or charity organisation or charity reuse shop are, generally, not considered as waste. In Slovakia and Iceland, however, used textiles are only considered as waste after sorting. In Sweden, the classification of used textiles as waste depends on the information provided on the collection bin. This might also explain the very low reported textile waste separately collected per capita in Sweden (Figure 2.4). The variations in interpreting the definition of textile waste, further discussed in the following chapter, emphasize the necessity for precise guidance to the Waste Framework Directive (WFD) regarding the differentiation between used textiles and textile waste. This clarification would foster a more uniform implementation and yield more accurate data on the generation of textile waste.

4 NACE category 38 reports textile waste generated in the following economic activity: 'waste collection, treatment and disposal activities; material recovery'

5 Czechia, Denmark, Greece, Italy, Latvia, Lithuania, Hungary, Austria, Portugal

In addition, Figure 2.4 gives an overview of the amounts of textiles and shoes in the mixed municipal waste from household sources per capita for 2020, calculated by applying the shares of textiles and shoes in the mixed municipal waste based on the waste composition analysis (Figure 2.3) to the amounts of mixed municipal waste from household sources as reported to Eurostat. On average, 11.5 kilograms of textiles and shoes per capita are present in the mixed municipal waste from household sources in Europe (EU27, Iceland, Norway). For the EU27, this corresponds to a total amount of textiles and shoes in the mixed municipal waste from household sources of 5 million tonnes, or 11.6 kilograms per capita. This is more than twice the amount of what is reported to be separately collected. Adding these volumes, the estimated total amount of textile waste generated in 2020 in the EU27 is 6.95 million tonnes, corresponding to 16 kilograms of textile waste per capita.

Figure 2.3 Generation of textile waste in 2020, in kilograms per capita



Source: Eurostat (2023b); Information provided by the countries in the ETC CE questionnaire; graphic created with flourish.studio (https://flourish.studio).

Notes: Amounts of separately collected textile waste from economic activities and households were obtained from Eurostat's ENV_WASGEN dataset. The amounts of textile waste in mixed municipal waste are estimations based on waste composition analyses (WCAs) and the mixed municipal waste from household sources. As there is no harmonised method for the WCA throughout Europe, caution should be taken when interpreting these numbers. Türkiye did not provide numbers concerning the textiles waste fraction (based on WCA) in mixed municipal waste, therefore no amounts are depicted for this waste category. Note that, due to a lack of capacity, Norway was not able to verify these data. Therefore data are calculated based on the residual waste composition provided in EEA's Early Warning assessment (EEA, 2022). Italy indicated that the amount from economic activities is an overestimation as this includes non-textile waste like scraps from leather manufacturing or secondary textile waste.

2.1 Sources of textile waste

The Eurostat 'ENV_WASGEN' dataset does not allow comparisons between post-industrial, pre-consumer and post-consumer textile wastes. For example, the NACE category 'Services' aggregates textile waste from retail and services, which means that this category includes both pre-consumer waste (e.g. unsold textiles) as well as post-consumer waste (e.g. textile waste from hotels and other services). In order to generate such a comparison, a breakdown according to type was requested in the ETC CE questionnaire to the Eionet Members. Eleven countries provided such a breakdown which can be found in Table 2.1. The different types are defined as followed (Huygens et al., 2023):

- post-industrial: textile waste generated during the manufacturing of textile products and their precursors;
- pre-consumer: textile waste generated at retail stages (e.g., unsold textiles);
- post-consumer from household sources: textile waste that has been disposed of after consumption and use by the citizen (excluding textiles for reuse);
- post-consumer from non-household or commercial sources: textile waste that has been disposed of by end-users of commercial and industrial activities (hotel, automotive, etc.).

Table 2.1 Breakdown according to type or source of textile waste generation by country

	Post-industrial	Pre-consumer	Post-consumer	
			Household sources	*Non-household sources*
Austria(1)	9 %	unknown	62 %	29 %
Belgium(1)	34 %	unknown	51 %	15 %
Czechia(1)	54 %		46%	
Italy(1)	35 %	6 %	48 %	11 %
Lithuania(2)	< 1 %	4 %	89 %	6 %
Luxembourg(1)	18 %	unknown	82 %	unknown
Netherlands(2)			65 %	35 %
Poland(2)	25 %	unknown	75 %	
Slovenia(2)	13 %	1 %	58 %	29 %
Spain(1)	2 %		98 %	
Sweden(1)	unknown	unknown	84 %	16 %
Average	**17 %**	**1 %**	**69 %**	**13 %**

Source: calculated based on what was reported in the ETC CE questionnaire by the respective countries

Notes: (1) data year 2020; (2) data year 2021.

The shares are calculated based upon the sum of the reported amounts only, neglecting the potential share of sources that were reported to be unknown or left blank in the questionnaire.

Data of Belgium only relate to data of the region of Flanders. Data of Austria includes only source separated collected textiles, excluding pre-consumer textile waste.

According to Table 2.1, post-consumer textile waste coming from household sources is the main source of textile waste generation in all countries, except in Czechia where post-industrial waste is the main type of textile waste. On average, post-consumer waste accounts for 82 % of all textile waste generated, household and non-household sources combined, followed by post-industrial waste (17 %) and pre-consumer waste (1 %). The breakdown according to shares of textile waste type, corresponds to what can be found in literature[6], although the size of the different shares varies. Data on the share of pre-consumer textile waste, which is textile waste generated at retail stages such as unsold textiles, are scarce and mostly unknown by countries. An estimated 4 to 9 % of all textile products put on the market in Europe are

[6] According to a mass flow analysis done by JRC in 2023, post-consumer waste accounts for almost 87 % of all textile waste, followed by post-industrial with 11 % and pre-consumer with 3 % (Huygens et al., 2023).

destroyed before use, amounting to between 264,000 and 594,000 tonnes of textiles destroyed each year (ETC CE, 2024). This would correspond to 3.8 and 8.5 % of textile waste generated.

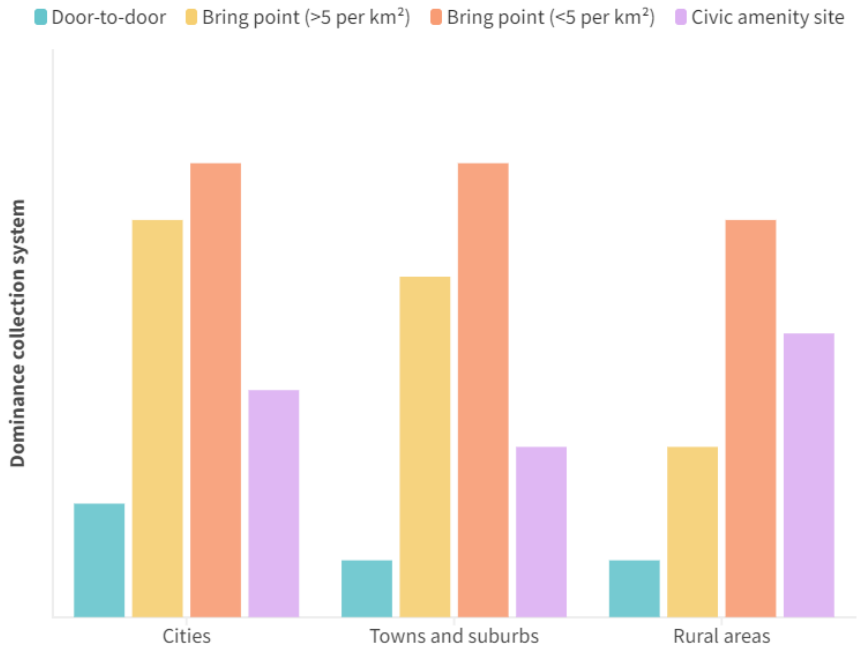
3 Current practices and perspectives on separate collection and management of textile waste

Impending legislation such as the Waste Framework Directive (Art. 11(1)), that requires mandatory separate textile collection from households throughout Europe by 2025, will drive the scaling of collection, sorting and recycling infrastructure across the EU. Inevitably, the mandatory collection of textile waste will be accompanied by the increased collection of low-value, non-reusable textiles. However, if capacities are not scaled timely this will result in the undesirable scenario of high volumes of textile waste and used textiles being separately collected only to become landfilled or incinerated together with mixed residual wastes or to be exported to Asia or Africa (ETC CE, 2023). Hence, the quantity of textile waste is predicted to increase while the quality of the collected textiles will decrease (van Duijn H. et al., 2022). In addition, while manual sorting is largely applied for reusable clothing, it may not be the most effective approach for textiles destined for recycling, especially if the identification of specific fibre types is required to enable high-quality chemical and mechanical recycling (Duhoux et al., 2021; Dahlbom et al., 2023). Hence, to ensure that low-value textile waste is efficiently and effectively recycled, scaling of automated sorting and sorting in general is also key.

3.1 Collection: current practices, challenges, and good practices

By means of ETC CE questionnaires sent out to the Eionet members, the current practices, shortcomings, and future perspectives in terms of textile collection and management were identified across the different EU Member States, Iceland and Türkiye. Overall, the collection of used textiles and textile waste occurs predominantly via bring points, regardless of the collector. Textiles collected by charities using bring banks, fit within the ‘bring point’ system. This collection is often complemented with collection at civic amenity sites. Figure 3.1 gives a graphical overview of the dominant collection systems for used textiles per degree of urbanisation. Door-to-door or curbside collection is less common across various countries and occurs only occasionally (e.g. quarterly) or on demand.

Figure 3.1 Dominant collection systems for used and waste textiles per degree of urbanisation



Source: information provided by the countries in the ETC CE questionnaire; graphic created with flourish.studio (https://flourish.studio).

Noteworthy is the recurrent practice of certain countries, such as Denmark, Belgium (specifically the Flanders region), Latvia, Slovenia, Slovakia, Finland, Estonia and Poland to have distinct collection systems in place for reuse and recycling. In most of these countries, textiles intended for reuse are collected by reuse actors such as charity organisations and are collected via special containers and reuse centers.

Collection through containers placed on collection yards of civic amenities are more likely to be regarded as textiles waste collection destined for recycling. In Denmark and Flanders, for example, the additional door-to-door separate collection run by municipalities is typically intended for textile waste for recycling, while containers from reuse actors at bring points or civic amenity sites serve to collect the reusable fraction, similar to the indoor collection organised by charities or social economy collectors in these Member States.

Each collection system has its own benefits and challenges. For example, indoor collection is the most suitable for the collection of high-quality, unsoiled textiles, suitable for reuse (Wagner J., 2022; van Duijn H. et al., 2022). However, the potential to obtain high collection volumes via this system is rather limited due to constraining factors such as opening hours and a smaller number of indoor collection points. Bring points typically collect large amounts of textiles, but, in contrast to indoor collection, there is a higher contamination risk (van Duijn H. et al., 2022). Contamination with damp textile waste or rainwater frequently results in mold, rendering textiles valueless for collectors. Especially because of the slim profit margins that often prevent the cleaning, washing, or drying of received textiles. Door-to-door collection, on the other hand, is associated with higher costs and theft risks (van Duijn H. et al., 2022). Consequently, bring points are generally regarded as the most suitable method to collect large quantities of used textiles with suitable quality (Wagner J., 2022). Nevertheless, additional factors besides the collection method such as location, collection frequency, container type, condition and labelling, as well as general communication regarding the collection of used textiles are key to improve the obtained collection volumes and quality.

In addition, collection via underfloor containers should be avoided for textile waste collection. Experience in the Netherlands has shown that the items become damp and musty and cannot be reused for the most part. Furthermore, the textiles collected through bring banks are typically taken out by hand and therefore they are subjected to an initial, on-site inspection, while this is not possible for underfloor collection systems (Wagner J., 2022; Nørup et al., 2019).

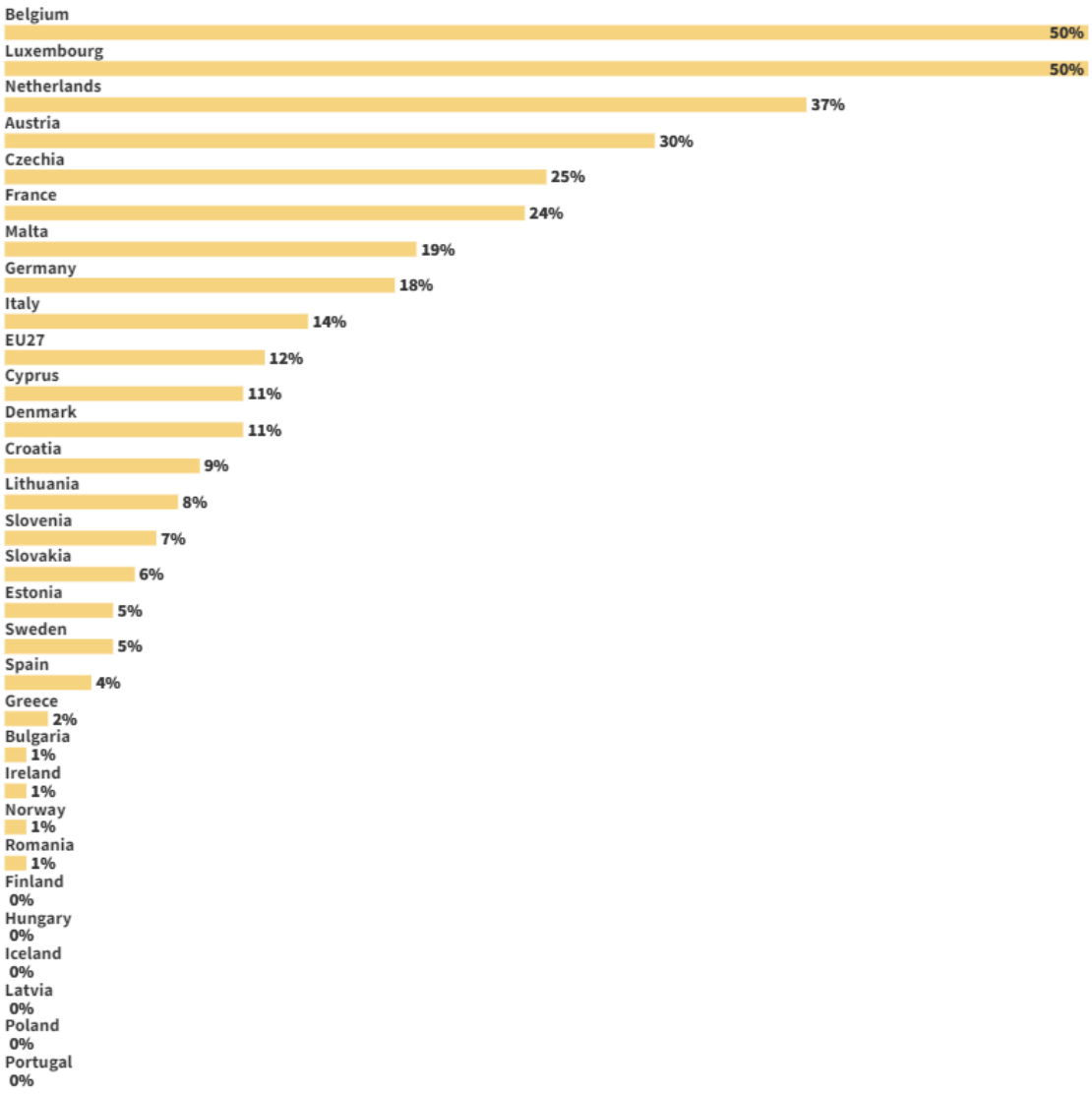
In Austria, different waste collectors offer detailed information regarding available collection points and reuse-shops on their websites. For example, via sachspenden.at citizens can find an overview of the drop-off points of social economy and charitable organisations throughout Austria.

In Flanders (Belgium), the local waste management program obliges municipalities to collect textiles door-to-door at least four times a year or to collect textiles via bring points (minimum 1 bring point per 1000 inhabitants). Additionally, used textiles and textile waste are collected in the civic amenity site.

A method often used for assessing the effectiveness of collection systems is to calculate the collection rate, which is defined as the total volume of used textiles collected separately, divided by the total quantity of textiles put on the market. According to available studies, the weighted average collection rate, based on data for 11 European countries, is 38 % of textiles put on the market (Köhler et al., 2021; van Duijn H. et al., 2022). However, this method fails to account for the complete amount of textiles that households own (*i.e.* household stock), as it only considers what is put on the market that specific year. Ideally, the collection rate should encompass the household textile stock (the textiles stored in households' closets), which could significantly reduce the collection rate (Wagner J., 2022).

Moreover, evaluating the efficiency of collection systems is more accurately achieved through the capture rate. This involves considering the amount of separately collected textiles in relation to the total amount of generated textile waste which consists of separately collected textile waste and textiles in the mixed municipal waste. The data needed to calculate the capture rate were received from the countries via the ETC CE questionnaire and taken from the Eurostat WASTE_MUNWDAT_A dataset. However, the reference years of the data often differed, and the Eurostat dataset often lacked data which made it difficult to make a comprehensive and consistent analysis. In order to do a consistent calculation of the capture rate, only data from the Eurostat ENV_WASGEN dataset were used. Annex 1 provides an overview of the data used for this calculation.

Figure 3.2 Overview of the capture rates for textiles and shoes per country, 2020



Sources: information provided by the countries in the ETC CE questionnaire; (Eurostat, 2023b); graphic created with flourish.studio (https://flourish.studio).

Note: in this figure, the capture rate for textiles and shoes is calculated by dividing the amount of separately collected textile waste from households by the sum of the amount of separately collected textile waste from households and the amount textile waste in the mixed municipal waste from households. The latter is calculated based on waste composition analyses performed by the countries. As there is no harmonised method for the WCA throughout Europe, caution should be taken when interpreting these numbers.

Figure 3.2 shows the capture rate for each country for which the required data were available[7]. The average capture rate for textile waste in Europe is only 12 %, which means that there is room for a lot of improvement of the separate collection system for textiles. Countries with the highest capture rate are Luxembourg (50 %) and Belgium (50 %), followed by the Netherlands (37 %) and Austria (30 %). Most of these countries provide a diversity of collection systems across all levels of urbanization.

Based on the information collected in the context of the European Environmental Agency's Early Warning assessments carried out between 2020 and 2022, a high share of the population is covered by high convenience collection services for used textiles in Austria, Germany, Belgium (Flanders) and Luxembourg

[7] The data to calculate the capture rate can be found in Annex 1

(EEA, 2022). For France, Czechia and the Netherlands a low population coverage is indicated by the Early Warning assessment as these countries did not provide high-density bring points (>5 per km²) or door-to-door collection (EEA, 2022). Nevertheless, based on the ETC CE questionnaire, Czechia nowadays offers, besides low-density bring points (<5 per km²) and collection at civic amenity sites, high-density bring points in cities at all urbanization levels and in rural areas these services are complemented with door-to-door collection. Similarly, the Netherlands and the Walloon region of Belgium seem to have expanded their collection systems by introducing high-density bring points (ETC CE questionnaire, 2023).

With regard to the population coverage of the separate collection system, eight countries (Austria, Belgium (Flanders), Denmark, Finland, France, Germany, Poland and Slovenia) indicate to have full (100 %) coverage. Nevertheless, this parameter is rather open for interpretation and high population coverage does not necessarily correspond to a high area coverage or convenience level. For example, in some countries a 100 % population coverage is reported when separate collection is facilitated by containers on civic amenity sites to which, in theory, all citizens have access. In practice, citizens often need transport to reach these sites which is not always at their disposal. Overall, the collection system is likely to capture more used and waste textiles if it is conveniently located and easily accessible for citizens in terms of distance, opening hours, cleanliness etc. (Watson et al., 2018). In order to obtain a good population coverage, the Belgian regions apply the rule of one street container per 1,000 inhabitants[8] or 2m^3 per 1,000 inhabitants[9] or 1 bubble[10] per 1,000 habitants[11]. Cyprus indicates to have an average of 151 bring points per 100,000 inhabitants.

It should be noted that the collection of used textiles, and reusable textiles in particular, still has a substantial social dimension. As stated in the EU's Circular Economy Action Plan, non-profit organisations and social enterprises play an important part in the circular economy. Indeed, more than 50 % of the responding countries mentioned charitable organisations and social-economic enterprises as collection actors, specifically for those textile products fit for reuse. Moreover, Austria, Belgium (Brussels and Wallonia), Czechia, Iceland, and Sweden explicitly mentioned that these are considered the main collection actors (ETC CE questionnaire, 2023). In Belgium (Wallonia), for example, the role of social enterprises is supported by the compensation provided for in the Government Decree of 3 April 2014 on the approval and granting of subsidies to non-profit associations and social purpose enterprises active in the reuse and preparation for the reuse sector. In general, it is important to regard non-profit organizations and social enterprises as key stakeholders in the development and organization of new management measures and schemes for used textiles and textile waste.

While municipal waste volumes are typically part of the national reporting, this is often not as straight forward for used textiles. This is because used textiles are not necessarily regarded as waste and because municipal collection of textiles for reuse and textile waste plays a secondary role in most countries (Wagner J., 2022). In certain countries like Italy, Austria, Germany, and the Netherlands, all textile collection through bring banks is categorized as waste collection, regardless of the quality of the textiles or the intention of the person delivering them. Conversely, in other nations, such as the Nordic countries, collection via bring banks is not classified as waste collection as long as the collector clearly communicates their intention to receive only reusable textiles (Watson et al, 2020a). Unless a target has been set for separate collection or reuse of that waste stream, Member States are not expected to report on separately collected quantities nor the amounts that are directed to preparation for reuse.

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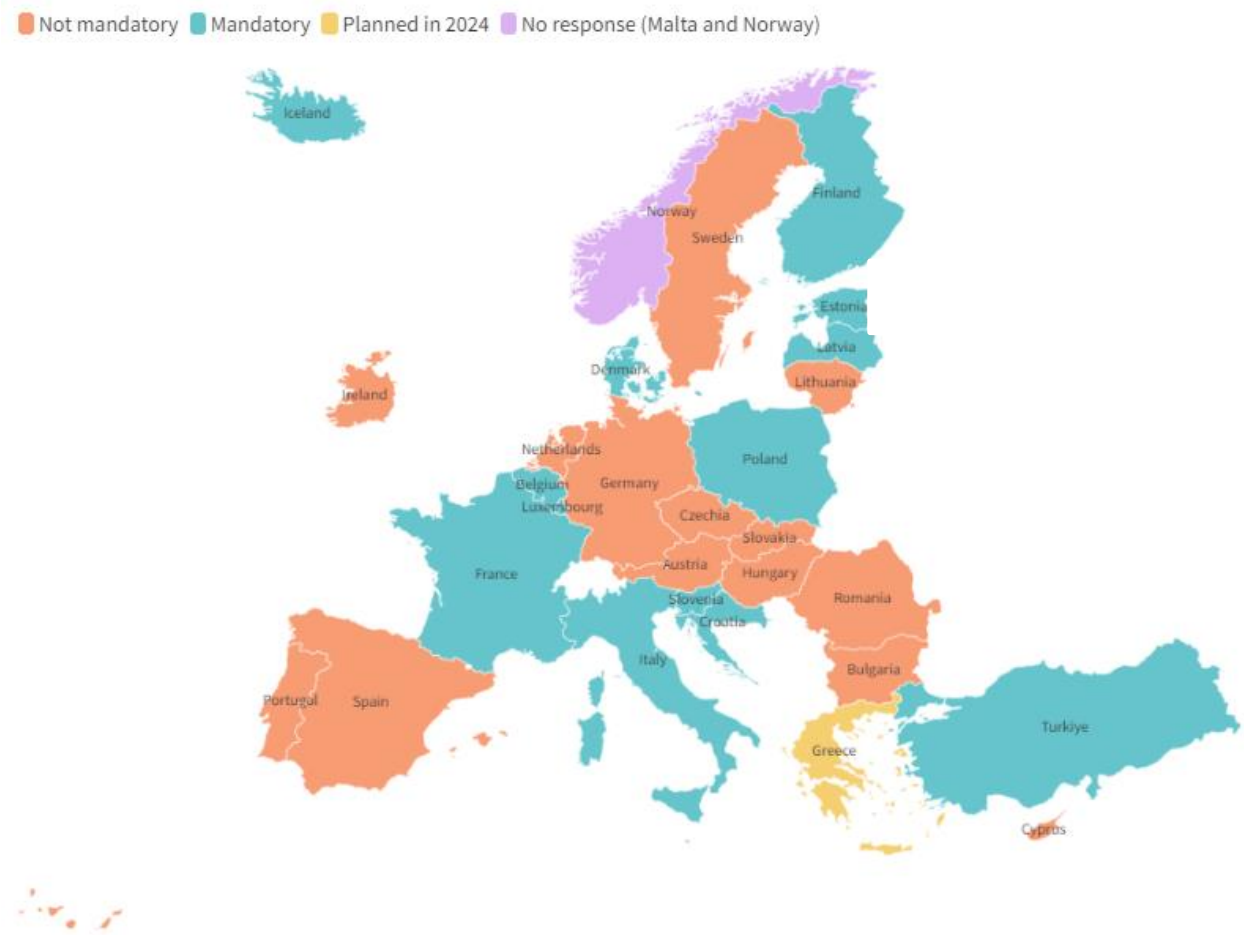
8 Belgium (Flanders)

9 Belgium (Brussels)

10 Textile collection bubble refers to a network of designated collection points or containers where individuals can deposit their used clothing and textiles for recycling or reuse. These collection bubbles are strategically placed in various locations, such as neighbourhoods, public spaces, or near retail stores, to encourage people to participate in sustainable textile disposal.

11 Belgium (Wallonia)

Figure 3.3 Current state of mandatory separate collection in place



Source: information provided by the countries in the ETC CE questionnaire; graphic created with flourish.studio (https://flourish.studio).

Note: the mandatory separate collection of textile waste is implemented in Estonia, however, it has not reached its full intended extent yet. In Finland, this obligation was implemented relatively recently. Therefore, the separately collected amounts of textile waste are not yet available in Eurostat data.

Across the different countries, municipalities are often responsible for the management of textile waste and carry out separate collection, at least, to some extent. In most cases, a tendering procedure is used to award the service to third parties. Furthermore, municipalities can reserve part of the task of collecting textiles for social enterprises to ensure that more clothing ends up in the domestic reuse market. Alternatively, the Slovenian government, for example, has mandated operators to facilitate the separation of reusable waste fractions by reuse preparation actors from waste such as textiles and bulky waste (ETC CE questionnaire, 2023). Overall, it is an important point raised by countries that collection and sorting systems should be harmonized in order to ensure that textiles of suitable quality are funnelled back into the economy for reuse and not sent to recycling.

Article 11 of the Directive suggests setting targets for textile waste preparation. While it is unclear whether these targets will focus solely on reuse and recycling or also include separate collection rates at the EU level, prioritizing high collection rates is essential. This would divert textile waste from the residual waste stream, enabling subsequent reuse and recycling efforts (Long L. and Lee-Simion K., 2022). Essentially, recycling targets should be established based on the portion of materials not reused. This prevents materials from bypassing (preparing for) reuse and going directly to recycling, which is not in line with the

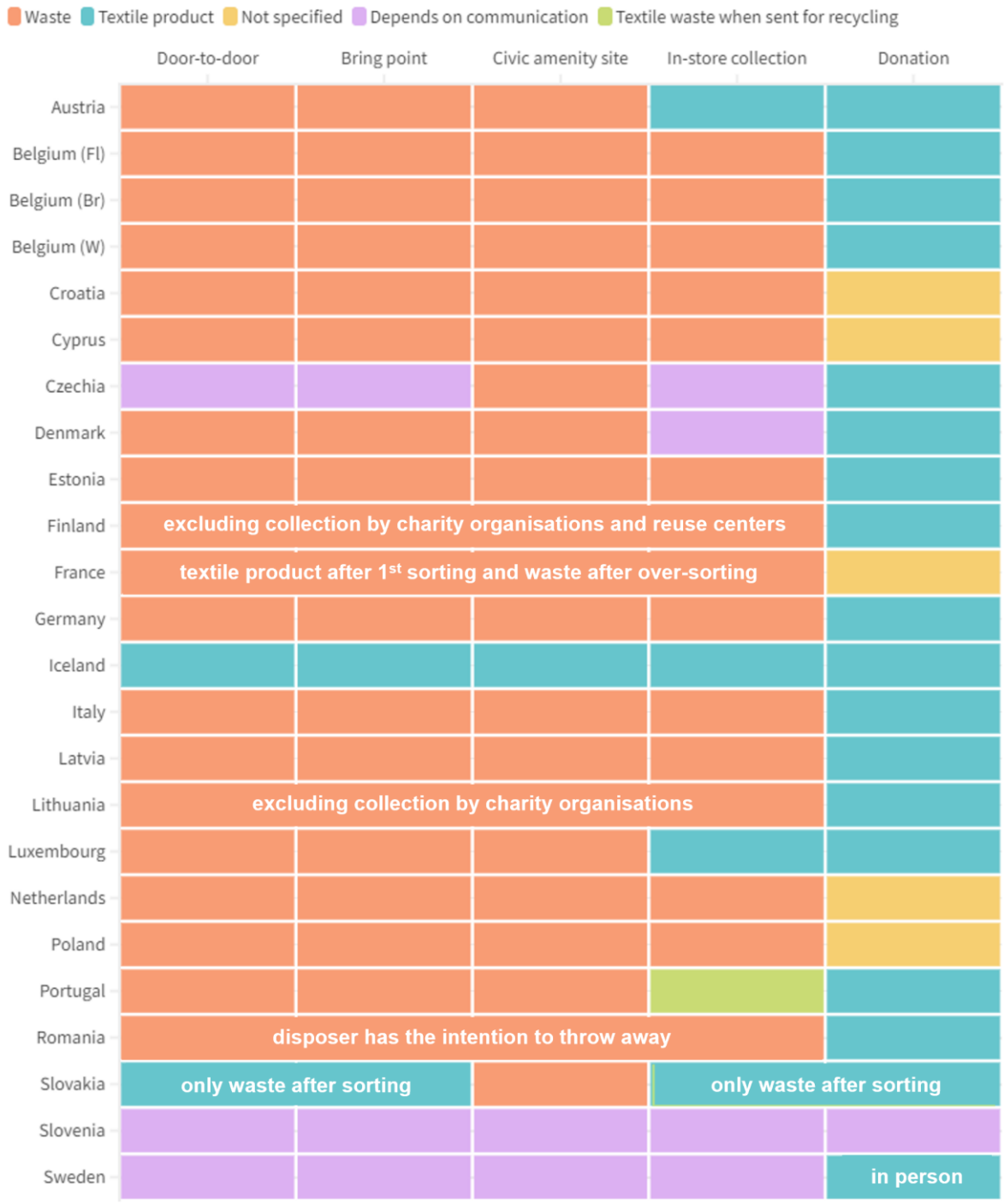
waste hierarchy[12] principles. As (preparing for) reuse is currently economically viable, there is not a strong incentive for recycling. However, with increased separate collection, the average quality of collected items may decrease, reducing the incentive for reuse (Long L. and Lee-Simion K., 2022). Setting recycling targets could intensify this situation, potentially creating competition between reuse and recycling. Therefore, it is important to avoid incentives that might divert materials away from reuse (Long L. and Lee-Simion K., 2022).

In more than half of the responding countries the separate collection of textiles is already mandatory (Figure 3.3). However, in most countries separate collection is mainly aimed at the collection of the reusable fraction. The absence of existing legal requirements for collecting used textiles should not be interpreted as a lack of collection efforts. In fact, clothing stands out as one of the rare products with a well-established post-consumer collection and treatment sector that has thrived for decades. The reason for this is quite simple: it has, or at least used to have, economic viability.

Several countries await the outcome of the currently ongoing revision of the Waste Framework Directive concerning textile waste and have raised the ambiguities concerning the definition of textile waste, as was already mentioned in the previous chapter. This definition is important to make sure that targets are uniform across Member States and in order to harmonize reporting on EU-level. Table 3.1 shows at which stage a subset of responding countries define textile products as waste.

[12] The waste hierarchy is a central concept in the WFD that establishes an order of preference for managing and disposing of waste: prevention first (including re-use) followed by waste management operations: preparing for re-use, recycling, recovery and, lastly, disposal. It is operationalised through specific rules and performance targets, such as setting separate collection obligations and targets for prevention, recycling or diversion from landfill.

Table 2.1 At what stage are collected textiles considered as waste?



Source: information provided by the countries in the ETC CE questionnaire; graphic created with flourish.studio (https://flourish.studio).

In general, countries classify textile products as textile waste when the holder intends to dispose of them. However, these textiles can regain their status as reusable textiles after undergoing sorting processes. In most countries, textiles transferred via sales or donations[13] to institutions, non-profit organizations, clothing stores, social department stores or second-hand shops are not categorized as waste.

[13] Donation refers to the act of transferring clothing or other textile items to another individual, organisation, or charity with reuse as the primary intention rather than disposal.

Nevertheless, some countries or regions, such as Germany and the Walloon region in Belgium, provide further specifications by considering textile products disposed of in bags (regardless of the collection method) as waste. This is because the third party collecting the textiles cannot determine the contents of each bag before opening it. Following sorting, assessment of the condition, and potential cleaning, some of these textiles may be deemed suitable for reuse.

In Germany, the German Circular Economy Act further specifies the textile waste definition in the WFD, where discarding is to be assumed if the holder renounces actual physical control over it and it no longer serves any purpose. This implies that, if textiles are packed in plastic bags, thrown into public containers or left for street collection, the original owner gets rid of them, and they are therefore considered as waste. This also applies to textiles delivered to in-store collection points (e.g. a retailer or brand that accepts textiles from private households) (ETC CE questionnaire, 2023).

Other countries, such as Denmark, Czechia, Slovenia and Sweden, take into account whether the intended purpose is in fact communicated by the collector or on the bin. This again largely originates from the consideration whether or not there is an intention to discard the textiles. When collection takes place without direct interaction between the collector and the person depositing the textiles (e.g. collection bins in the city), the message conveyed by the collector becomes important in determining the disposer's intent. Such information can, for example, be provided on the collection bin specifying which textiles should be placed inside and what they are meant to be used for.

In Sweden, the classification of textiles as waste depends on the information provided on the collection bin. This information typically outlines which textiles should be deposited in the bin and what they are meant to be used for. If it is clearly stated that whole and clean clothes and other textiles are meant to be used again, the textiles put in the collection bin are not considered to be waste and the collection of these items is not regarded as a waste collection (ETC CE questionnaire, 2023).

Additionally, the distinction between collecting waste or reusable textiles can be based on whether the collection method is manned or unmanned. For example, in Cyprus textiles are considered as waste at disposal in collection bins. However, when exchanged between persons or handed over they are still considered products.

To summarize, based on the responses to the questionnaire, most countries take into account the intent of the holder as the primary criterion for determining whether textile products are classified as waste or not, which is in correspondence with the Waste Framework Directive (ETC CE questionnaire, 2023). As mentioned before, textiles donated for reuse are typically seen as non-waste because the holder's intention is to transfer these textiles for reuse, indicating that the products still hold value in their view. However, the collection channels and methods that are implemented for donations (intended for reuse) or disposal (regarded as waste) vary among Member States. Overall, countries seem to implicitly make a distinction between the collection methods associated with reuse on the one hand and disposal on the other hand, hence this underlines the need for such an approach. Nevertheless, in order to improve the standardisation of reporting and to facilitate the set-up of performance targets (e.g. targets for separate collection, preparation for reuse, recycling) guidelines and harmonisation of the collection and sorting practices would be useful.

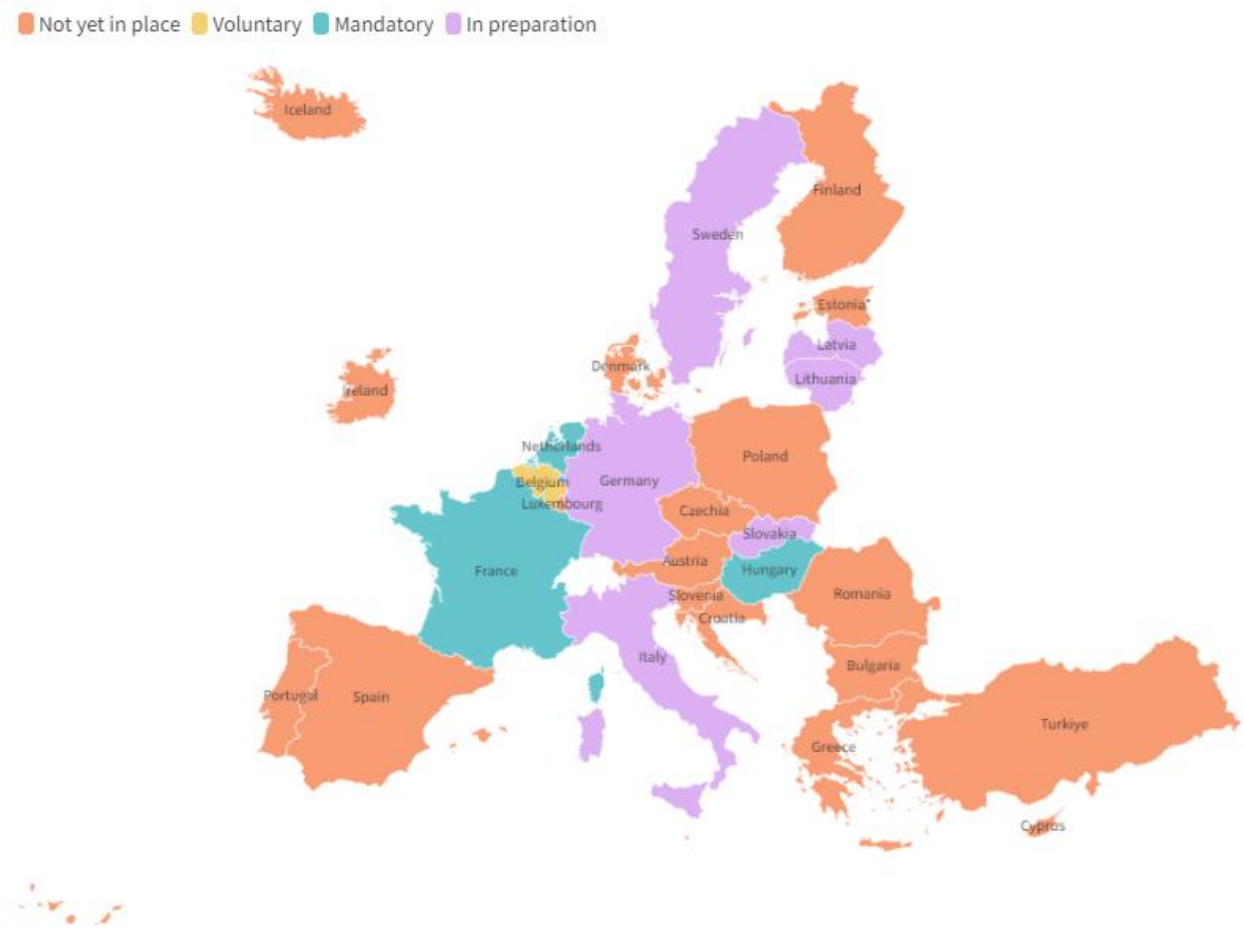
As mentioned above, certain collection methods are more suitable for one fraction than the other. The question arises whether the responsibility to distinguish between reusable textiles and textile waste needs to be placed with the disposer. Considering the prospects of collecting more lower-quality textiles, which might compromise the quality of the reusable fraction, it becomes increasingly more important to implement some form of sorting at the source, which is currently already implicitly implemented by some countries. This pre-sorting might be facilitated through citizen education or by other means, however, the quality of reusable textiles needs to be safeguarded. One of the criticisms of this approach is that citizens

often cannot distinguish between reusable and non-reusable textiles due to a lack of clarity regarding the sorting criteria applied. Consequently, this may lead to misthrows (Huygens D., 2024).

3.2 Extended Producers Responsibility system and implementation

The European Commission proposed harmonized Extended Producer Responsibility (EPR) regulations for textiles as part of the revision of the Waste Framework Directive in 2023[14]. This initiative aims to establish an economy focused on collecting, sorting, reusing, and recycling textiles, while also ensuring that products are designed with circularity in mind. To achieve these objectives, the European Commission proposes to allocate a significant portion of the EPR contributions paid by textile producers[15] to waste prevention measures and preparing items for reuse (European Commission, 2023a).

Figure 3.4 Geographical overview on the current state of EPR systems for textiles



Source: information provided by the countries in the ETC/CE questionnaire; graphic created with flourish.studio (https://flourish.studio).

Note: the voluntary ERP scheme in Belgium only applies to the Flanders region

[14] Proposal for a directive of the European Parliament and of the council, amending Directive 2008/98/EC on waste, 5.7.2023 (COM(2023) 420 final)

[15] According to the amending Directive 2008/98/EC on waste a new definition for producer of textiles will be included in Article 3 of the WFD.

Up till now, an EPR system is only mandatory in France, Hungary and the Netherlands and voluntary in the region of Flanders (Belgium) (Figure 3.4). Croatia mandates textile producers to facilitate the collection of the type of textile products that they put on the market[16]. While this collection obligation is one of the main requirements of an EPR system, the general minimum requirements (WFD Article 8a) have not yet been set up in Croatia. Similarly, many responding countries[17] indicate that they are at the pre-discussion level, conducting preparatory studies or drafting an EPR scheme. Other countries, such as Austria, Estonia, Iceland, Luxembourg and Czechia are awaiting the amendment of the WFD.

As many individual countries take steps towards the implementation of an EPR system in regard to textile waste, European authorities must ensure this shift spans national boundaries and regulations are harmonized. Up till now, there is no obligation to include eco-modulation policies in national law for textiles, however, this would contribute to the robustness of the EPR systems and facilitate the promotion of eco-design, as is the case in France (Refashion, 2022; Arya, A and Arpit, B, 2023).

To illustrate, the French EPR scheme provides a 50 % discount for producers of textiles made with at least 15 % post-consumer recycled fibres. Furthermore, producers of textile products like jeans, t-shirt, jumpers, bedsheets and shoes benefit a discount when at least two durability criteria are fulfilled, such as on colour fastness, dimensional stability, abrasion resistance and resistance to pilling (Sachdeva, 2021). The promotion of eco-modulation as a solution can only effectively encourage producers to alter their product designs when it is developed comprehensively and consistently at the EU level. The eco-modulation measures incentivise changes to product designs which can create further material saving opportunities (Arya, A and Arpit, B, 2023; Sachdeva, 2021). In line with this, the European Commission has proposed the eco-modulation of the EPR fees for textiles[14].

The fact that large amounts of used textiles are exported from the countries of collection, generates specific challenges for the proper implementation of EPR systems and their effectiveness. In case of exporting of textiles for reuse or waste treatment, EPR fees typically stay within exporting countries, which deprives receiving countries – including third countries in Africa and Asia - from the financial support for end-of-life treatment. Hence, as indicated by Thapa et al. (2023), there is an option for the transition to a so-called 'Ultimate Producer Responsibility' (UPR). The UPR system relies on high product traceability from exporting to importing countries and should help improve accountability for producers and distributors of products.

In addition to UPR, a digital product passport (DPP) is proposed as a solution for monitoring the cross-border trade of products and their multiple life cycles. Unlike UPR, the DPP focuses on gathering and disseminating information about the products and their supply chain, facilitating a shared understanding of product characteristics and materials for all parties involved. The DPP offers valuable insights for consumers by enabling them to better understand the environmental impact and materials associated with a product. However, the DPP is equally crucial for all participants within the (reverse) value chain. By combining UPR and DPP, not only can product traceability be improved, but it can also ensure that EPR fees remain linked to the product, irrespective of its origin or shipping destination (Thapa et al., 2023). On 5 December 2023, the Council of the European Union and the European Parliament reached a provisional political agreement on a proposed regulation establishing a framework for setting eco-design requirements for sustainable products (ESPR). This regulation also includes the introduction of a DPP which should help consumers and businesses make informed choices when purchasing products, facilitate repairs and recycling and improve transparency about products' life cycle impacts on the environment (European Commission, 2023b).

Finally, it is key that EPR schemes are designed in a way that stimulates the adoption of reuse and repair practices, which have been recognized as the more environmentally sustainable option compared to

16 Ordinance on waste textile and waste footwear management-OG 99/15

17 Belgium, Denmark, Finland, Italy, Latvia, Lithuania and Sweden.

recycling and which at the same time also yield socio-economic advantages (Circle Economy, 2021). Nevertheless, the establishment of large-scale repair operations in European countries encounters commercial non-viability, primarily due to the combination of high labour costs and notably lower pricing for new products manufactured in, for example, Asia. Consequently, for a significant portion of consumers, the more rational choice is to acquire new garments rather than pursuing expensive repairs for lower-cost clothing. Subsidies for textile repairs funded through EPR fees, coupled with tax reductions on circular labour practices like repair and reuse, could potentially help bridge this gap.

On 1 July 2023, Hungary implemented its new extended producer responsibility system that is compliant with the concession notice[18] and relevant legislation, and aligns with the EU Directives. The scope of this system is broader than the current product fee system, more products will be included, and the definition of producer will include the importer in addition to the domestic producer. The aim is to ensure that the producers or first domestic marketers of products bear the financial responsibility for waste management throughout the life cycle of the product. Under the new system, the product responsibility organisation (PRO)[19] is responsible for the organisation and management of the collection, transport and recycling of products or materials covered by the EPR regulations as well as the efficient use and operation of the waste management facilities (ETC CE questionnaire, 2023).

4 Reuse, recycling and treatment capacities

The Implementing Decision (EU) 2019/1004[20] establishes rules for calculating, verifying, and reporting data on municipal waste. The decision requires a breakdown of municipal waste in several waste fractions, including textile waste. The reporting requirement serves the showing of compliance with the targets on the preparing for reuse and recycling of municipal waste laid down in the WFD. However, it is important to note that only data concerning the generation of waste, recycling, and energy recovery of textile waste are mandatory to report, while reporting on separate collection and preparation for reuse is optional (Köhler et al., 2021). Additionally, it is worth highlighting that this reporting requirement does not encompass exchanges of used textiles that have never been officially categorised as waste.

Note that, according to the implementing decision of 18 December 2020[21], Member States are obliged to report on reuse data. As Member States have reported their reuse flow data to the EEA, these comprehensive reuse data will be published by the EEA in early 2024 and fall beyond the scope of this report.

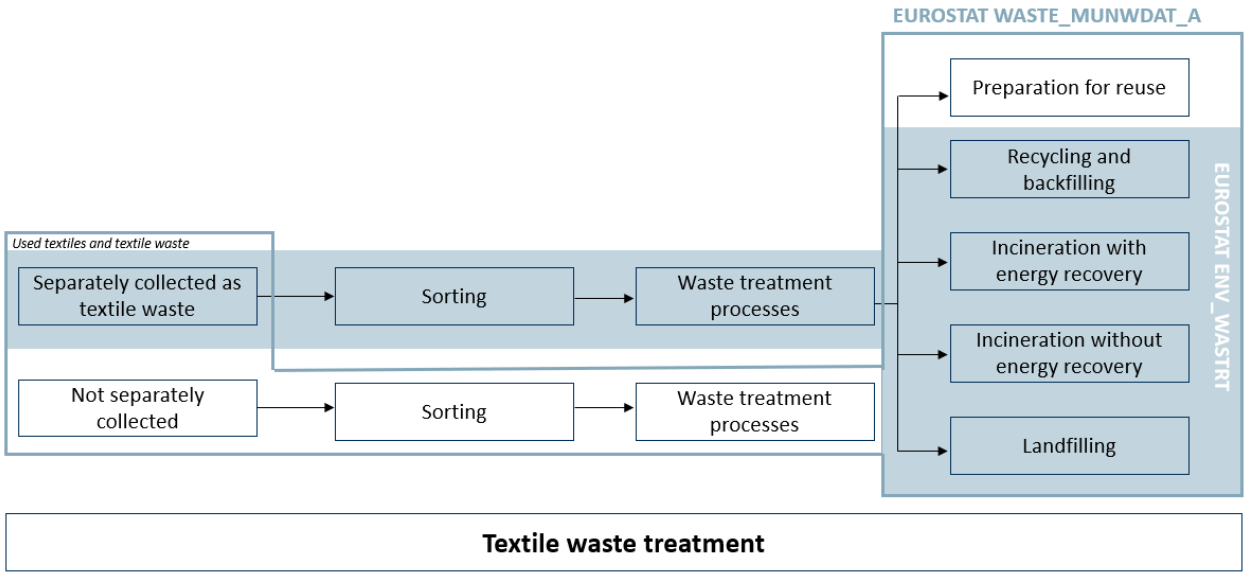
18 A concession notice serves as a formal invitation and announcement, signaling the availability of a concession opportunity and inviting interested parties to participate in the procurement process.

19 A Producer Responsibility Organization is a key player in EPR systems, which are designed to hold producers or manufacturers responsible for the environmental impact of their products throughout their entire life cycle. PROs are typically independent, non-profit entities or companies established to help producers comply with their EPR obligations.

20 COMMISSION IMPLEMENTING DECISION (EU) 2019/1004, 20.6.2019

21 COMMISSION IMPLEMENTING DECISION (EU) 2021/19, 18.12.2020

Figure 4.1 Material and product flows, scope of textile waste treatment and existing datasets



Source: ETC CE

Data on the treatment of textile waste must be reported by EU Member States according to the EU Waste Statistics Regulation, for waste from the whole economy[22]. According to this dataset, between 2010 and 2020, an average of 76 % of the textile waste was recovered, *i.e.* recycled or backfilled[23], at EU level (Eurostat, 2023d). Note that this dataset (ENV_WASTRT) does not encompass data on textile waste included in mixed waste (Figure 4.1). Furthermore, these figures only consider textile waste treated within the country itself, not taking into account exports. Therefore, the total volume of textile waste treated within the EU27, amounting to 1.41 million tonnes in 2020 (Eurostat, 2023d), was lower than the total volume of textile waste separately collected (ENV_WASGEN), *i.e.* 1.95 million tonnes, in the same data year (Eurostat, 2023b).

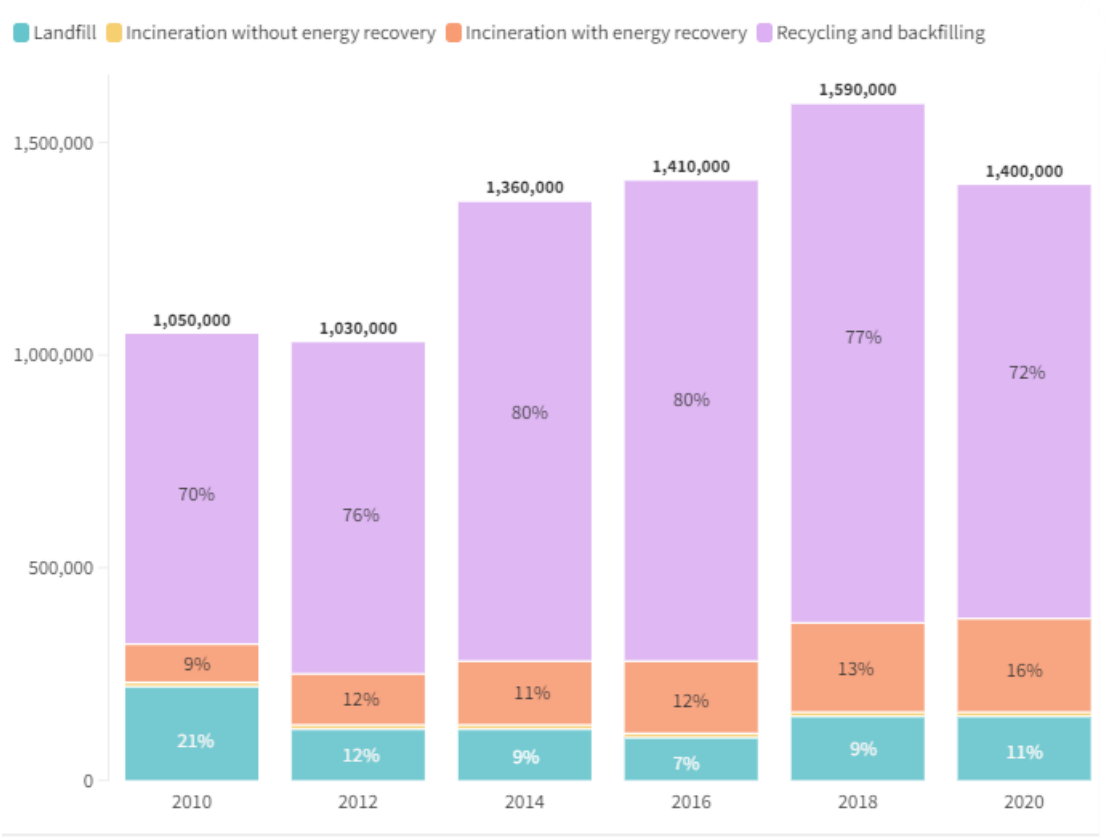
In Figure 4.2, a reduction can be observed for landfilling of textiles within the EU27. In 2010, up to 21 % of textile waste was landfilled, while in 2020 11 % was reported to be landfilled. This corresponds to, respectively, 220,000 tonnes and 150,000 tonnes of textile waste. According to Eurostat, the highest amounts are landfilled in Spain (20,517 tonnes), Poland (42,618 tonnes), Czechia (30,080 tonnes), Portugal (14,353 tonnes) and Romania (10,745 tonnes). While most countries show a decreasing trend towards 2020, landfilling in Bulgaria, Estonia, France, Poland, Latvia, Lithuania, the Netherlands and Hungary increased (Eurostat, 2023d).

The amount of textile waste being redirected towards energy recovery increased from 9 % in 2010 to 16 % in 2020, which corresponds to a total amount of 90,000 tonnes in 2010 and 220,000 tonnes in 2020. The highest numbers are observed for Germany (69,335 tonnes), the Netherlands (34,368 tonnes), Hungary (19,570 tonnes), Czechia (18,020 tonnes) and Latvia (14,092 tonnes) (Eurostat, 2023d).

22 Eurostat dataset: Treatment of waste by waste category, hazardousness and waste management operations (ENV_WASTRT) published by Eurostat

23 Backfilling involves using textile waste, often in the form of shredded or compacted materials, to fill empty spaces or voids in the ground, such as abandoned mines or excavations. The purpose of backfilling is to stabilize the land, promote land reclamation, and reduce void spaces. Czechia is the only country that reports this treatment method in regard to textile waste.

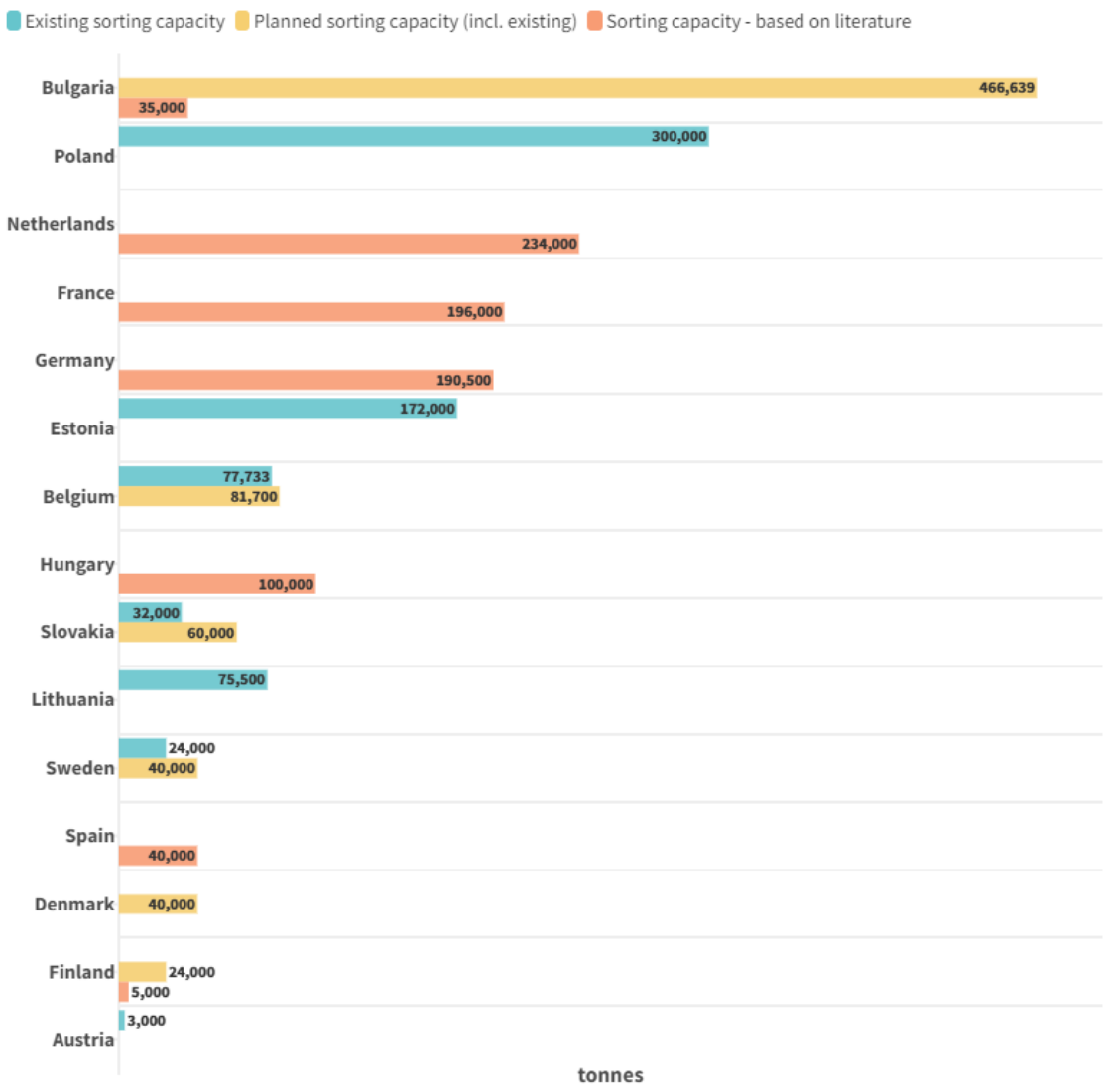
Figure 4.2 Treatment of textile waste in the EU27, 2010-2020, in tonnes and shares



Source: Eurostat (2023b); graphic created with flourish.studio (https://flourish.studio).

Strikingly, the Netherlands and Czechia are both countries with a high capture rate in their textile waste collection systems. Furthermore, the Netherlands and Poland are among the primary receiving countries of exported used and waste textiles with estimated sorting capacities of respectively 200,000 tonnes and 234,000 tonnes in 2020 (van Duijn H. et al., 2022). In the ETC CE questionnaire, Poland indicated an even higher sorting capacity of approximately 300,000 tonnes per year. One of the largest clothing sorting plants in Poland, sorts approximately 72,000 tonnes per year. Therefore, the observation that countries such as Poland and Czechia exhibit a noteworthy share of textile waste going to landfills emphasizes the concern that without timely capacity scaling, there is a risk of the undesirable scenario where substantial amounts of separately collected textile waste end up being sent to landfills or are incinerated.

Figure 4.3 Existing and planned total sorting capacity



Sources: information provided by the countries in the ETC CE questionnaire; Köhler et al.,(2021); Dahlbom et al., (2023); van Duijn H. et al., (2022); graphic created with flourish.studio (https://flourish.studio).

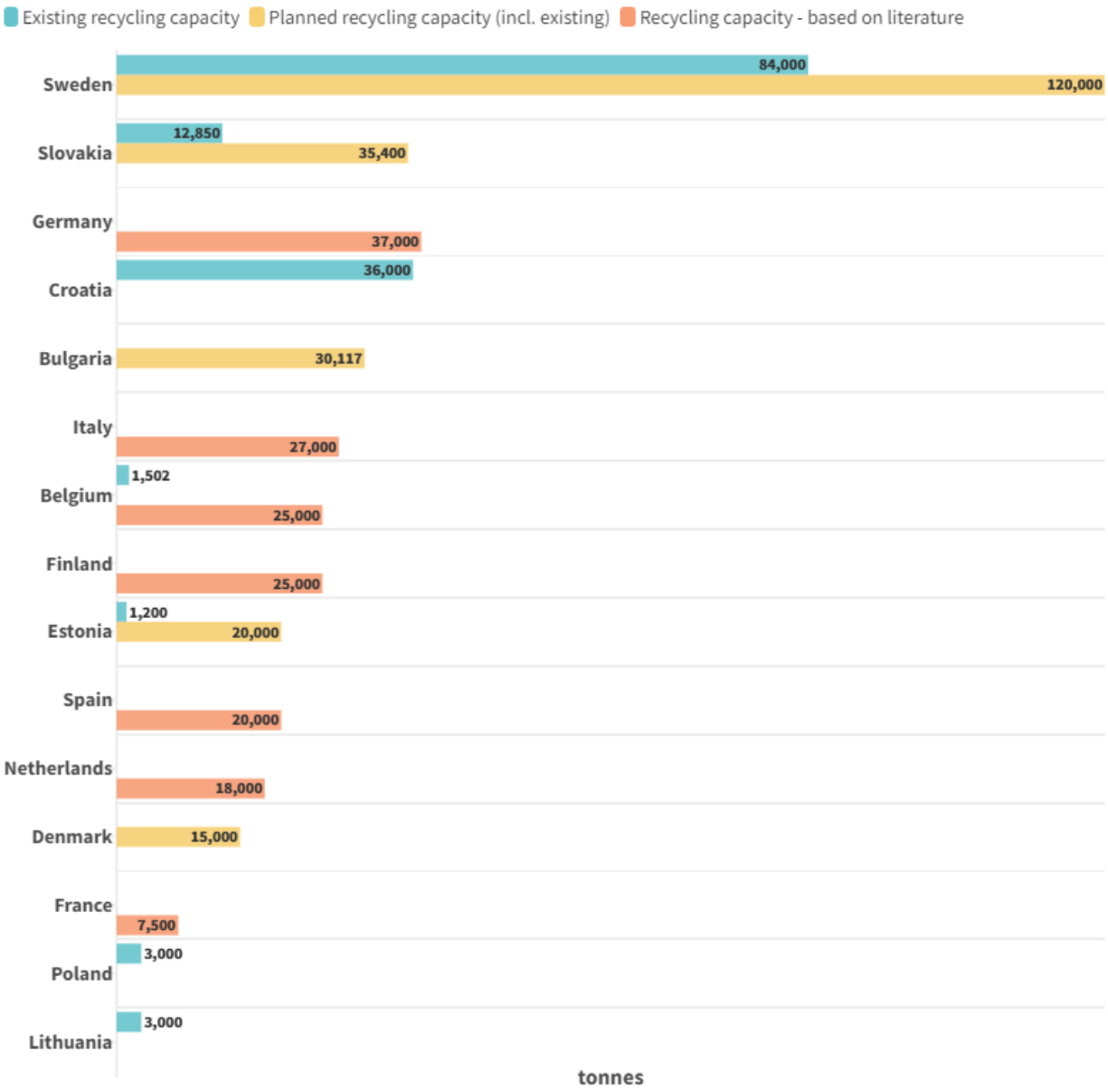
Drawing from the responses collected via the ETC CE questionnaire and supplemented with insights from literature, it is estimated that the EU sorting capacity amounts to approximately 1.5 million tonnes. It is important to note that this estimation is derived from literature data and data provided by only seven[24] out of thirty surveyed countries. According to Dahlbom et al. (2023), Estonia, Latvia, and Lithuania are recognised as significant importers of used and waste textiles for sorting and processing purposes. These countries are also among the top importers in Europe when assessed on a per capita basis. In 2018 more than 90,000 tonnes of used textiles were imported by the Baltic states with a substantial portion of these textiles originating from Nordic countries (Dahlbom et al., 2023).

At the same time, Italy was found to have the highest number of sorting and recycling facilities, with a significant majority being mechanical recyclers (Dahlbom et al., 2023). However, precise sorting and recycling statistics for Italy are not available as it is not possible to differentiate between preparation for reuse (in sorting capacities) and recycling (mechanical or chemical treatment facilities). Figures are only

[24] Austria, Belgium, Estonia, Lithuania, Poland, Slovakia and Sweden

accessible for mechanical wool recycling in the Prato region, amounting to 22,000 tonnes per year. Against this background, it is worth mentioning that Dahlbom et al. (2023) have suggested that their reported annual sorting capacity of 560,000 tonnes might be an underestimation, primarily due to the challenges associated with identifying manual sorting actors.

Figure 4.4 Existing and planned total recycling capacity



Sources: information provided by the countries in the ETC CE questionnaire; Dahlbom et al. (2023); Huygens et al. (2023); graphic created with flourish.studio (https://flourish.studio).

In terms of recycling capacity, Dahlbom et al. (2023) identified 17 fibre-to-fibre recycling actors across Europe of which the capacities amount to a total of 1.3 million tonnes per year up to 2025. More specifically, the study estimated that 1,000,000 tonnes would be directed to mechanical recycling while 250,000 tonnes would be destined for chemical recycling. The latter largely corresponds to the figures that Köhler et al. (2021) estimated in terms of chemical recycling. However, Dahlbom et al. (2023) indicate that the volume for mechanical recycling is most likely underestimated as the mapping only identified 30 % of the total number of actors. The open-source 'Textiles Sorting and Recycling database', provided by

WRAP[25], maps out textiles sorters, pre-processors, recyclers, and yarn spinners within the EU and UK. Currently, this database contains over 50 fibre-to-fibre recyclers, both chemical and mechanical, some of which are in the piloting phase. Within this context, the data provided by the participating countries through the ETC CE questionnaire, significantly underestimate what is documented in literature. The complete recycling capacity, based on the ETC CE questionnaire, would amount to only 194,552 tonnes annually. Again, it is important to note that these figures are derived from information obtained from only seven countries[26] out of the surveyed countries, complemented by data extracted from literature sources for Germany, France, Finland and Italy (Prato region exclusively). In addition, Poland's recycling capacity is underestimated as the indicated capacity represents merely that of one facility. Nevertheless, these lower numbers fall within the range reported by Huygens et al. (2023), who estimated a yearly capacity of 0.2 – 0.3 million tonnes in terms of closed-loop recycling for the EU. When considering Eurostat's ENV_WASTRT dataset, a total amount of 1.02 million tonnes is recycled within the EU27, with exception of Ireland, Cyprus and Luxembourg as no data are available. It is important to note, that these reported amounts directed to recycling include all kinds of recovery (excluding energy recovery), not only fibre-to-fibre recycling.

Another Eurostat dataset, based on the annual reporting of municipal waste (WASTE_MUNWDAT_A), that is used to monitor whether countries meet the municipal waste recycling targets, provides additional insights into the treatment of separately collected textile waste, both from household and non-household sources (Figure 4.1). Noteworthy is the observation that only a limited number[27] of countries indicate the amounts of used and waste textiles directed to preparation for reuse. The lack of reporting on preparation for reuse could originate from the fact that the reusable fraction is not regarded as waste. Charities are mainly responsible for the collection of this fraction while municipalities have a secondary role in this process.

To illustrate, in this dataset, Sweden indicates that 50 % of the collected textile waste is recycled, while the other 50 % is designated for energy recovery. This is in line with the fact that Sweden reports relatively low figures regarding textile waste generation (Figure 2.4) and textiles are only defined as waste when this is specified on the collection bins. For Iceland, for example, no data were disclosed, possibly because, until January 2023, textile collection in Iceland was predominantly carried out by charitable organisations where feasible, leading to an exclusive emphasis on preparing textiles for reuse, which was 2,542 tonnes according to information provided in the ETC CE questionnaire.

When comparing Eurostat data provided in the annual reporting of municipal waste (WASTE_MUNWDAT_A) with the ENV_WASTRT dataset, the following differences can be observed (Figure 4.1):

- In the dataset 'Treatment of waste by waste category, hazardousness and waste management operations (ENV_WASTRT)', covering total waste, preparation for reuse is not included as a reporting category;
- In the dataset 'Municipal waste by waste management operations (WASTE_MUNWDAT_A)', data are available for waste generation, recycling and energy recovery of textile waste, while reporting on separate collection and preparation for reuse is voluntary, following Implementing Decision 2019/1004 that specifies the reporting obligation.

Against this background, only a limited number of surveyed countries disclosed numbers on amounts of textile waste prepared for reuse either through the ETC CE questionnaire or the WASTE_MUNWDAT_A dataset. These countries encompassed Austria (23,720 tonnes), France (138,930 tonnes), Germany (810,000 tonnes), Iceland (2,542 tonnes), Ireland (11,696 tonnes), Lithuania (1,762 tonnes) and Slovenia

25 WRAP's Textiles Sorting and Recycling Database: https://wrap.org.uk/resources/tool/textiles-sorting-and-recycling-database

26 Belgium, Croatia, Estonia, Lithuania, Poland, Slovakia and Sweden

27 Austria, Germany, France, Iceland,

(575 tonnes). In addition, Italy indicated that 131,277 tonnes are designated for recycling, however, with the remark that it is not possible to discern between material recycling and preparation for reuse.

Secondly, regarding the proportion that becomes recycled or is destined for energy recovery, recycling seems to be the main destination for textile waste when considering the ENV_WASTRT dataset, while energy recovery, as well as preparing for reuse, seem to be the main treatments for municipal textile waste.

5 Trade, exports and imports of used textiles and textile waste

Given that sorting is a labour-intensive and, most of the times, a manual process, it is more cost-effective when this is done in countries with relatively lower labour costs, such as Poland (ETC CE, 2023; van Duijn H. et al., 2022). In general, trade dynamics within the EU are largely driven by variations in feedstock prices for sorting and recycling, as well as disparities in labour costs. For instance, almost the entire sorting capacity of the Netherlands is used to sort textiles from Germany, while 55 % of the collected textiles in the Netherlands are sorted abroad (van Duijn H. et al., 2022). Sorting facilities in countries where the purchase of collected textiles is costlier often source textiles from neighbouring countries. For example, through the questionnaire Germany indicates to have 810,000 tonnes of textiles prepared for reuse of which, presumably, a large portion will be exported for further processing. More specifically, according to the German Environmental Agency, in 2018, Germany exported a total of 515,944 tonnes of which 313,912 tonnes were exported to destinations within the EU, with Poland and the Netherlands as main receiving countries. This is in line with the finding of Huygens et al. (2023), that Germany's sorting capacity falls significantly below the levels of separate collection.

Table 5.1 gives an overview of the major exporters of used textiles and/or textile waste in Europe, based on the information received from the countries through the ETC CE questionnaire. Overall, Germany is a major exporter to both within, as well as outside the EU.

Table 5.1 Major exporters of used textiles and/or textile waste in Europe

	Volume of exports to countries within the EU (tonnes)		Volume of exports to countries outside the EU (tonnes)
Germany	313,912	Germany	202,032
Sweden	31,205	Spain	200,000
Austria	35,000	Poland	65,800
Italy	28,762	Lithuania	40,240
		Italy	35,054

Source: information provided by the countries in the ETC CE questionnaire

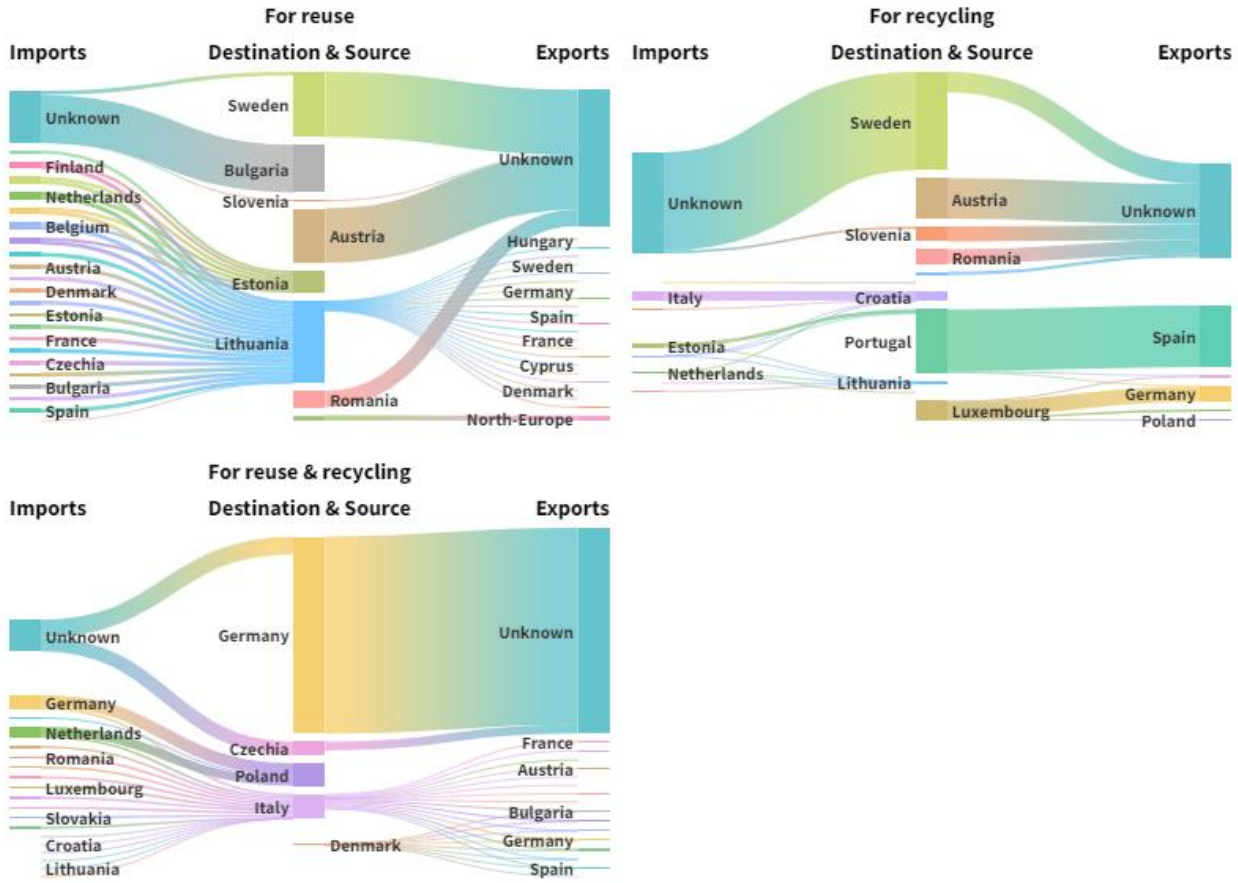
Note: background information provided in Annex 2

Lithuania takes up an interesting position in these trade figures (Figure 5.1), as it imports a substantial amount (58,025 tonnes) from EU countries of which the largest proportion is designated for reuse. Nevertheless, a large amount (40,243 tonnes) is exported to outside the EU. This aligns with Lithuania's inclusion in the top five EU exporters in 2019 (ETC CE, 2023). In light of these observations, Lithuania is not only an important exporter, but can be considered an important import-export hub.

In a similar context, Germany was already highlighted by the EEA in a previous report as an important EU export hub of used and waste textiles, exporting largely to Belgium, Italy, the Netherlands, Poland and Romania (ETC CE, 2023), but Germany also exports large amounts to outside the EU (ETC CE questionnaire, 2023). Sweden also emerges as significant importer of used textiles, most likely destined for recycling, and

received 21,868 tonnes in 2021 from inside EU27, the exact originating countries were not specified. Austria indicates to export 26,000 tonnes to within the EU, destined for reuse while 9,000 tonnes are destined for recycling. Based on the figures provided by the responses to the questionnaire 413,820 tonnes are exported to non-specified countries within the EU and 255,014 tonnes to non-specified countries outside the EU. Overall, the exact whereabouts of used textiles and textile waste can be difficult to determine due to intra-trade.

Figure 5.1 Imports and exports of used textiles (for reuse) and textile waste (for recycling) within the EU (in tonnes)



Source: information provided by the countries in the ETC CE questionnaire; graphic created with flourish.studio (https://flourish.studio).

Note: background information provided in Annex 2

Strikingly, Spain exports large quantities of textiles destined for recycling (200,000 tonnes) to Türkiye. At the same time, Spain itself, is the main export destination for textile waste originating from Portugal, although to a much smaller extent. In accordance with Dahlbom et al. (2023), Estonia receives relatively significant quantities in terms of amount per capita and imports 10,862 tonnes textiles destined for reuse from inside the EU27 and 3,000 tonnes from outside the EU27.

According to the provided data, Italy and Poland qualify as important import-export hubs as well. Being both included in the top five EU exporters (ETC CE, 2023), Italy and Poland indicate to substantially export textiles and textile waste (Table 5.1). In addition, possibly because of their considerable sorting and recycling capacity, both countries receive substantial amounts of textiles and textile waste mainly from EU countries. More specifically, Italy imports 40,291 tonnes and Poland 38,640 tonnes.

Annex 2, provides a complete overview of trade figures received from countries through the ETC CE questionnaire.

6 The need for harmonisation

The recent proposal[14] of the European Commission to amend the Waste Framework Directive for textile waste also envisions setting performance targets in the future related to preparation for reuse and recycling that are in line with the waste hierarchy.

However, difficulties arise in establishing these targets due to inconsistencies and ambiguities in the data and reporting methods for textile waste generation and management. Furthermore, the identification and implementation of improvement measures that tackle shortcomings of the current systems are hindered by data gaps. These inconsistencies primarily stem from the lack of a generally applicable definition of 'textile waste'.

To illustrate, in most countries the collection of used textiles through collection bins on civic amenity sites are regarded as waste. Hence their subsequent sorting is considered a waste treatment activity and these textiles are considered waste, even if the discarded textiles are eventually subjected to reuse. The sorting of the reusable fraction constitute preparation for reuse which is regarded as waste treatment activity in this context. However, if the same mix of used textiles is donated to a charity shop and undergoes 'in house' sorting, then the reusable fraction, suitable for sale, is very unlikely classified as waste and the 'preparation for reuse' in this case is not considered a waste treatment activity. The recyclable fraction is typically sold to a textile waste collector. As these used textiles enter the waste management system, they are regarded as textile waste. Alternatively, if the sorting of the donated textiles happens at a centralised warehouse, this can either be classified as waste or not (Long L. and Lee-Simion K., 2022).

Data inconsistencies arise due to varying interpretations of waste definitions, particularly concerning textiles. These discrepancies are largely attributed to the absence of specific reporting requirements for used textiles that are not considered as waste. While reporting on municipal waste amounts is mandatory, this obligation extends to municipal textile waste only if it falls under the waste classification. If used textiles are not regarded as waste, there is no corresponding reporting requirement. Secondly, reporting on treatment such as energy recovery and recycling is mandatory, however, the reporting on separate collection and preparation for reuse, up till now, is voluntary. Standardising and mandating reporting on these flows, would facilitate the identification of improvement potential in textile management across Europe and the individual countries.

Furthermore, it is crucial to clearly define the entry and exit of a waste status to avoid the export of flows abroad that are in fact not reusable or recyclable and that will not be valorised. A tailored waste definition that is better applicable to textiles and clear end-of-waste criteria, would aid to prevent burdening countries that would not have authorised the import of these used textiles if they, in fact, had been identified as 'waste' (cf. Basel Convention). As highlighted by the ETC CE report: *EU exports of used textiles in Europe's circular economy*, a major part of used textiles are exported unsorted as so-called 'originals', and are likely to contain both items fit and unfit for reuse (ETC CE, 2023). For example, almost 40 % of the of used textiles imported by Ghana cannot be sold – some clothes arrive damaged beyond repair or are of such poor quality that customers have little interest in them. Furthermore, as approximately 30 million garments arrive every fortnight, this supply is undoubtedly exceeding the demand of the 31 million inhabitants (ETC CE, 2023). There is still a lack of transparency around the global used textiles industry which is complex, interconnected, and inadequately reported on.

7 Glossary

Bring bank: a bring bank is a collection service provided as designated collection point, often bins or containers located in public places, where individuals can directly deposit their used and/or waste textiles. This system is designed to facilitate proper waste treatment by providing convenient drop-off locations.

Curbside collection: curbside collection is a waste management practice where used textiles are collected directly from the curb in front of residential properties. It eliminates the need for residents to transport textiles to a central collection point. Items are placed at the curb on designated collection days, and waste management personnel or specialized vehicles collect them directly form the curbside.

Door-to-door collection: waste management method where collection services are organized to pick up used textiles directly from individual households or businesses at their doorstep. Instead of citizens or businesses having to bring their textile waste to a centralized collection point, a door-to-door collection system brings the collection service to them. In the case of textile waste, this method involves the scheduled or regular collection of unwanted textiles, such as clothing, linens, or other fabric items, directly from the premises of households or businesses.

Extended Product Responsibility (EPR): refers to a waste management policy approach where producers and manufacturers take on an extended role and responsibility for the entire life cycle of their textile products, including the post-consumer stage. Under EPR, producers are tasked with designing and managing their products in a way that minimizes environmental impact, encourages reuse and recycling, and ensures proper disposal at the end of the product's life.

In-store collection: refers to a collection system where customers can bring their unwanted or used textile products, such as clothing or fabrics, to designated collection points within physical retail stores.

Mixed household waste (or mixed municipal waste from household sources): refers specifically to the commingled waste generated by households, consisting of non-recyclable materials, general household refuse, and items that are not separated at the source for recycling. This waste is typically collected by municipal authorities and may undergo various waste treatments, depending on local waste management practices and policies. In some waste management systems, mixed household waste is subject to sorting before undergoing further treatment. In regions where waste-to-energy or mechanical-biological treatment facilities are employed, sorting may involve the removal of certain materials that can be recycled, such as metals, plastics, and paper, before the remaining waste is processed.

Mixed municipal waste: mixed municipal waste includes waste not only generated by households but also by businesses and other economic activities within the municipality. While (mixed) household waste accounts for a significant portion of mixed municipal waste, waste from businesses, offices, public institutions, and other non-residential sources are also included in this stream.

Preparation for reuse: means checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing. Precondition for ‘preparing for re-use’ is that the respective item was wasted, repair or cleaning of items which never became waste are not captured under this treatment category.

Recycling: textile recycling involves the process of recovering and converting used textiles into new products, fibers, or materials. This can include breaking down textiles into raw fibers for the production of

new fabrics (fiber-to-fiber recycling) or transforming them into other items, such as insulation, cleaning cloths, or even new clothing items.

Residual waste: refers to the portion of waste that remains after the implementation of waste reduction, removal of recyclables, and other diversion efforts. It represents the fraction of waste that is not easily recyclable or recoverable through current technologies or practices**.** This waste is often collected after efforts to extract organic waste and recyclables, such as metal, glass, paper, and plastic. Residual waste may be subjected to additional treatment processes, including compacting, shredding, or incineration, before final disposal in landfills or utilization for waste-to-energy methods

Reuse: textile reuse involves extending the functional life of textile products through various means, such as transferring them to new owners or users. This process may include actions like mending, refurbishing, or repurposing textiles, allowing them to serve additional purposes and delaying their entry into the waste stream. The goal of textile reuse is to maximize the value and utility of textiles, promoting sustainability and reducing the environmental impact associated with the production and disposal of new textiles.

Reusable textiles: clothing items that can be reused in their initial form and for their intended purpose fall under the classification of "product reuse," a term widely used by textile collectors and sorters. Rewearables are further divided into various qualities, with the top-tier Cream and Vintage categories typically sold within domestic markets. Lower-quality items, categorized from A to C or 1 to 3, are often exported abroad.

Underfloor collection: waste collection via underfloor containers that involves placing collection containers beneath the surface of public areas or buildings, typically accessed through small hatches or access points at ground level. Waste is deposited into these underground containers by users and is periodically collected by specialized vehicles equipped with lifting mechanisms.

Used textiles: clothing and other textile fibre-based items that have been previously owned or used for various purposes and durations. These items may include clothing, linens, accessories, or any other products made from textile fibres. The term encompasses textile items in various conditions—ranging from gently used to well-worn or even damaged.

7.1 List of abbreviations

Abbreviation	Name
CE	Circular economy
DPP	Digital Product Passport
EC	European Commission
EEA	European Environment Agency
EPR	Extended Producer Responsibility
ETC CE	European Topic Centre / Circular Economy and Resource Use
EU	European Union (27 Member States)
MSW	Municipal solid waste
PRO	Producer Responsibility Organisation
UPR	Ultimate Producer Responsibility
WCA	Waste composition analysis
WFD	Waste Framework Directive

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Annex 1 – Overview of textiles and shoes in residual waste and calculation of capture rate

	Waste Composition Analysis(*)		ENV_WASGEN(**)						WASTE_MUNWDAT_A(***) / Questionnaire(*)		
	Share of textiles and shoes	Reference year	Household waste (2020)	Textiles & shoes in household waste (2020)		Textile waste separately collected from households (2020)		Capture rate	Textile waste separately collected	Textile waste generated in municipal waste	Capture rate
				Tonnes	kg/cap	Tonnes	kg/cap		Tonnes	Tonnes	
Austria	5,00%[1]	2018/2019	1.786.701	89.335,05	10,02	38.330	4,30	**30%**	47.460(***)	139.278(***)	**34%**
Belgium	4,40%[1]	2019/2021	1.926.641	84.772,20	7,35	84.804	7,35	**50%**	75.346(*)(-)	148.416(*)(-)	**51%**
Bulgaria	5,00%[4]	2018	1.836.802	91.840,10	13,24	737	0,11	**1%**	9.585(*)(-)	939(***)	Different data year
Croatia	3,70%[2]	2015	899.503	33.281,61	8,22	3.341	0,83	**9%**	3.838(*)(-)	41.119(*)(-)	**9%**
Cyprus	7,00%[4]	2013	327.060	22.894,20	25,67	2.740	3,07	**11%**	2.336(*)(-)	4820(*)(--)	Different data year
Czechia	3,10%[3]	2021	2.733.165	84.728,12	7,92	28.096	2,63	**25%**	34.010(***)(-)	34.010(***)(-)	
Denmark	2,00%[4]	2019	1.553.778	31.075,56	5,33	3.873	0,66	**11%**	1.203(*)(--)	4.165(***)	Different data year
Estonia	5,80%[4]	2020	212.116	12.302,73	9,25	639	0,48	**5%**	2.265(*)(-)	20.623(*)(-)	**11%**
Finland	6,50%[3]	2015/2019	1.208.580	78.557,70	14,21	290	0,05	**0%**	437(*)(-)	86.437(*)(-)	**0%**
France	3,98%[4]	2017	16.125.769	641.805,61	9,50	204.291	3,02	**24%**	232.840(*)(-)	896.033(*)(-)	**26%**
Germany	3,50%[1]	2017	16.161.777	565.662,20	6,80	123.775	1,49	**18%**	1.271.242(*)(---)	187.949(***)	Different data year
Greece	2,00%[4]		4.069.504	81.390,08	7,61	1.909	0,18	**2%**	20.000(*)(-)		
Hungary	3,52%[4]	2018	2.591.910	91.235,23	9,36	30	0,00	**0%**	7.265(*)(---)	10.676(***)(-)	Different data year

Iceland	3,60%[1]	2019/2021	117.153	4.217,51	11,51	0	0,00	**0%**	2.400(*)(-)	0	
Ireland	9.3%[3]		1.400.936	130.287.05	26.13	1.089	0,22	**1%**	13.052(***)	132.214(***)(-)	Different data year
Italy	7,50%[2]	2009/2021	12.067.193	905.039,48	15,23	143.253	2,41	**14%**	143.292(*)	1.053.793(***)	**14%**
Latvia	2,84%[2]	2021	524.858	14.905,97	7,84	0	0,00	**0%**	1.183(*)	15.792(*)	**7%**
Lithuania	7,30%[2]	2021	685.456	50.038,29	17,90	4.467	1,60	**8%**	7.267(***)(-)	60.392(*)(-)	**12%**
Luxembourg	3,89%[1]	2021/2022	129.925	5.054,08	8,02	5.151	8,17	**50%**	5.096(***)	9.338(***)(-)	Different data year
Malta	7,00%[4]	2018	90.063	6.304,41	12,23	1.466	2,84	**19%**	1.475(***)	1.475(***)(-)	Different data year
Netherlands	4,55%[1]	2020/2022	3.609.148	164.216,23	9,42	95.345	5,47	**37%**	84.018(***)	301.000(*)	**28%**
Norway	6,00%[1]	2022	958.339	57.500,34	10,69	392	0,07	**1%**	n.d.		
Poland	6,00%[2]	2021	8.587.394	515.243,64	13,60	1.262	0,03	**0%**	4.460(***)(-)	424.000(*)(-)	**1%**
Portugal	3,78%[4]	2019	4.477.906	169.264,85	16,44	0	0	**0%**	2.068(*)(--)	4.454(***)	Different data year
Romania	3,00%[4]	2021	3.501.732	105.051,96	5,45	801	0,04	**1%**	1.042(***)	53.596(***)	**2%**
Slovakia	5,00%[3]	2017/2019	1.357.068	67.853,40	12,43	4.655	0,85	**6%**	9.313(***)(-)	63.689(*)(-)	**15%**
Slovenia	8,40%[2]	2020	270.542	22.725,53	10,81	1.633	0,78	**7%**	2.167(***)(-)	25.856(*)(-)	**8%**
Spain	5,00%[2]	2010	17.327.572	866.378,60	18,29	39.972	0,84	**4%**	69.631(***)	1.963.529(*)	**4%**
Sweden	3,50%[3]	2017/2021	1.747.972	61.179,02	5,91	3.141	0,30	**5%**	3.301(***)(-)	63.243(***)(-)	**5%**
Türkiye	n.d.		26.680.761	n.d.	n.d.	n.d.	n.d.	**n.d.**	n.d.	n.d	
AVERAGE (all)	5%				11.53			12%			14%
AVERAGE (EU27)					11.64			13%			14%

Sources: (*) information provided by the countries in the ETC CE questionnaire; (**) (Eurostat, 2023b, 2023c); (***) (Eurostat, 2023a)

Notes:

[1] WCA performed on household waste

[2] WCA performed on mixed municipal waste

[3] WCA performed on residual waste

[4] Fraction of WCA not clearly specified

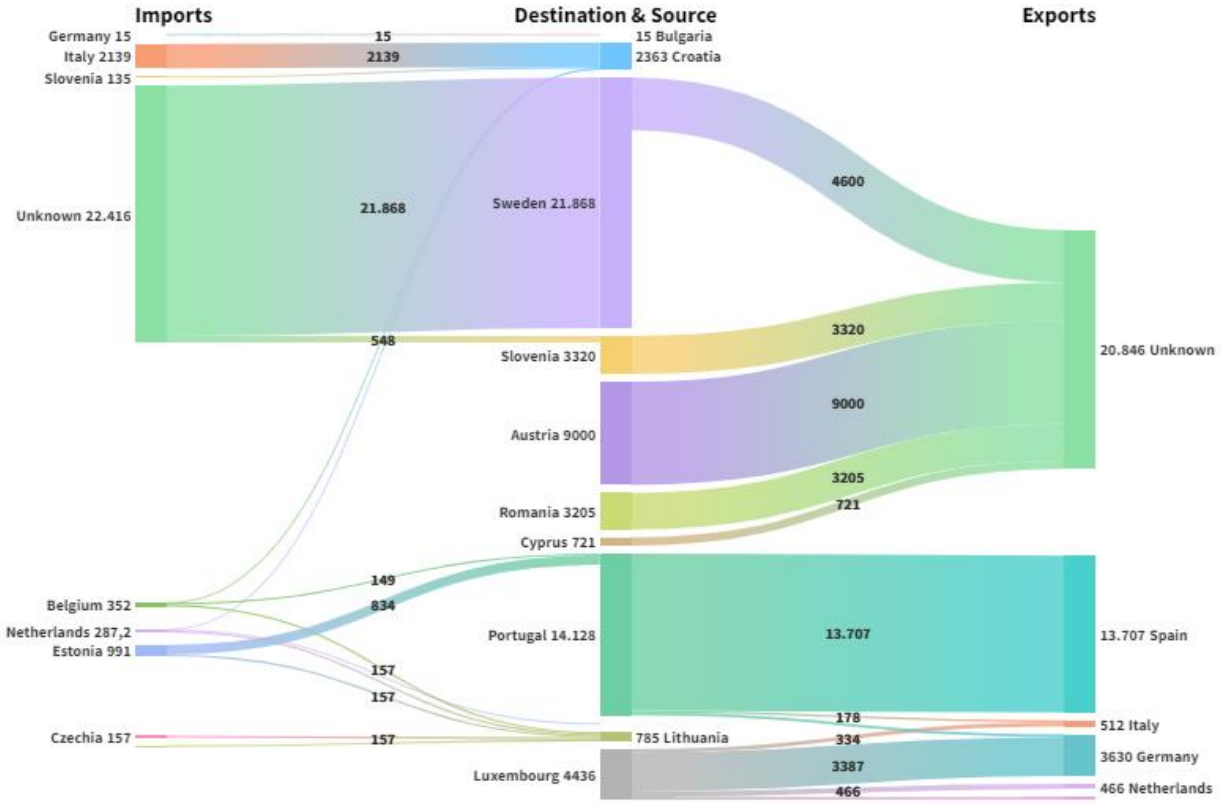
(-) reference year 2021

(--) reference year 2019

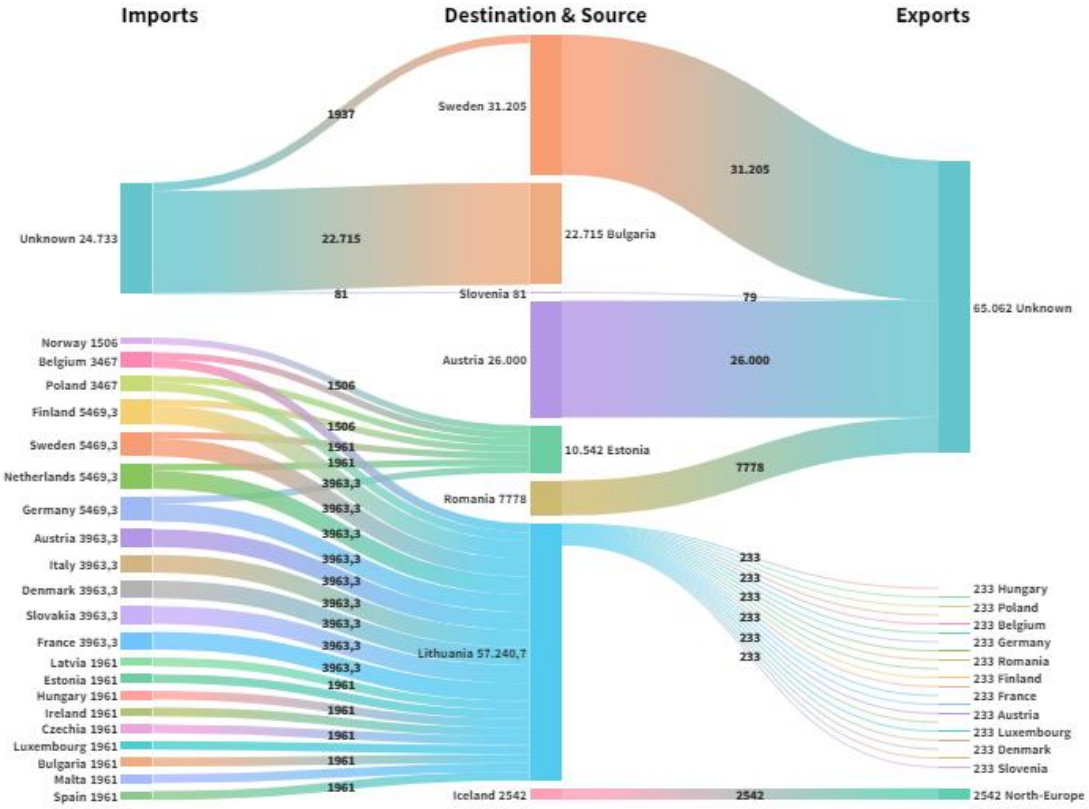
(---) reference year 2018

Annex 2 – Exports and imports of used textiles and textile waste

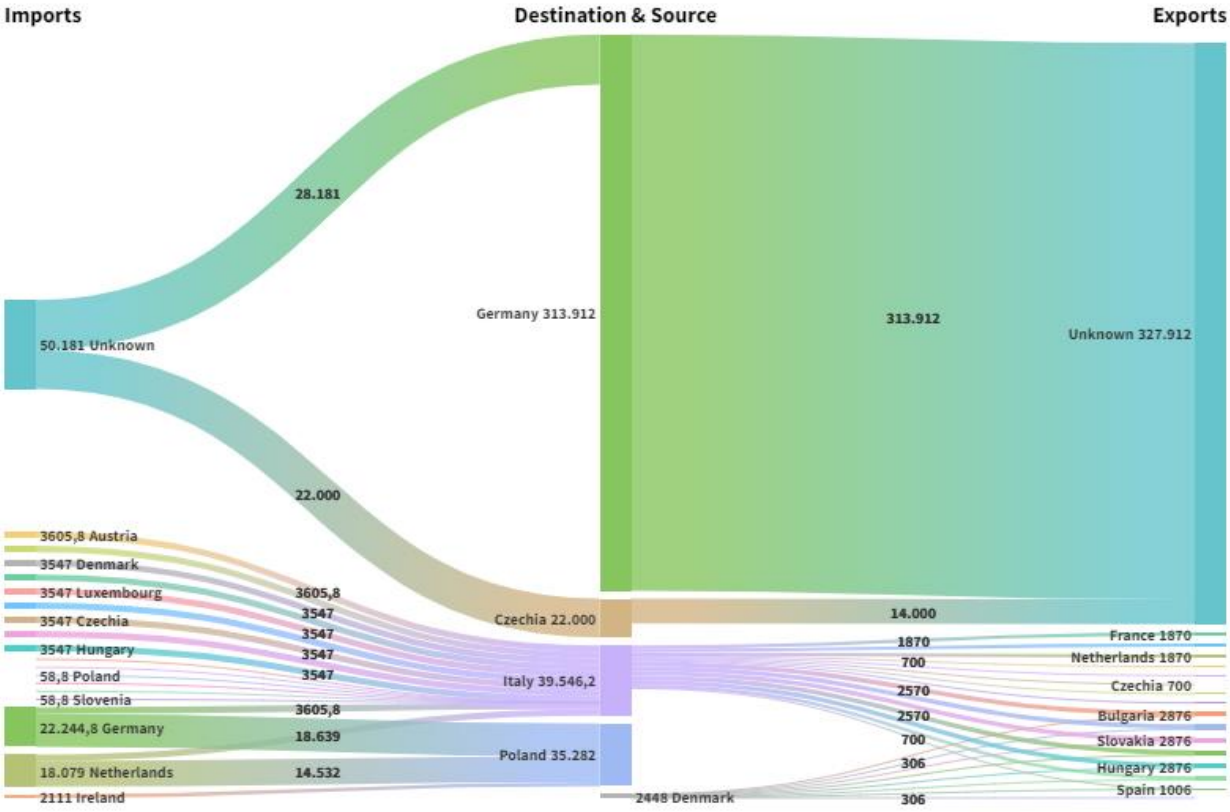
For recycling within EU



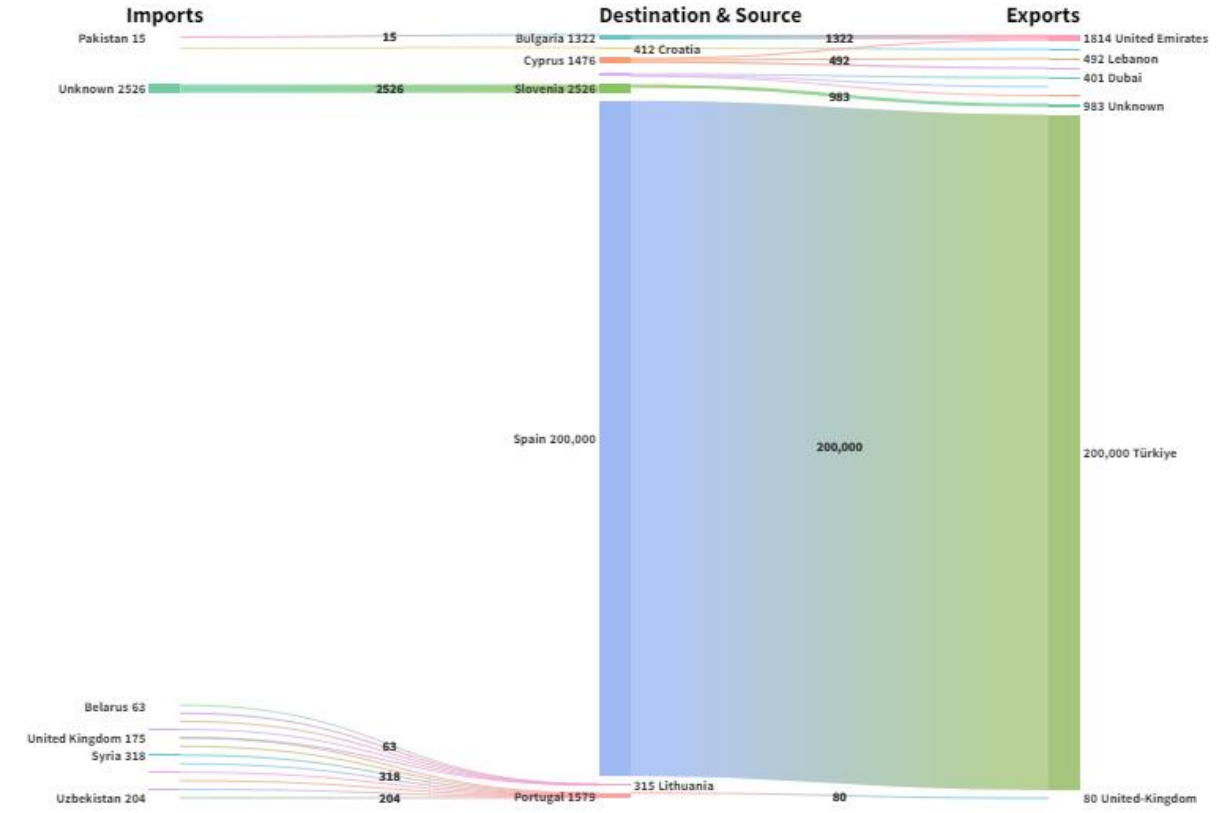
For reuse within EU



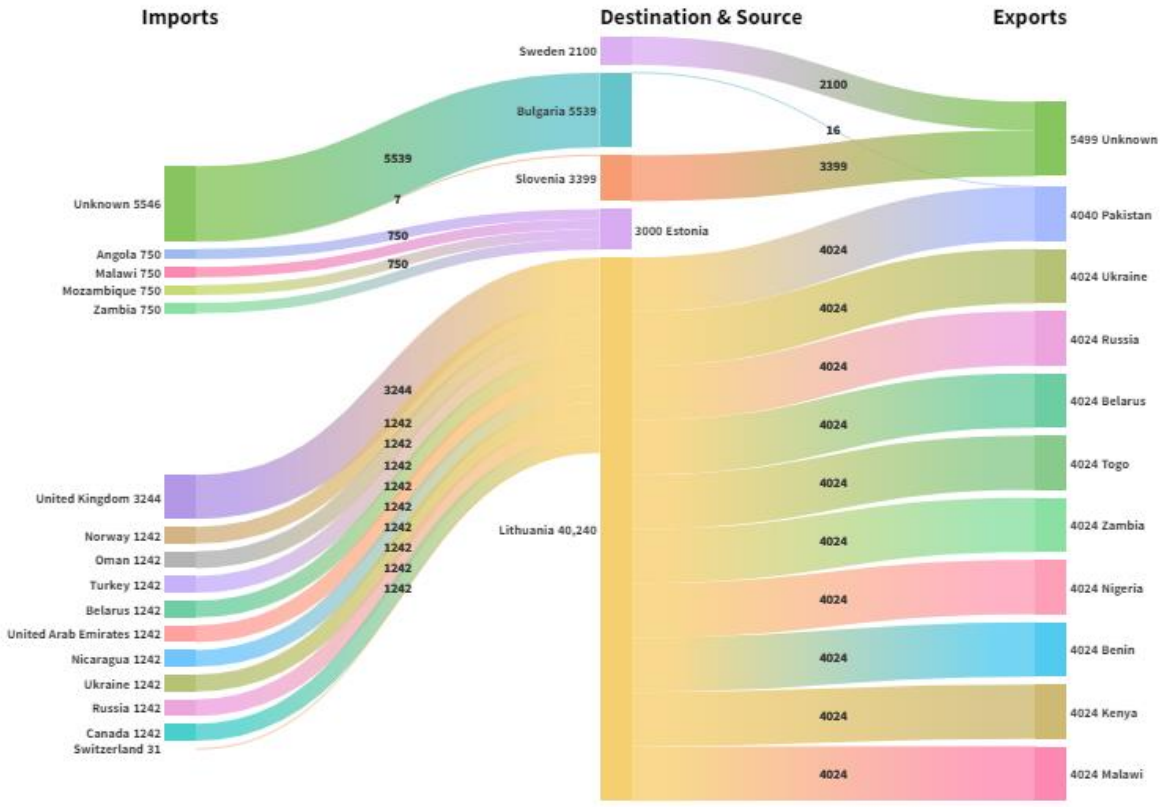
For reuse & recycling within EU



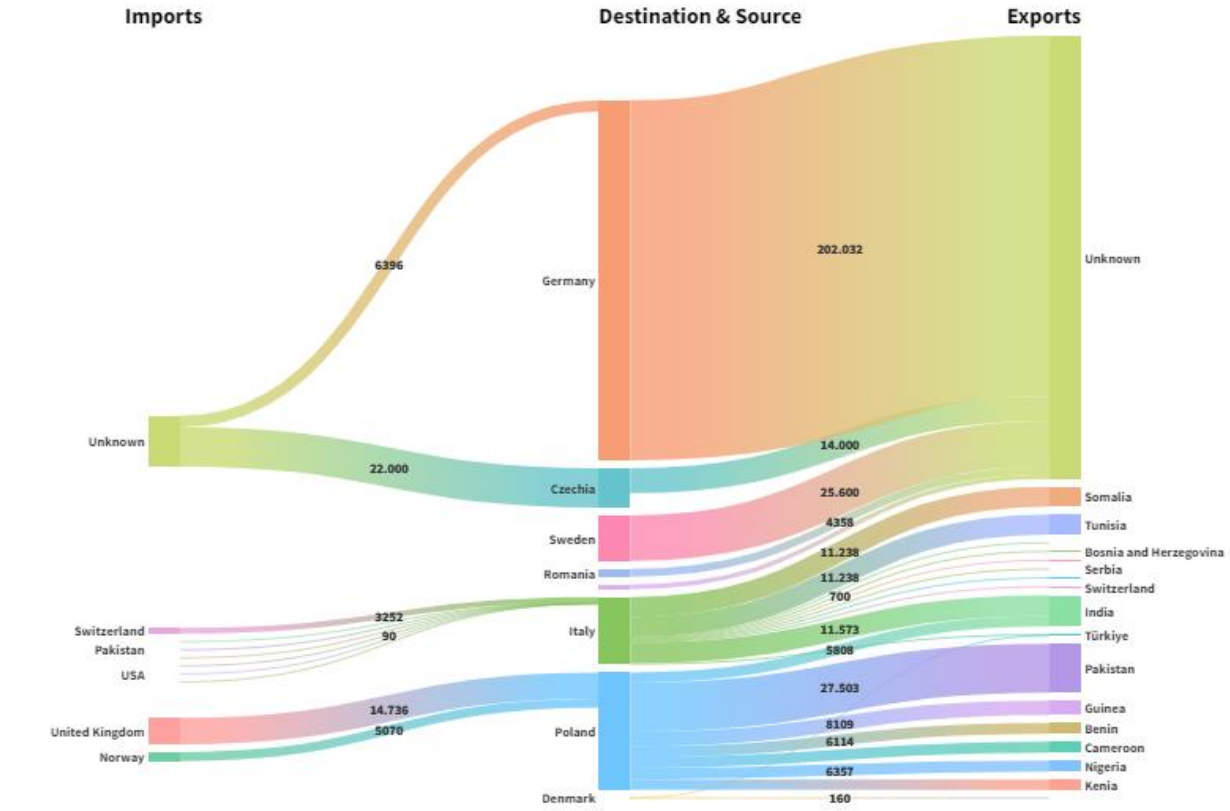
For recycling outside EU



For reuse outside EU



For reuse & recycling outside EU



Background information

Country	Reference year	Remarks
Austria	2020	
Belgium		No data available
Bulgaria	Not specified	
Croatia	2021	
Cyprus	2021	'1 476 tonnes exported to Lebanon, Togo, United Emirates.' Figure: Assumed equal distribution over receiving countries.
Czechia	2019	'The provided data are an estimation of total amount of exported textile waste to both within and outside the EU.' Figure: Data are depicted twice, for both inside EU and outside EU.
Germany	2018	
Denmark	2020	'Recycled amounts include amounts collected for recycling and preparing for reuse.'
Estonia	2021	The export figure provided is based solely on one major collector and reseller of used textiles; there is no data available for others.
Spain	2020	Only data available for export outside EU (Türkiye)
Finland		No data available
France		No data available
Iceland	Not specified	The Red Cross is currently the only actor exporting used textiles and textile waste.
Italy	2020	Example of input: '16 834 tonnes (LoW 200110 – 200111) exported to Bulgaria, France, Germany, Lithuania, Malta, Netherlands, Poland, Slovakia, Hungary' Data provided for Italy consisted of overall export/import figures with receiving/exporting countries. Indicated quantities consider both recycling and preparation for re-use as it was not possible to quantify the two separately. Figure: Assumed equal distribution over countries. Amounts are presented as designated for reuse.
Lithuania	2021	'Statistics Lithuania, data for 2021 according to combined nomenclature category 6309.' Data provided for Lithuania consisted of overall export/import figures with receiving/exporting countries. Figure: Assumed equal distribution over countries.
Luxembourg	2020	
Latvia		No data available
Netherlands		No data available
Poland	2022	
Romania	2020	
Sweden	2016/2020/2022	
Slovakia		No data available
Slovenia	Not specified	
Türkiye		No data available

Source: Information provided by the countries in the ETC CE questionnaire; graphics created with flourish.studio (https://flourish.studio).

Annex 3 - Selection of innovative research and pilot projects

There is a general need to subsidize R&D and industrialization projects. Different EU Member States, indicate that knowledge gaps and challenges related to efficient collection systems, sorting practices, preparation for reuse and recycling, recycling processes, EPR schemes and eco-design remain a major concern. A wide range of projects throughout the EU aim to tackle these questions and challenges.

As an example, the Sorting for Circularity Europe Project, led by Fashion for Good and Circle Economy, was completed in 2022 and provides insights into the attributes of post-consumer textiles present in the European market, along with an examination of the economic viability of recycling. Based on analyses conducted in Belgium, Germany, the Netherlands, Poland, Spain and the UK, this initiative identified the various types of textile waste being produced, the volume of waste that can serve as input for recycling, and the potential to redirect textile waste to entities employing innovative recycling solutions. The project focuses on textiles that cannot be reused in their original form and textiles that can only be resold at low prices. Their findings underline that it is crucial to increase investment into infrastructure that can sort and prepare textiles for reuse and recycling. As scalability is one of the core concepts, this study was extended to include Sorting for Circularity in India. Other Fashion for Good projects include the Full Circle Projects regarding man-made cellulosic fibres (report published) and polyester.

In Austria, various actors in the textile industry (e.g. Lenzing AG, Refibra) and research (e.g. TU Wien) carried out (pilot) projects regarding fibre recycling. For example, the TEX2MAT project, supported by the Austrian Research Promotion Agency (FFG), was a collaborative effort involving 13 research institutions and private enterprises. It aimed to develop an innovative process for recycling specific multi-material textile streams, focusing on pre- and post-consumer cotton-polyester blends from Austrian SMEs. The project employed a novel approach using enzymatic hydrolysis to transform cotton into glucose while retaining polyester as the primary polymer, enabling efficient recycling. This innovative process successfully demonstrated the complete removal of cotton from textiles and the weaving of new towels using recycled polyester. Furthermore, Lenzing, ARA, Salesianer Miettex, Caritas and Södra joined forces in a pilot project to produce Once More® pulp. In this project, Salesianer Miettex will divert non-reusable textiles to ARA, who will then transfer them to Caritas for manual sorting at a recycling plant. Caritas employs over 70 individuals with disabilities in this facility. Following sorting, the textiles will be sent to Södra for recycling and processing to produce OnceMore® pulp[28] from blended fiber textile waste, marking a world first in the industrial recycling of textile waste made from blended fibers. Lenzing will subsequently apply its REFIBRA™ technology[29] to produce new lyocell and viscose fibers from this pulp.

The Finnish FINIX project (2019-2025), funded by the Strategic Research Council established within the Research Council of Finland, investigates environmentally and socio-economically sound practices and business models for the textile industry, led by researchers from diverse fields including chemical engineering, fashion design and business management. In addition, the project focuses on shifting both production and consumption behaviors toward a more sustainable path.

In Belgium, by means of the 'Living Lab Carpet' project, Centexbel aims to *i.a.* initiate EPR within the carpet sector, map the value chain and logistics scenarios, test suitability of business models by involved partners and stakeholders, and provide guidelines for eco-design that facilitate reuse, repair and refurbishing.

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[28] In the OnceMore® process deployed by Södra by which cotton and polyester are separated from polycotton blends, one of the world's most widely used textile types. Nowadays the product contains 20% recycled textile and 80% wood, the ambition is to offer pulp that is for 50% made out of recycled textile material.

[29] The REFIBRA™ technology applied by Lenzing involves upcycling cotton scraps from garment production. These cotton scraps are transformed into cotton pulp. Up to one third of this pulp can be added to wood pulp, and the combined raw material is transformed to produce new virgin TENCEL™ Lyocell fibers to make fabrics and garments.

Through the Interreg North-West Europe program, Circtex together with other partners, aims to advance recycling and production technologies within a closed-loop process for PET workwear. This approach is designed to reduce the use of non-renewable input materials and minimize the ecological footprint in the textiles of the North-West Europe region. Throughout this project several technologies and processes for circular PET workwear are developed, such as mechanical and chemical recycling, no-waste production, recyclable laminates and accessories, the application of Wear2® yarn[30] and industrial microwave for (dis)assembly.

Within the context of the 'Labs on Fibre' project, a consortium of social-profit organisations, research organisations and profit-sector enterprises take on the challenge of maximizing high-quality recycling from non-reusable textile streams. The partnership is exploring the possibility of handling some of the processing itself, such as partial disassembly or initial sorting for recycling and aim to bring scale and focus to the transparent and sustainable processing of consumer textile sub-streams.

The SCIRT project is an EU-funded project that aims to demonstrate a circular textile-to-textile recycling system for discarded clothing or post-consumer textiles, focusing on the recycling of natural and synthetic fibres, as well as fibre blends. Another EU-funded project is the T-REX project, through which 12 partners across the recycling value chain work together to create a harmonized EU blueprint for closed-loop sorting and recycling of household textile waste. More specifically, household textile waste will be sorted and collected, and the project will showcase the complete recycling process for polyester, polyamide 6, and cellulosic materials into new garments. It also aims to establish sustainable business models for all involved actors, conduct a lifecycle analysis of the circular process, implement digital tools to streamline closed-loop textile recycling, and create circular design guidelines.

In addition, EURATEX launched their ReHubs initiative in 2020 which plans to pursue fibre-to-fibre recycling for 2.5 million tonnes of textile waste by 2030. The "Transform Waste into Feedstock" project is the first project supported through this initiative and addresses current sorting technologies and the related challenges like the accurate identification of materials. Hence, the project is led by Texaid AG and focusses on further developing and scaling sorting technologies.

[30] Wear2® yarn is made from polyester with an innovative core composition. When exposed to electromagnetic energy, this thread loses its strength, allowing garments to be disassembled quickly.

Annex 4 – Questionnaire sent to the Eionet Members

Questionnaire to Member States for providing information on textile waste management

Background and how to fill in the questionnaire

The EU Waste Framework Directive (WFD) sets a waste hierarchy which starts with prevention and ends with disposal. It was amended in 2018 and alongside other amendments it was legislated that Member States should promote re-use and repair, facilitating proper waste management and that by 1 January 2025 Member States shall set up separate collection for textiles.

The EEA and ETC/CE are developing a report on textile waste management in Europe, analysing and describing the collection, reuse, preparation for reuse, recycling and management of used textiles and textile waste. The aim of this report is to support Member States in implementing the upcoming legislation. The answers provided through this questionnaire will feed into this report.

The questionnaire is partly prefilled with data for textile waste that were reported to Eurostat[31]. We kindly ask you to review and where relevant complement the data. Sources can be specified below the corresponding table.

Country:

Institution Name:

Respondent Name:

Date:

[31] Eurostat (2023), ENV_WASGEN (unpublished); Eurostat (2023), ENV_WASTRT (unpublished); Eurostat (2023), WASTE_MUNDAT

Composition of mixed municipal waste

Please indicate the **% of textiles in the mixed municipal waste** (based on waste composition analysis). Please use the most recent data available and indicate the reference year.

Reference year		*Please specify corrections/comments*

Total municipal waste generated (tonnes)		*Please specify corrections/comments*
Mixed waste generated (tonnes)		*Please specify corrections/comments*
Textiles in mixed municipal waste (%)		*Please specify corrections/comments*
Shoes in mixed municipal waste (%)		*Please specify corrections/comments*
Reference year of composition analysis		*Please specify corrections/comments*
Waste composition data based on household waste only?		*Please specify corrections/comments*

Sources:

Textiles waste generated

Reference year		*Please specify corrections/comments*

Textiles waste generated in municipal waste (separately collected + textiles in mixed municipal waste) (tonnes)		*Please specify corrections/comments*
List of waste codes (LoW) for generated amounts only		*Please specify corrections/comments*

Sources:

Reference year		*Please specify corrections/comments*

Textiles waste generated (tonnes) - households		*Please specify corrections/comments*
Textiles waste generated (tonnes) – all NACE activities plus households		*Please specify corrections/comments*

Sources:

Do you have a **breakdown of the different types/sources of textile waste?** If so, please use the latest data year available.

Reference year	

Type of textile waste	Description	Tonnes	Specify
Post-industrial	Textile waste generated during the manufacturing of textile products and their precursors.		separately collected / mixed municipal waste fraction
Pre-consumer	Textile waste generated at retail stages (e.g., unsold textiles).		separately collected / mixed municipal waste fraction
Post-consumer from household sources	Textile waste that has been disposed of after consumption and use by the citizen (excluding textiles for reuse).		separately collected / mixed municipal waste fraction
Post-consumer from non-household or commercial sources	Textile waste that has been disposed of by end-users of commercial and industrial activities (hotel, automotive, etc.).		separately collected / mixed municipal waste fraction

Sources:

Textile products put on the market

Do you have information about the amount of textile products **put on the market**? If so, please use the latest data year available.

Reference year	

	Tonnes	Specify products that are included
Clothing and footwear (trousers, t-shirts, sweaters, coats, footwear, dresses, apparel accessories such as scarves, handkerchiefs, etc.).		
Household textiles (other textiles used in households, curtains, bed linen, carpets, etc.).		
Technical textiles, any textile product manufactured for non-aesthetic purpose, where function is the primary design criterion for industrial applications (automotive applications, medical textiles, agricultural textiles, protective equipment, etc.).		

Sources:

Separately collected amounts of textiles from households and similar sources (municipal waste statistics)

Please add the **volumes of the separately collected textiles**					
	2017	**2018**	**2019**	**2020**	**2021**
Tonnes					
Corrections/ comments					

Sources:

Please indicate **what is included in the reported figures**[32]:

	Included in the figures reported as separately collected amounts?
Clothing (trousers, t-shirts, sweaters, coats, dresses, apparel accessories such as scarves, handkerchiefs, etc.).	Yes / No
Household textiles (other textiles used in households, curtains, bed linen, carpets, etc.).	Yes / No
Accessories such as leatherware (bags, belts, etc.)	Yes / No
Footwear	Yes / No

Which **separate collection system** is in place for (post-consumer) textile waste collection? Please fill out the table below by marking the dominant separate collection systems in use with XX and the other significant collection systems with X. Additionally, if you have information about the amount of post-consumer textile waste collected via the different systems, please indicate the amounts (tonnes) or shares (%) per system in the two last rows.

	Door-to-door - separate	Bring point (>5 per km²)	Bring point (<5 per km²)	Civic amenity site
Cities (densely populated areas)				
Towns and suburbs (intermediate density areas)				
Rural areas (thinly populated areas)				
Collected amount (tonnes)				
Collection share (%)				

Notes:

(1) textiles collected by charities using bring banks fit within the 'bring point' system

(2) please specify whether collection through civic amenity site is on top of other collection system(s)

[32] As defined in the Textiles Labelling Regulation

Please add any comments on the information you have provided in the table to give a better understanding of the system in place.
Do you have **quantified information** about the convenience and coverage of the separate collection system? If so, could you provide this data? This could for example be data on the number of bring points per 100 000 inhabitants, minimum service requirements for municipalities or waste collectors, service levels defined in Waste Management Plans, etc.
Are there different collection systems in place for textiles for reuse, preparation for reuse and textiles for recycling? Please describe.
Are there **firm plans** to introduce or change the separate collection system of post-consumer textiles within the next 2 years? If so, please describe the planned changes and when they are expected to be implemented.
Who is **responsible** or currently taking responsibility for the collection of post-consumer textile waste? Please describe.

Which **share (%) of the population is covered** by textile waste collection services?
How has the share of population covered developed over time?
Are there any initiatives to improve the population coverage? Please describe.

Extended producer responsibility (EPR)

Is there an **EPR system** for textiles in place?	Not yet in place / Yes (voluntary) / Yes (mandatory)
If applicable, please **describe** the EPR system in place (coverage, responsibilities, fee and fee structure, mechanisms to prevent free-riding, …)	
If there is no EPR system in place yet, are there any preparatory activities for the introduction of an EPR?	

Legal framework and governance

Are there new **textile waste legislation and policies** planned? Please describe, as well as the timeline and when they are expected to come into force. How are they expected to impact practices for textile waste management?
What are the **key strategies or plans** to address textile waste management?
Are there any (long term) **objectives and quantified targets** regarding textile waste management? Please describe.

Treatment

When (at what stage) are textiles considered as waste and when are textiles considered as products for reuse? E.g. from the moment of collection, after sorting, at disposal, ….

What happens with the **total textile waste** collected (including textile waste from agriculture, manufacturing, etc.)? Do you have figures about the amount or share of collected textiles going to recycling, energy recovery, incineration, backfilling and landfill? If so, please use the latest data year available.

Reference year		*Please specify corrections/comments*

	Tonnes [1]	**Comments/corrections**
Recovery - recycling		
Recovery - backfilling		
Recovery – energy recovery		
Disposal – incineration		
Disposal – landfill and other		
Total waste treatment		

Source:

What happens with the **textile** waste in the municipal waste? Do you have figures about the amount or share of collected textiles going to reuse, preparation for reuse, recycling, energy recovery, incineration, backfilling and landfill? If so, please use the latest data year available.

Reference year		*Please specify corrections/comments*

	Tonnes [1]	**Comments/corrections**
Preparing for reuse		
Recycling		
Energy recovery		
Other recovery		
Total		

Source:

Is there currently a **ban** in place for the destruction of unsold textiles (e.g. overstocks)? If there is a plan banned, please indicate by when this ban will be in place.	Yes / No / Planned

Do you have more information or studies about a difference in treatment of the different sources/types (post-industrial, pre-consumer, post-consumer) of textile waste?

Do you have information about the volume or share of textiles that are being **exported** as second-hand textiles or textile waste?

Reference year	

	Tonnes	**Specify receiving counties**	**Before or after sorting**
Exported for **reuse** to within the EU			before / after / unknown
			before / after / unknown
			before / after / unknown
			before / after / unknown
Exported for **recycling** to within the EU			before / after / unknown
			before / after / unknown
			before / after / unknown
			before / after / unknown
Total exported within the EU			
Exported for **reuse** to outside the EU			before / after / unknown
			before / after / unknown
			before / after / unknown
			before / after / unknown
Exported for **recycling** to outside the EU			before / after / unknown
			before / after / unknown
			before / after / unknown
			before / after / unknown
Total exported outside the EU			

Sources: *(1)*
(2)

	Tonnes
Total exported before sorting	
Total exported after sorting	
Total exported for reuse	
Total exported for recycling	

Sources: *(1)*
(2)

Do you have information about the volume or share of textiles that are being **imported** as second-hand textiles or textile waste?

	Tonnes	Specify receiving counties	Before or after sorting
Imported for **reuse** from within the EU			before / after / unknown
			before / after / unknown
			before / after / unknown
			before / after / unknown
Imported for **recycling** from within the EU			before / after / unknown
			before / after / unknown
			before / after / unknown
			before / after / unknown
Total imported from within the EU			
Imported for **reuse** from outside the EU			before / after / unknown
			before / after / unknown
			before / after / unknown
			before / after / unknown
Imported for **recycling** from outside the EU			before / after / unknown
			before / after / unknown
			before / after / unknown
			before / after / unknown
Total exported outside the EU			

Sources: *(1)*
(2)

	Tonnes
Total imported before sorting	
Total imported after sorting	
Total imported for reuse	
Total imported for recycling	

Sources: *(1)*
(2)

What are the **existing capacities** for textiles waste sorting and recycling?

	Tonnes / year
Sorting capacity	
Recycling capacity	

Sources: *(1)*
(2)

What are the **planned capacities** (including existing) for textiles waste sorting and recycling? By when?

	Tonnes / year	**By when**
Sorting capacity		
Recycling capacity		

Sources: *(1)*
(2)

Are there any (planned) pilot projects on innovative textiles waste treatment? Please describe.

Are there any projects or initiatives on monitoring the concentration or dispersion of PFAS in waste textiles?

What is most relevant for you to learn more in relation to collection and management of used textiles and textile waste?

European Topic Centre on
Circular economy and resource use
https://www.eionet.europa.eu/etcs/etc-ce

The European Topic Centre on Circular economy and resource use (ETC CE) is a consortium of European institutes under contract of the European Environment Agency.

European Environment Agency
European Topic Centre
Circular economy and resource use