INDICATORS AND METHODS FOR MEASURING TRANSITION TO CLIMATE NEUTRAL CIRCULARITY

Task 5: Case-study group 1

Report for: DG RTD, Directorate B – Healthy Planet, Unit B1: Circular Economy & Biobased Systems

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1. INTRODUCTION

The transition to a circular economy (CE) must occur on multiple levels, from households and individual consumers to national and cross-border ecosystems. Measuring and monitoring the development of this transition is an ambitious task, ideally supported by indicators relevant to all steps in that process.

This case study is one of 19 developed for a research project into "*Indicators and methods for measuring transition to climate neutral circularity, its benefits, challenges and trade-offs*". It provides a detailed summary of the development and testing programme conducted for the textile sub-policy area during Task 5 of the project. The primary purpose of this case study is:

1. Provide an overview of the testing and monitoring method adopted for each indicator.
2. Outline the key results and performance of each indicator.
3. Highlight any challenges or lessons learnt from identifying, planning, delivering and analysing the relevant methodology for each indicator.

The aim of Task 5 is to take the learnings of all other Tasks thus far and develop and test the new indicators identified in Tasks 3 and 4 as having the potential to enable a deeper understanding of the three facets of circularity for the five fundamental approaches. This case study is a direct output of Task 5.

This case study focuses on the following five indicators outlined in Table 1.

Table 1. Overview of case study Group 1

URN		Indicator name	Methodology	Level of implementation				
				EU	National	City / Region	Companies	Household
T1	**1**	Jobs in textile repair	Desk research / stakeholder consultation	(x)[1]	x			
T2	**2**	Jobs in textile recycling	Desk research / stakeholder consultation	x				
T3	**3**	Separately collected textiles	Desk research / stakeholder consultation	x	x			
T4	**4**	Output from textile recycling	Desk research / stakeholder consultation	x				
T5	**5**	Share of recycled content in products put on market by European brand and retailers	Desk research / stakeholder consultation	x				

[1] The testing of this indicator was complemented with data collection and findings on the EU level, when available.

2. INDICATOR 1 – NUMBER OF JOBS IN THE TEXTILE REPAIR SECTOR

This indicator aims to measure the number of jobs in the textile repair sector at national level.

A key objective of the European Union's (EU's) Strategy of Sustainable and Circular Textiles is to increase product repair (European Commission, 2022), which through extended product use, ultimately reduces waste and resource consumption. Many EU Member States have introduced financial incentives to strengthen the professional textile repair sector, with ten Member States (Austria, Belgium, Czechia, Ireland, Luxembourg, Malta, Netherlands, Poland, Slovenia and Sweden) applying a reduced tax on clothing repair (Manoochehri et al., 2022). In November 2023, France introduced a "repair bonus", allowing consumers to claim back between €6 and €25 of the cost of mending clothes and shoes at affiliated repair workshops (Bonus reparation, n.d.). Since textile repairs are usually carried out locally, additional jobs and revenue opportunities emerging from increased textile repair are expected to contribute to local sustainable growth. The anticipated growth in professional repair activities is assumed to enhance job quality in this sector, driven by advancements in vocational training and qualification systems (Manoochehri et al., 2022).

To measure and monitor the prevalence of repair in Europe, the number of jobs in the industry was chosen as a suitable indicator in Task 4 of the overall study. There are many benefits to monitoring this indicator:

- It serves as a socio-economic indicator, providing insights into the textile repair sector's size and growth when measured over time.
- It reflects changing consumption patterns which result in an increase (or decrease) of textiles being repaired, correlating with employment in the textile repair sector.
- It helps to monitor the effectiveness of EU efforts to promote repair activities, and of national incentives for repair, such as the French repair bonus.

Currently, the textile repair sector is facing difficulties due to low prices of new products, high prices of spare parts, standard exchange procedures, and a shortage of qualified workforce that can adapt to the development of the repair profession (ADEME, 2023a). Thus, for countries that introduced incentives for repair, monitoring the number of jobs in the textile repair sector can provide insights into whether their initiatives are effective.

2.1 KEY METHODOLOGY

2.1.1 Testing method

The scope of this indicator is the number of professional jobs in the textile repair sector, such as tailors carrying out repairs of clothing and household textiles (sheets, curtains, towels), excluding jobs in leather and footwear repair. Unpaid work, such as repairs at home or in community projects (e.g. in repair cafés), is not accounted for. Furthermore, it excludes repair jobs within the retail and brand sector, even though some of these companies offer textile repair activities (e.g. Jules and Patagonia), as this activity is still not widespread and thus would not significantly impact the value (ADEME, 2023a).

Since no data is available on the number of jobs in textile repair at a European level[2], France was selected as a case study to test the possibility of obtaining a value for this indicator. France was the first EU Member State to introduce an Extended Producer Responsibility (EPR) scheme for textile products in 2007 and has since been at the forefront of promoting a circular textile industry[3]. Since November 2023, France has offered a "repair bonus" for the repair of clothing, household textiles and footwear, where consumers benefit from price reductions at certified repair professionals (Bonus reparation, n.d.)[4]. The French Agency for Ecological Transition ADEME regularly publishes data on the development of the repair sector in France as part of their

[2] Statistical data on the professional textile repair sector is not available in European statistics since the repair and alteration of clothing are covered by NACE code "95.29 Repair of other personal and household goods". This category also includes the repair of musical instruments, books and bikes, amongst others, and is not broken down by these subcategories.

[3] More information on the French EPR scheme for textile products can be found here: https://www.ecologie.gouv.fr/produits-textiles-tlc

[4] The repair bonus is financed through the EPR contributions of producers to the Refashion Repair Fund. More information on the initiative can be found here: https://faq.refashion.fr/hc/fr/sections/10368497194269-Bonus-R%C3%A9paration

overall work on driving and monitoring the circular transition[5]. France, therefore, served as an ideal case to assess employment in textile repair.

The testing encompassed an analysis of the available data in France and the methods used to obtain this data, identifying potential data gaps and methodological challenges. It then evaluated whether, and under which requirements, this methodology could be extended to all EU countries. The testing method included desk research and stakeholder engagement. The data collection and analysis are primarily based on the French case study. Still, the testing of this indicator was complemented with data collection and findings on the EU level, when available.

2.1.2 Data collection process

The data collection for this indicator started with a broad stakeholder outreach to public authorities and other organisations in France. This included the producer responsibility organisation (PRO) Refashion, the National Statistical Institute INSEE, and several government agencies and ministries to explore the availability of data on jobs in textile repair in France[6]. In the data collection process, it became apparent that ADEME had previously developed an indicator on jobs in textile repair, providing detailed information on their methodology and data collection. Hence, the assessment of this indicator is based on further stakeholder engagement with ADEME, including an expert consultation, to investigate the methodology and data collection process underpinning this indicator in France. ADEME generously provided access to some of their data models, while other calculations had to be reconstructed based on the methodology provided.

No national statistical data on the number of repair jobs in France is available. The methodology for this indicator has been developed by ADEME and is based on the extrapolation of data from the National Registry of Trades (RNM)[7] by the Chamber of Crafts and Trade (CMA)[8], the French company registry SIRENE, the French Social Security Agency URSAFF (formerly ACOSS) and INSEE. Thus, this indicator requires the collection of data from a multitude of other sources available in France. This includes the following resources:

Table 2. Overview of data sources (France)

Source	Type of data
National Registry of Trades (CMA)	• Number of companies
French company registry SIRENE	• Number of establishments
National Registry of Trades (CMA)	• Number of companies with “Répar’acteurs” label9
French Social Security Agency URSAFF (ACOSS)	• Number of employees

At the EU level, Eurostat data are unavailable for textile repair due to the absence of a specific activity code. In the forthcoming NACE Rev. 2.1, effective from 2025, textile repair will continue to fall under the broad category of household goods repair, with minor adjustments to the NACE 95.29 code to encompass "Repair and maintenance of personal and household goods n.e.c." (not elsewhere classified) (Eurostat, 2024). Table 3 provides an overview of the NACE Codes available for repair activities in European statistics.

[5] Six studies on the repair sector were carried out before on behalf of ADEME, the latest being the “Panorama de l’offre de reparation en France – actualisation 2022” which was published in February 2023.

[6] A more detailed list of the stakeholders contacted at this stage is provided in the data collection plan available on request.

[7] Répertoire National des Métiers

[8] La Chambre des Métiers et de l'Artisanat

[9] The Réparac’teur label is a voluntary label for craft workshops that engage in repair activities in France.

Table 3. Overview NACE Rev. 2.1. Codes for repair activities

Group 95
95.10 Repair and maintenance of computers and communication equipment
95.21 Repair and maintenance of consumer electronics
95.22 Repair and maintenance of household appliances and home and garden equipment
95.23 Repair and maintenance of footwear and leather goods
95.24 Repair and maintenance of furniture and home furnishings
95.25 Repair and maintenance of watches, clocks and jewellery
95.29 Repair and maintenance of personal and household goods n.e.c.

2.1.3 Calculations

This indicator requires multiple calculations to identify 1) the number of companies operating in the textile repair sector, 2) the number of employees, and 3) the number of self-employed individuals. The calculations are based on the methodology developed by ADEME.

1) Number of companies in textile repair

The number of companies operating in the textile repair sector is calculated based on data provided by the RNM. ADEME used the RNM for the identification of the total of craft workshops that carry out repair activities as primary or secondary activities in France, since it used to be mandatory for independent craft businesses to register themselves[10]. It is based on NAFA codes[11], which are more precise and allows to break down the data for specific NAF codes[12] that cover several areas of repair (such as NAF code 9529Z, which covers the repair of bicycles, textiles, sports and camping equipment, books, musical instruments, toys and other household goods). The following NAFA codes have been included in the development of this indicator:

- 1413ZA : Modelling - fashion designer
- 1413ZB : Manufacture of custom-made women's clothing
- 1413ZC : Manufacture of custom-made men's clothing
- 3299ZB : Other manufacturing activities
- 9529ZC : Alteration workshop

All companies registered under the category 9529ZC “alteration workshop” have been included in the calculations since this is specific for repair. For all other categories, the share of companies carrying out repair activities has been calculated based on the share of companies labelled "Répar'Acteurs". CMA and ADEME have collaborated to create this label, distinguishing craft workshops engaged in repair activities as their primary or secondary function. This label, aimed at promoting repair work and reducing waste, is awarded to workshops verified by the CMA (La Chambre des Métiers et de l'Artisanat, n.d.). For this indicator, it serves as a vital tool for identifying workshops that are involved in repair activities. Table 4 below details the number and percentage of "Répar'acteurs" labelled workshops for each NAFA code, offering a precise, albeit not exhaustive, representation of the number of repair workshops in France[13].

[10] Since 1st of January 2023, the RNM has been replaced by the national registry of enterprises (RNE) in France. Before, companies with less than eleven employees needed to register themselves with the RNM if their activity fell within the scope of the RNM; companies with more than ten employees may be registered with the RNM if their manager can claim to be a craftsman or artisan. More information can be found here: https://entreprendre.service-public.fr/vosdroits/F23887

[11] NAFA (Nomenclature d'Activités Française de l'Artisanat) is the French classification for handicraft activities.

[12] NAF (Nomenclature d'Activités Française), is a classification of productive economic activities used in national statistics, following the same structure as the NACE codes on European level.

[13] The 'Répar'acteurs' label, which has been in existence for over 10 years, is available to companies registered in the RNM at no cost. This label serves as an indication of the commitment to repair services and circular economy practices. While data on repair workshops without this label is unavailable, the presence of 'Répar'acteurs' labelled workshops offers a useful but not exhaustive representation of the number of repair facilities in France.

Table 4. Number of companies operating in textile repair in France (2021)

NAFA Code	Title	No. of registered artisans	No. of Répar'Acteurs	% of Répar'Acteurs
1413ZA	Modelling - Fashion designer	1556	66	4.2%
1413ZB	Manufacture of custom-made women's clothing	4825	184	3.8%
1413ZC	Manufacture of custom-made men's clothing	220	7	3.2%
3299ZB	Other manufacturing activities	522	17	3.3%
9529ZC	Alteration workshop	**5120**	327	6.4%
	Total (excl. Alteration)	**7123**	274	3.7%
	TOTAL	12243	601	10.1%

2) Number of employees in textile repair

Due to the lack of employment figures available for the NAFA codes, a distribution key has been developed for the broader NAF code 9529Z, “Repair of other personal and household goods”. This key was used by ADEME to allocate the jobs within the overall category in proportion to the number of companies in each of the relevant NAFA sub-codes listed in the National Registry of Trades[14]. Through this, 29.3% of the jobs relating to the overarching NAF code have been allocated to textile repairs (ADEME, 2023a).

3) Number of self-employed individuals in textile repair

For each establishment without registered employees, an additional job has been allocated to fill the existing data gaps. This is based on the assumption that the high number of establishments without employees results from many people working in this sector as self-employed, rather than mistakes in the registry entries from companies that no longer operate.

2.1.4 Timeline

The project timeline is shown in Table 5.

[14] The methodology (ADEME, 2023b) does not offer additional information regarding the redistribution key. The data sheets provided by ADEME lack these calculations, and the expert consultation did not yield further insights on this specific aspect.

Table 5. Gantt chart for T1

Gantt chart

WC	18/Dec	25/Dec	01/Jan	08/Jan	15/Jan	22/Jan	29/Jan	05/Feb	12/Feb	19/Feb	26/Feb	04/Mar	11/Mar	18/Mar	25/Mar
Task 1 - Initial desk research															
Task 2 - Data collection requests															
Task 3 - Investigation of available data															
Task 4 - Replication of calculations															
Task 5 - Stakeholder engagement															
Task 6 - Simple testing on EU level															
Task 7 - Write up case study															
Review period															
Key deliverables									Expert interview		Initial draft case study		Draft case study		Final case study

Legend

	Task progress
	Christmas holiday
	Review period
	Key deliverable

2.1.5 Data gaps and mitigation

ADEME followed an indirect approach to estimate the number of companies in the textile repair sector where no distinct NAFA code exists. Companies were identified through relevant NAF codes, and the proportion of businesses registered as "Répar'Acteurs" in categories not explicitly mentioning repair. However, due to the absence of employment data specific to NAFA codes, a redistribution key was applied to the broader NAF category "repair of other personal and household goods". Additionally, for companies without any registered employees, ADEME assumed one additional job per establishment to include self-employed textile repairers. Consequently, the data for this indicator is derived from extrapolating data across various sources.

Table 6 provides an overview of all identified data gaps.

Table 6. Overview of identified data gaps, limitations and mitigation efforts

	Description of data gap	Mitigation efforts	Level of confidence
1	Number of textile repair companies cannot be segregated in national statistics.	• Repairers have been identified using the NAFA codes of the national registry of crafts (CMA). • The share of "Répar'Acteurs" has been used to identify repairers in codes that do not mention repair. • Cross-referencing of national company registry numbers using NAF codes and SIREN numbers.	Medium
2	Number of employees in textile repair cannot be segregated in national statistics.	• A distribution key has been applied to allocate the jobs in the overall NAF category "repair of other personal and household goods" to textile repair.	High
3	Number of self-employed textile repairers cannot be segregated in national statistics.	• A distribution key has been applied to allocate the jobs in the overall NAF category "repair of other personal and household goods" to textile repair. • For each company without any employees, one self-employed has been calculated.	High

2.1.6 Quality review of analysis

The methodology for ADEME's "Panorama de l'offre de réparation en France" has evolved since its 2007 inception to track changes in France's repair sector accurately. ADEME ensures regular updates and revisions of the indicators and methodologies for each edition, maintaining overall consistency (ADEME, 2023b)[15]. The quality assurance process for this indicator focused on a comprehensive understanding of ADEME's complex methodology, including its assumptions and limitations. To achieve this, a thorough examination of the published methodology was integral but insufficient since some information was missing. Therefore, an expert consultation was held with an ADEME technical expert to gain detailed insights into the methodologies and calculations employed. Additionally, any inconsistencies observed between the methodology and ADEME's report findings were systematically documented and addressed in writing.

Here is a short summary of the quality review process is provided below:

- Mid-December: Quality Assurance (QA) internally on data collection plan with Project Management team.
- January and February: Informal internal QA and sense-checking with colleagues engaged in textile projects and colleagues engaged in other indicators.
- Early February: Expert consultation with a technical expert from ADEME on clarification of methodology and data collection process.
- Mid-February: Further clarifications on inconsistencies between methodology, data collection sheet and report with ADEME via email.
- Late February: Formal internal QA and sense-checking with colleagues engaged in textile projects.

2.2 KEY ANALYSIS RESULTS

2.2.1 Analysis

The first part of the analysis is based on the findings from France, and the second part investigates the data availability on the EU level.

France

The textile repair sector included 5,349 companies, with 7,490 establishments that employed approximately 2,050 workers in 2021. In addition, 7,668 self-employed repairers worked in this sector. Thus, around 9,700 people worked in this sector in France, of which almost 80% are self-employed[16].

[15] For instance, in the recent edition, the Yellow Pages were no longer used as a data source for identifying textile repair companies, accounting as a source for 36% in the previous edition. This is due to GDPR-related restrictions limiting its added value beyond the INSEE database (ADEME, 2023b).

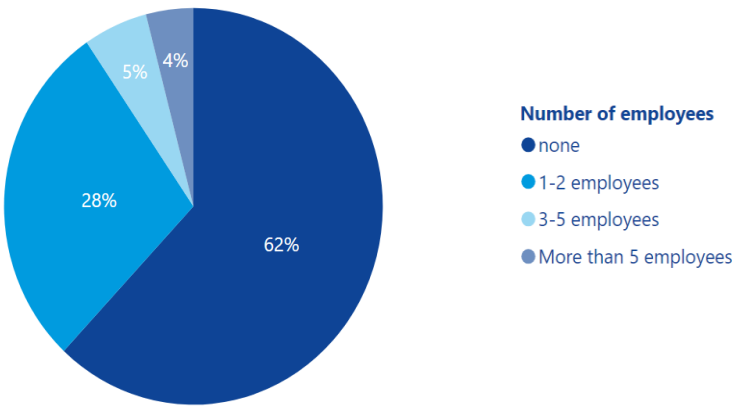
[16] These figures are based on the calculations provided by ADEME. However, they do not match with the numbers in their written report, due to some inconsistencies that were addressed with ADEME, but not resolved.

Table 7. Overview of the textile repair sector in France (2021)

Indicator	Source	Retail		Repairers	Total repair
		No.	% Reparation (share of Répar'Acteurs)		
Number of companies	National statistics (NAF Codes)	n/a	n/a	n/a	n/a
	Expert data (RNM)	7.123	3.8%	5.120	5.394
	Total	7.123	3.8%	5.120	5.394
Number of establishments	National statistics (NAF Codes)	n/a	n/a	n/a	n/a
	Expert data (RNM)	10.136	3.9%	7.095	7.490
	Total	10.136	3.9%	7.095	7.490
Number of employees	National agency ACOSS (NAF Codes)	14.928	3.9%	1.469	2.051
	Expert data (RNM)	n/a	n/a	n/a	n/a
	Total	14.928	3.9%	1.469	2.051
Number of self-employed	Total	12.785	3.9%	7.170	7.668
Total number of jobs	**Total**	**27.713**	**3.9%**	**8.639**	**9.719**

The French textile repair workshops are craft businesses, of which three out of four establishments (75%) do not have employees (ADEME, 2023a). A more detailed analysis is provided for the sub-category of “alteration workshops”, where 62% of businesses are without employees, and only 4% of all businesses have more than five employees in 2022 (Figure 1). These findings are in line with the overall characteristics of the European repair sector, where the sub-sector of repair of other personal and household goods consists of relatively more minor companies (Manoochehri et al. 2022).

Figure 1. Company size of alteration workshops (NAFA Code 9529ZC) in France (2022)



The total number of company employees in France was determined based on a distribution key within the NAF category 9529Z, “Repair of other personal and household goods.” In this category, textile alteration workshops comprise 29.3% of all establishments (ADEME, 2023a).

For comparison, in Italy, the 2018 data for the occupational composition in the repair category shows that 18.2% of the workforce comprises garment and related trades workers, encompassing tailors, dressmakers, furriers, and hatters (Manoochehri et al. 2022)[17]. While a direct comparison of these figures is not possible due to methodological differences, it is conceivable that France’s occupation within textile repair may be higher, positively influenced by policy efforts to encourage clothing and household textile repairs.

ADEME regularly conducts studies on the repair sector in France and includes an assessment of its development over time. The figures from 2017 – 2021 indicate a slight increase in employees working in tailoring and repair workshops during this period despite a drop in 2020 (ADEME, 2023a)[18].

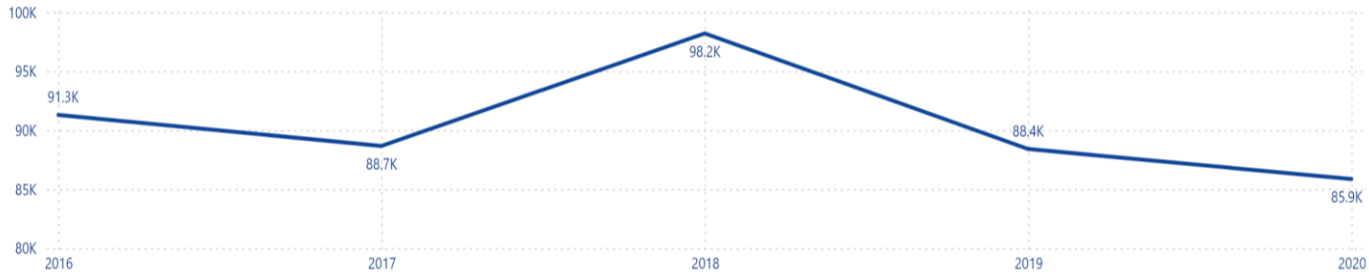
EU-level

On a European level, there is no specific data on jobs in textile repair. This lack of specificity may reflect a gendered view of work, where textile repair, traditionally seen as part of the domestic sphere, is not recognised as a separate economic activity (Andrew, 2021). Such classification overlooks the professional significance of textile repair, a sector associated with female labour[19].

It has been found that only around 0.3% of all employees in the EU are working in repair services – including repairing computers, textiles, and other goods (Lechner et al., 2021). In 2019, the “repair of other personal and household goods” jobs accounted for 19% of the people working in the business-to-consumer repair sector in the EU (Manoochehri et al., 2022). In this category, there were about 86.000 jobs in 2020, decreasing from roughly 91,000 in 2016, and a peak of 98,000 in 2018, according to Eurostat data (see Figure 2).

These figures from Eurostat do not allow a more detailed analysis of jobs in textile repair, and it is essential to note that Eurostat's statistics only include companies registered with repair activities as their primary function. This approach excludes those companies that offer repair as a secondary activity, such as tailors that offer primarily custom-made clothing but also carry out repair activities.

Figure 2. Number of jobs in repair of other personal and household jobs in EU (2016 – 2020).



The lack of European statistical data will continue after the newest version of NACE rev. 2.1 enters into force, since the NACE 95.29 code will only undergo minor modifications to encompass "Repair and maintenance of personal and household goods n.e.c." (not elsewhere classified), still combining various activities under a single category. Unlike the distinct category for repairing watches, clocks, jewellery, and various electronic goods categories, this revision will not provide a more detailed breakdown of textile repair activities. This hinders a more nuanced monitoring and analysis of textile repair activities across the EU. A direct inquiry by

[17] These figures are from the ETC CE Report 2022/6. The original reference is from the Italian Labour Force Survey, 2018, which can be accessed here: https://www.istat.it/en/archivio/289718

[18] In these figures, only 3,9% of companies under code 1413Z have been considered, based on the share of companies labelled “Répar’Acteurs” in these sections.

[19] There is no gender-specific data available for textile repairers, but it has been found that 84% of professional tailors are women in Germany in 2021. Retrieved from: https://www.deutsche-handwerks-zeitung.de/frauen-im-handwerk-eine-bestandsaufnahme-zum-weltfrauentag-166993/

our team to Eurostat about revising NACE codes better to represent CE activities, including textile repair, remains unanswered at time of writing[20].

The data collection template is included in Appendix 7.1.

2.2.2 Limitations

Besides the limitations arising from the data gaps mentioned above, the following fundamental limitations have been identified for this indicator:

- No comprehensive dataset combines employment figures with specific economic activities related to textile repair. Consequently, this indicator is constructed from a multifaceted approach that includes extracting data from various sources, making assumptions to bridge data gaps, and employing extrapolation techniques. As a result, the job numbers presented should be regarded as the best possible approximation under the circumstances, providing a basis for comparative analysis over time rather than definitive figures.
- Repair activities carried out by brands and retailers are not accounted for. While their share of overall textile repair is assumed to be insignificant today, it might become relevant to include them in the future due to the growth of circular business models in the fashion industry and the upcoming Ecodesign for Sustainable Products Regulation (ESPR).21 This could include jobs related to brands offering product repairs to customers or take-back schemes where damaged pieces get repaired for resale (Ellen MacArthur Foundation, 2021).
- It is unclear whether the number of jobs is measured in full-time equivalents. The French national employment statistics are provided in full-time equivalents (FTE) (Institut national de la statistique et des études économiques (INSEE), 2023). In contrast, the Eurostat employment statistics for economic activities based on data reported by the EU Member States do not distinguish between full-time and part-time work (Eurostat, 2024). In contrast, the Eurostat employment statistics for economic activities based on data reported by the EU Member States. The data does not distinguish between full-time and part-time work (Eurostat, 2024). Therefore, it is unclear whether the number of jobs can be equated with the number of employees in the sector.
- Repairers not registered as “Répar’Acteurs” are not accounted for, likely resulting in an underestimation of repairers in NAFA categories that are not specific to repair.
- Measuring the number of jobs in textile repair does not provide any qualitative insights into employment, such as job quality, inclusion and skills.

2.2.3 Performance

A revised RACER assessment was conducted, with the following justification for the scoring:

Relevance: This indicator aligns fully with the EU Strategy of Sustainable and Circular Textiles, which supports the European repair sector and creates sustainable growth and local jobs. It also aligns with national strategies by EU Member States to promote textile repair.

Acceptability: Measuring employment in the CE is widely accepted as a metric by all key stakeholders. An overall indicator of jobs in the recycling, repair, and reuse sector is part of the EU CE Monitoring Framework (CEMF). Studies of the repair sector on the EU level, as well as national studies for France, have included an assessment of the jobs in this sector.

Credibility: ADEME has developed a comprehensive methodology for measuring jobs in textile repair in France, which is regularly updated and improved. The existence of this methodology was not known at the point of the first RACER assessment, resulting in a higher RACER score in the present assessment than before. The units of measurement (number of jobs) are straightforward to communicate.

[20] A direct inquiry to Eurostat was made via email on the 16/02/2024.

[21] The ESPR will set ecodesign requirements for specific product groups (including textiles) to improve their circularity, energy performance and other environmental sustainability aspects. Increasing the reparability of products will be a key aspect in the regulations, which will likely increase the number of repair offerings provided by brands.

Ease: Data collection is expensive since segregated data on textile repair are not available in national statistics. Therefore, this indicator requires extrapolation of data from multiple sources.

Robustness: The methodology developed by ADEME over many years is considered robust. However, it cannot easily be replicated due to the many required data inputs. Moreover, it cannot be applied to other EU Member States due to the country-specific datasets and the national French repair label used in the calculations.

This indicator primarily measures the social impact of the CE. It provides insights into local employment since most jobs are carried out by self-employed individuals and micro enterprises. Thus, it is closely linked to the economic impact, which, in the case of France, is complemented by a broader set of indicators assessing the development of the textile repair sector. It would be beneficial to complement this indicator with a qualitative assessment of the working conditions for tailors.

The number of jobs reflects shifts in consumer behaviour favouring repairs over disposal since it is assumed that professional repair does not replace repairs otherwise carried out at home (Manoochehri et al. 2022). Indirectly, this indicator sheds light on the environmental impact of repair since the number of jobs is closely linked to the number of items being repaired, indicative of extended product lifetimes and reductions in GHG emissions, waste production and primary resource use (Manoochehri et al. 2022).

This indicator is part of ADEME's regular assessment of the repair sector in France and is thus designed to measure progress over time.

Table 8 provides an overview of the RACER evaluation for this indicator, before and after the completion of the testing programme.

Table 8. RACER evaluation

Stage of project	RACER criterion					Score
	Relevance	Acceptability	Credibility	Ease	Robustness	
Task 4 (original RACER assessment)	3	3	2	1	2	11
After Task 5 (following testing)	3	3	3	1	2	12

2.3 CHALLENGES AND LESSONS LEARNED

2.3.1 Challenges

The methodology and data used in France are intended to be comprehensive and replicable in other countries. However, the replication process proved to be significantly more challenging than expected. One reason for this is the complex modelling and extrapolation method underlying this indicator developed by ADEME; another is the identified inconsistencies between the methodology and the actual calculations. For instance, the written methodology specified that the following four codes were to be included in calculating the number of companies in textile repair (ADEME, 2023b):

- 1413ZA: Modelling - fashion designer
- 1413ZB: Manufacture of custom-made women's clothing
- 1413ZC: Manufacture of custom-made men's clothing
- 9529ZC: Alteration workshop

However, discrepancies arose during replication attempts. The numbers from the calculations based on these categories did not match ADEME's results. It was discovered that ADEME included an additional category, 3299ZB: "Other manufacturing activities", from the registry of trades, without mention, in the methodology. These inconsistencies hindered the ability to replicate the methodology applied by ADEME accurately. While the consultation with a technical expert from ADEME clarified certain aspects, some issues persisted. These were addressed in follow-up emails but could not be resolved since ADEME subcontractors carried out some of the calculations.

2.3.2 Lessons learned

ADEME's development of the indicator is part of their broader studies on repair activities across various product categories in France over time. These studies assess the evolution, new practices, and key economic metrics such as the number of companies, turnover, and employment in different repair sectors, including textiles. Therefore, this indicator should be viewed within the larger framework of policy measures promoting repair activities and ongoing monitoring efforts in France rather than as an isolated metric.

The methodology for assessing the number of jobs in textile repair is intricate and multi-layered. Despite our team's extensive efforts, we could not fully replicate the figures provided for France, and certain inconsistencies remained unresolved. This experience underscores that the indicator in question demands significant effort in data collection and calculations, highlighting its complexity and the challenges in replication.

2.4 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that this indicator is considered for further development, with significant work required to facilitate its progress.

The methodology employed in France is relatively complex and cost-intensive, relying on data from multiple sources and preliminary calculations. The methodology can be considered robust since it has been improved over time and is regularly reassessed by ADEME, even though we could not fully replicate it. Its methodology cannot easily be applied in other EU Member States since it is built upon country-specific data sets such as the French national registry of trades and the unique “Répar’Acteur” label, which does not exist in other EU Member States.

Despite these challenges, it is recommended that this indicator be developed further since the number of jobs in the textile repair sector reflects the overall developments in the sector, such as the economic viability of professional textile repair and the number of items being repaired. Considering that ‘job numbers’ is a common employment indicator for the circular economy, and textiles are a key focus area for the EU in enhancing circular economy practices with repair as a priority, measuring the "number of jobs in textile repair" is deemed appropriate, and should remain the name for this indicator. However, alternative metrics may be more feasible depending on the availability of data at a national level. For instance, these could include evaluating the sector's economic turnover or the volume of items repaired, using tax data as a reference. Furthermore, to achieve a more holistic understanding of employment in textile repair, it is recommended to complement the indicator on the number of jobs with more qualitative means of data collection on the quality of jobs[22].

The development of indicators for the repair sector should be accompanied by the development of specific targets at the national level. In France, there are currently no specific targets for the number of textile repairers related to the indicator developed by ADEME. However, the objective is to increase the volume of textile repairs by 35% from 2023 – 2028 by introducing the “Repair Bonus” (Refashion, 2023); and the objective of Refashion is to have 1.500 registered companies participating in this initiative by 2025[23].

The textile repair sector in Europe is generally very fragmented and comprises many small enterprises with few employees, often operating as independent repairers. There is no trade union or industry association at the European level for textile repair or tailoring professionals, and national associations of tailors focus predominantly on promoting custom-made clothing. As shown in the case of France, some professional tailors carry out both customised orders and repair activities. This, along with the lack of overarching representation, makes it generally very difficult to provide reliable data on the textile repair sector in Europe in the absence of specific activity codes in national statistics.

On a European level, it is currently impossible to extract data on the number of jobs in textile repair. This will continue to be the case after implementing the revised NACE classification system, where textile repair will remain within the umbrella category of “repair and maintenance of household and other goods”. The current limitations in Eurostat's classification are also reflected in the CEMF, where jobs in the CE are monitored on a vast scale, encompassing jobs in waste management, recycling, repair, and sale of second-hand goods

[22] The Circular Economy Indicators Coalition (CEIC) offers a summary of how to measure the social dimensions of employment-related indicators for a circular economy (Circular Economy Indicators Coalition, 2023).

[23] This objective is not publicly available on the website of Refashion but has been stated on several French websites referring to a presentation from 07 November 2023 by Elsa Chassagnette, who is responsible for the Repair Bonus at Refashion. It can for example be found here: https://www.thewomensvoices.fr/business/video-elsa-chassagnette-presente-le-bonus-reparation/.

(Eurostat, n.d.). Many of the categories included are overly generalised and might include activities that do not necessarily contribute to closing the loop, such as collecting hazardous waste. Thus, further segregation of data and revising the NACE classifications would allow for more accurate monitoring of jobs in different CE sectors. However, revising these classifications will be long, complex, and resource-intensive.

On a more practical and medium-term level, professional textile repair activities could be promoted by creating an EU-wide label for repairers. Such an initiative could be integrated with the EC's ongoing efforts to establish a “Right to Repair” for consumer goods and the associated initiatives aimed at enhancing consumer access to repair. This could also be in synergy with implementing and harmonising EPR schemes for textiles, providing an opportunity to use the collected fees to promote textile repair activities.

Table 9. Summary of recommendations for T1

Type of recommendation	RACER Score addressed	Recommendation	Timeline	Key stakeholders or partners
Development of repair label	This would improve the ease of data collection across EU Member States, since the methodology by France cannot be replicated.	The creation of a European-wide label for repair shops should be considered, as part of the efforts on harmonising EPR-schemes for textiles across Europe and in light of the efforts to establish a “right to repair”.	Medium (1.5 – 5 years)	• DG RTD could facilitate the work. • National authorities and PRO-organisations responsible for the implementation of EPR schemes should be involved in the design and implementation. • ADEME, CML and Refashion should be consulted to share experiences on the Répar’Acteur label and Repair Bonus in France.
Inclusion of social dimensions of employment	This would not improve the RACER score for this indicator but provide a more robust picture of the employment in the textile repair sector in general.	To achieve a more holistic understanding of employment in textile repair, it is recommended to include social dimensions of employment, such as skills, quality and inclusion aspects.	Medium (1.5 – 5 years)	• DG RTD could lead the process on measuring skills and job quality in textile repair. • The Circular Economy Indicators Coalition (CEIC) to support the work. • ILO to support the work through on decent work indicators and just transition guidelines.
Revision of economic activity classifications	This would improve the ease of data collection and provide a more robust methodology across EU Member States.	To improve the monitoring and analysis of textile repair activities within the EU, it is recommended to revise the NACE classifications to specifically include textile repair as a distinct category. This adjustment would allow for more accurate tracking and understanding of the sector's contributions to the CE, addressing the current limitations in data collection and analysis.	Long (> 5 years)	• Eurostat in collaboration with the World Customs Organization (WCO)

3. INDICATOR 2 – NUMBER OF JOBS IN THE TEXTILE RECYCLING SECTOR

This indicator measures the number of jobs in textile recycling (specifically fibre-to-fibre recycling), at an EU-level.

Measuring the number of jobs in textile recycling in the EU is assumed to reflect the growth of the textile recycling sector, which is a prerequisite for the textile and clothing industry (TCI) to reduce the reliance on virgin fibres for textile production. Currently, the share of recycled fibres in total textile fibre production is around 7.9% globally, mostly recycled polyester from PET plastic bottles produced by Asian suppliers (Textile Exchange, 2022; Textile Exchange, 2023). As outlined in the EU Strategy for Sustainable and Circular Textiles, the EC wants to create a "*competitive, resilient, and innovative textile sector* [in which] *producers take responsibility for their products along the value chain, including when they become waste*" (European Commission, 2022). Sufficient fibre-to-fibre recycling capacities are thereby considered a key element for a circular textile ecosystem, and the EC calls on EU Member States to promote innovation and investments in circular textiles to create sustainable growth and local jobs (European Commission, 2022).

As such, monitoring jobs in textile recycling also highlights the social and economic benefits of building this capacity. In line with this, the EC has proposed different policy measures to accelerate the development of the separate collection, sorting, reuse and recycling sector for textiles in the EU. This includes the proposal for mandatory and harmonised EPR schemes for textiles in all EU Member States to facilitate the mandatory separate collection of used textiles from 2025 (European Commission, 2023a). This shift is expected to create "green jobs" in the EU while reducing the negative environmental impacts of textile production.

The main benefits of this indicator are:

- It contributes to quantifying the impact of recent EU efforts to boost textile recycling and circular job development within the EU, providing more granular insights at sectoral level.
- It can help to evaluate the economic and social effects of EU strategies and policies.

3.1 KEY METHODOLOGY

3.1.1 Testing method

Ideally, the scope of this indicator covers jobs at all stages of the process that are specific to the recycling of textiles: i.e. collection of used textiles, sorting and grading, cleaning and processing (e.g. mechanical or chemical recycling). The focus on fibre-to-fibre recycling rather than PET-to-textile recycling aligns with the EU Strategy for Sustainable and Circular Textiles (European Commission, 2022), since the latter is considered a downcycling of plastic bottles (Duhoux et al., 2021). It is suggested to exclude jobs in the spinning, re-manufacturing, distribution, and sales of clothes made from recycled fibres from this indicator; those working with these functions are rarely only working with textiles made from recycled fibres and including these jobs would then reflect the jobs of the fashion industry overall.

Regarding the geographical boundary, this indicator should cover the entire EU since the textile recycling industry operates cross-nationally, and textile waste management is covered by supra-national EU regulations such as the Waste Framework Directive (WFD). EU policies and strategies aim to establish a competitive European textile recycling industry, and existing initiatives by the European Apparel and Textile Organisation EURATEX (such as the RegioGreenTex[24] project and the Sustainable Textiles European Partnership (STEP2030)[25]) promote collaboration in research and development (European Commission, 2023b). The inclusion of Switzerland in the assessment of the European textile recycling landscape could be considered, as suggested by McKinsey & Company (Hedrich et al., 2022), due to its geographical position surrounded by EU countries. This integration might provide a more comprehensive understanding of the region's textile recycling dynamics (Hedrich et al., 2022).

[24] https://www.regiogreentex.eu
[25] https://euratex.eu/innovation-skills/

The testing method included desk research and stakeholder engagement.

3.1.2 Data collection method

The data collection for this indicator was conducted as an iterative process, continually evolving by testing various approaches and adapting new strategies when existing ones proved ineffective. This section provides an overview of the different approaches taken:

Statistical data

Eurostat was investigated to obtain continuously updated statistical data. There are no specific NACE codes for economic activities related to textile recycling. Thus, it is impossible to extract information on this indicator from Eurostat. For example, the textile collection is part of NACE E 38.11, “Collection of non-hazardous waste” (Eurostat, 2008).

Primary data collection from textile recyclers across Europe

The data collection for this indicator therefore aimed to collect primary data from textile recycling processing facilities across Europe, based on companies listed in the Recycler’s Database[26]. This database was developed by Fashion for Good and Circle Economy as part of their Sorting for Circularity Europe project and serves as a tool to map textile recyclers’ capabilities and to provide updated information about mechanical and chemical recycling facilities (Van Duijn et al., 2022). As the database does not include information on company size, we reached out to all 51 mechanical and chemical textile recycling companies operating in the EU and listed in this database (via an e-mail survey, see Appendix 7.2), asking them to provide data on their number of employees and the share of jobs related to textile recycling[27]. However, the response rate was very low, and thus, adequate data was not provided to measure this indicator.

Literature review of existing reports

Two key reports were identified which contained estimations of jobs in textile recycling in Europe:

- In 2020, EURATEX provided an estimate in their report “ReHubs: A joint initiative for industrial upcycling of textile waste streams & circular materials”. Here, it is suggested that for every 1,000 tonnes of textiles that are collected, sorted, and recycled, approximately 20 new jobs may emerge, potentially generating as many as 120,000 jobs across the EU (EURATEX, 2020). However, it is unclear what sectors are included in this estimation, when these new jobs are expected to arise, and what assumptions the figures are based on.
- In 2022, McKinsey estimated in their report “Scaling textile recycling in Europe — turning waste into value” that 15,000 new jobs in textile recycling could be created by 2030 in the EU and Switzerland (Hedrich et al., 2022). While this report encompasses information on the definitions and methodology supporting the overall analysis, it lacks detailed information concerning the job estimate.

Our team reached out to EURATEX and McKinsey respectively, to gather further information on their methodology and data collection process. We succeeded in arranging an expert consultation with one of the authors of the McKinsey report.

[26] https://airtable.com/appSHNfy7U4jB4kAt/shr4HXLP5MoJLQ8Bf/tbl3ILaQuQqA1Xxha/viwb29qFADWrUpSM3

[27] Some companies are operating in multiple waste streams, so this was to ensure that we would only count jobs related to textile recycling activities.

Less successful data search: RegioGreenTex Initiative and LinkedIn

Two other potential sources of information were tested without relevant results:

- The RegioGreenTex Initiative (https://www.regiogreentex.eu) aims to build a dynamic textile recycling ecosystem in Europe, including the creation of five regional textile recycling hubs. On the project website, information on the number of employees is provided for all participating partners. However, the group of partners does not encompass all relevant actors within the EU, and many of them engage in multiple business activities, with only a portion of their jobs directly linked to textile recycling. Thus, the data gathered does not reflect the true scale and characteristics of textile recycling employment across the EU. Our team did not consider it feasible to investigate each of these companies further to determine the share of business activities linked to textile recycling since this would have required direct stakeholder engagement with more than 40 companies. A formal request for additional data on job creation in textile recycling through the RegioGreenTex initiative was submitted. However, the response offering to share the request via the RegioGreenTex digital tool with project partners was received after an extended delay, and therefore not followed up further.
- A LinkedIn search using the keywords “textile recycling” and “fibre-to-fibre textile recycling” was conducted, using the filter option only to show companies based in the EU. The search results provide an overview of companies categorised by their size, which is determined by the number of employees falling within specified ranges. Based on the range of employees, a lower and upper estimate was calculated. However, LinkedIn does not provide an exhaustive list of companies operating in core textile recycling activities while potentially also including fashion brands that work with recycled textiles for the keyword “textile recycling”. Furthermore, many of these companies engage in multiple business activities, with only a fraction directly related to textile recycling. Some operations, and consequently jobs, are located outside the EU, resulting in an overestimation of jobs in textile recycling in the EU. While there are significantly fewer search hits for “fibre-to-fibre textile recycling”, some of these issues persisted. Hence, while this approach is low-cost and efficient in the data collection, the data gathered is of very limited analytical value. Rather, this provides an estimation of jobs in companies widely linked to textile recycling activities based on their self-descriptions of business activities – which is very different from the actual number of jobs in textile recycling.

3.1.3 Calculations

The job estimation conducted by McKinsey was based on a material flow analysis with data on the material volumes being processed at each step of the textile waste value chain (i.e. collection, sorting, pre-processing, and fibre-to-fibre recycling) (Hedrich et al., 2022) – with specific flows for different types of materials (cotton, polyester, man-made cellulosic fibres) and recycling techniques (mechanical and chemical recycling). Based on the information provided by actors in the value chains, McKinsey estimated the number of jobs needed at each step to process the registered amounts of textile materials. These calculations were used as a basis for the overall calculation of 15,000 EU-jobs created in a scenario where 50% of post-consumer textile waste gets collected separately in Europe by 2030, and in which around 1,7 million tonnes of textile waste becomes available for recycling (Hedrich et al., 2022).

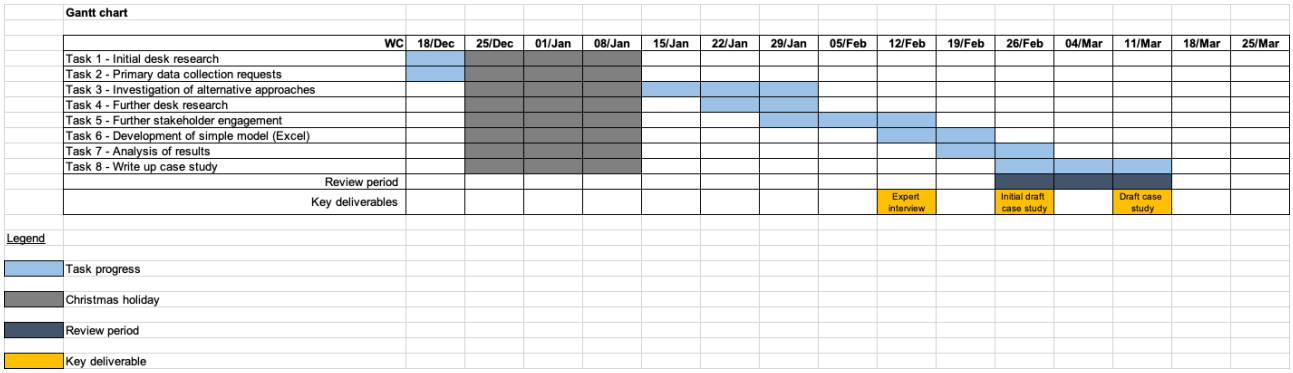
During an expert consultation, McKinsey provided additional data underpinning their calculations, and information on system boundaries, data sources, and methodology — to the extent possible, considering sensitive business data covered by non-disclosure agreements[28]. Based on this, a lower and upper estimate of jobs for each main step (collection, sorting, recycling) of the value chain was calculated. A more detailed breakdown was not possible due to the lack of disaggregated data.

3.1.4 Timeline

The project timeline is shown in Table 10.

[28] The expert consultation was conducted with one of the authors of the report” Scaling textile recycling in Europe – Turning waste into value” on 09/02/2024.

Table 10. Gantt chart for T2



3.1.5 Data gaps and mitigation

No national statistical data on employment in textile recycling is available since there are no specific NACE codes for these activities. In the study by McKinsey & Company (2022), the calculations of the number of jobs/tonne are based on a material flow analysis for all EU-27 and Switzerland, and the extrapolation of company data from the ReHubs Initiative (EURATEX, 2020). When no specific information for a certain technology or material was available, data was based on assumptions, including that there is no significant difference between the number of employees needed for chemical recycling of polyester or cellulose-based materials and that there is a higher demand for labour in mechanical recycling than in chemical recycling. All numbers underpinning the job estimate in the McKinsey study should be regarded as the best possible estimation rather than absolute figures; the results are expected to be fairly accurate on an aggregate level but not necessarily at a more granular level[29].

Table 11 provides an overview of all identified data gaps.

Table 11. Overview of identified data gaps, limitations and mitigation efforts

	Description of data gap	Mitigation efforts	Level of confidence
1	Data on gross textile waste volumes are not readily available.	• McKinsey used data from the Joint Research Centre (JRC) study in 2021 (Köhler et al., 2021), and country-specific reports. Country report data has been scaled up using Euromonitor data on apparel retail volumes (extrapolation).	High
2	Data on collection rates are not readily available.	• McKinsey used country-specific reports when available and filled data gaps with information from expert interviews. For each country, a separate assessment was conducted, based on the best available approach. For example, similar collection rates were assumed for comparable neighbouring countries.	High
3	Employment data from national statistics does not include specific codes for textile recycling activities.	• McKinsey based the estimation of jobs on those needed per tonne of material processed at each step of the textile recycling value chain. • McKinsey had direct access to company data through the ReHubs project. Data gaps were filled based on employment numbers per volume from similar materials and processes.	Medium

[29] It was stated in the expert consultation that McKinsey & Company are confident in the overall estimates, even though some of the individual data points may be inaccurate due to a lack of more precise data.

	Description of data gap	Mitigation efforts	Level of confidence
4	Lack of specificity for recycling-only activities in the job estimation by McKinsey, merging textile recycling and reuse jobs.	• McKinsey provided rough estimations on the share of jobs related to each step of the value chain, allowing calculation of lower and upper estimates. • The share of jobs in reuse vs. recycling was calculated based on the share of textiles fit for reuse versus the share that becomes available to recycling.	Low

3.1.6 Quality review of analysis

The McKinsey study builds upon the Joint Research Centre's 2021 report (Köhler et al., 2021), various country-specific studies, and expert interviews. The report lacks information on the methodology for the job number estimations, but one of the authors provided additional information through this testing programme. Industry stakeholders like EURATEX, the ReHubs initiative, and RegioGreenTex were not able to respond to requests for additional insights.

A short summary of the quality review process is provided below:

- Mid-December: QA internally on data collection plan with Project Management team.
- January and February: Informal internal QA and sense-checking with internal textile experts and colleagues engaged in testing other indicators within this project.
- Early February: Expert consultation with one of the authors from the McKinsey report regarding the methodology and data collection process of their job estimation.
- Late February: Formal internal QA and sense-checking with internal textile experts.

3.2 KEY ANALYSIS RESULTS

It is estimated that the post-consumer textile waste value chain currently employs about 9.000 people in the EU and Switzerland, covering the collection, sorting for reuse and recycling, and chemical and mechanical recycling[30]. Only about 1.170 to 1.710 of these jobs are directly related to recycling, whereas the majority is in the reuse sector, such as jobs in second-hand clothing stores.

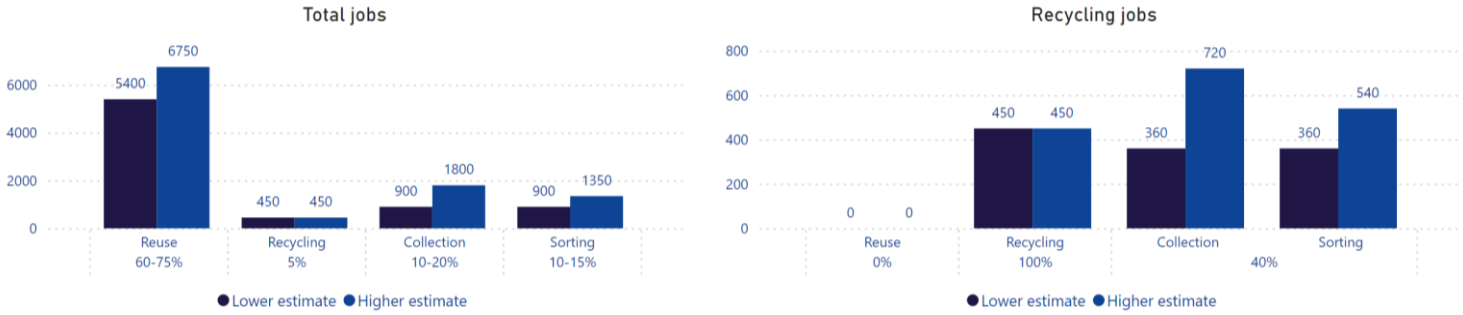
It is estimated that 60% of the collected textiles are sorted for reuse, hence 40% of the total labour in the collection and sorting process has been allocated to recycling (Hedrich et al., 2022). There are generally more jobs in the pre-stages necessary for textile recycling than in the mechanical and chemical recycling itself, reflecting the labour-intensive nature of the pre-processing activities compared to the capital-intensive recycling stage, which requires significant initial investment but less manual labour (Hedrich et al., 2022).

[30] The job share attributed to each stage of the value chain - collection, sorting, recycling, and reuse - is derived from a rough estimate obtained during an expert consultation with McKinsey & Company. The 5% figure for recycling jobs should be viewed with caution. The option of a range was considered; however, a 0-5% span was deemed inaccurate as it would falsely imply that there could be no recycling jobs, while a 5-10% range was also dismissed because it overstated the upper limit. Therefore, a precise 5% was chosen, opting against a more granulated range, such as 2.5–5%, to avoid conveying a false precision in the data's accuracy.

Table 12. Jobs in textile recycling in EU and Switzerland, 2022

Stage	Total jobs			Recycling jobs		
	Share (%)	Lower estimate	Higher estimate	Share (%)	Lower estimate	Higher estimate
Collection	10 - 20	900	1.800	40	360	720
Sorting	10 - 15	900	1.350	40	360	540
Recycling	5	450	450	100	450	450
Reuse	60 - 75	5.400	6.750	0	0	0
Total		**7.650**	**10.350**		**1.170**	**1.710**

Figure 3. Jobs in textile recycling in EU and Switzerland, 2022



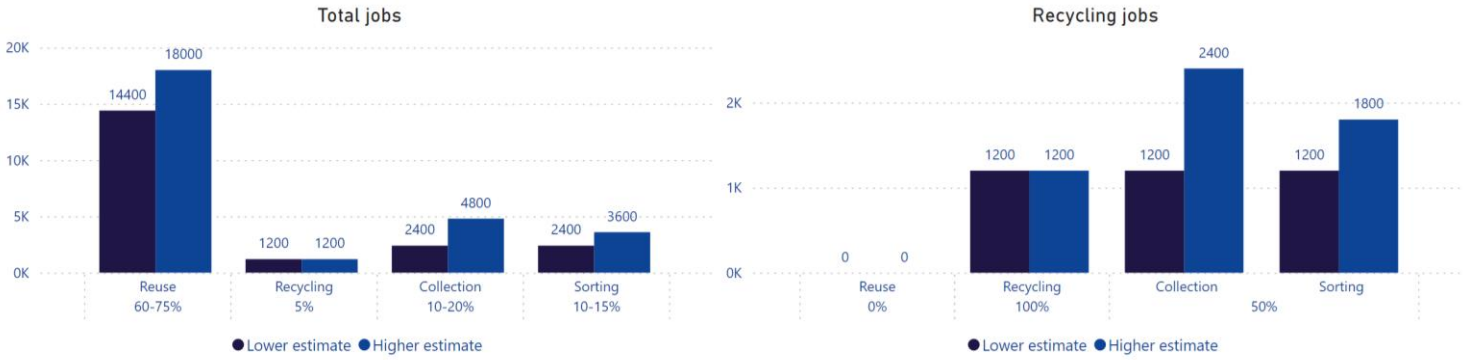
McKinsey estimates that around 15.000 new jobs could be created by 2030, based on a 50% collection rate of all EU post-consumer textile waste. As the quality of textile waste is expected to decrease with higher collection rates, the share of post-consumer textiles for recycling is expected to grow from 40% today to 50% in 2030 (Hedrich et al., 2022). For this scenario, there would be roughly 3.600 – 5.400 jobs directly related to textile recycling activities in 2030 (Table 13).

Table 13. Jobs in textile recycling in EU and Switzerland by 2030, according to base-case scenario

Stage	Total jobs			Recycling jobs		
	Share (%)	Lower estimate	Higher estimate	Share (%)	Lower estimate	Higher estimate
Collection	10 - 20	2.400	4.800	50	1.200	2.400
Sorting	10 - 15	2.400	3.600	50	1.200	1.800
Recycling	5	1.200	1.200	100	1.200	1.200
Reuse	60 - 75	14.400	18.000	0	0	0
Total		**20.400**	**27.600**		**3.600**	**5.400**[31]

[31] Calculations are based on data provided by McKinsey & Company (2022).

Figure 4. Jobs in textile recycling in EU and Switzerland by 2030, according to base-case scenario



Our estimate and McKinsey's original estimate of 24.000 jobs in textile recycling by 2030[32], including jobs in the reuse sector, are significantly lower than EURATEX's estimation. EURATEX suggests that for every 1.000 tonnes of textiles collected, sorted, and recycled, 20 new jobs may emerge, potentially generating as many as 120.000 jobs across the EU (EURATEX, 2020). Regardless of that, it remains unclear which sectors are included in EURATEX's estimation, when these new jobs are expected to arise, and what assumptions it is based on. This estimate deviates vastly from McKinsey's base-case scenario. This underscores the importance of transparency regarding definitions, data collection processes, and underlying assumptions.

However, these results do not consider technological advancements and efficiency gains from scaling textile recycling, assuming a similar distribution of jobs between the different stages of the recycling value chain. The following section analyses the potential for technological advancement and their impact on job creation in the different stages:

The sorting process is divided in two steps:

1. Sorting for reuse: At this stage, post-consumer textiles are sorted for textiles that can be sold for reuse. This takes place in manual sorting plants and is unlikely to become automated in the foreseeable future, since items are typically sorted into over 100 different product categories (Donatello, 2021). In one of the biggest sorting centres in Europe, employees sort between up to 300 grades (“Cotton rags” n.d.). This complex process of sorting according to quality, product type, size, style, markets, season, and other parameters requires experienced staff (Donatello, 2021). Thus, the increased collection of textiles is expected to create new jobs in manual sorting for reuse (Donatello, 2021).
2. Sorting for recycling: At this stage, textiles are sorted according to their fibres and compositions. Manual sorting remains prevalent, despite challenges for sorters to precisely determine fibre compositions, and growing demands for accurate fibre separation to meet the specific requirements of various recycling processes. Near-infrared scanning systems (NIRS) show potential in addressing these sorting challenges. While advancements are underway with test sites operational in Europe, the efficacy of NIRS in fully automated and accurate textile sorting is not yet established, and alternative technologies remain scarce (Hedrich et al., 2022). Thus, the demand for labour at this stage depends on the success of technological developments.

The pre-processing stage, where garments are disassembled and clean and non-fibre components (such as zippers, buttons, and mixed-fibre trims) removed, is mainly carried out manually today since advanced automated processes are not yet developed. It is usually integrated within sorting or recycling companies. In the future, this could become an independent step, or become integrated with the fibre-sorting step for chemical recyclers (Hedrich et al., 2022). Thus, the job development in pre-processing will depend on these developments.

Compared to sorting and pre-processing, where each individual garment has to be considered, the textile recycling process itself does not require a large number of workers, since these processes are largely

[32] The figure of 24,000 jobs by 2030 is not documented in the McKinsey report (2022) but was disclosed during the expert consultation. See footnote above.

automated. With further technological advancements and the scaling of fibre-to-fibre recycling, it can be expected that even fewer employees will be needed relative to the amounts being processed.

Future employment trends in the EU are closely tied to the economic viability of these processes. For instance, the potential relocation of sorting activities to lower-income countries, due to an increase in low-value textiles and labour market shortages, may negatively impact job creation in the EU if this is not compensated for through the introduction of EPR regulation (Van Duijn et al., 2022).

The data collection template is included in Appendix 7.3.

3.2.1 Limitations

In addition to the data gaps and mitigation strategies mentioned above, the following key limitations have been identified:

- The calculations underpinning this indicator cannot be replicated, due to the company data utilised by McKinsey & Company being subject to non-disclosure agreements. Consequently, the estimation is static, grounded in the best information available at the assessment time, and cannot be employed to track progress over time.
- The calculations for recycling-specific jobs are overly simplified, as they assume that all jobs in the collection and sorting process are exclusively related to either reuse or recycling. This overlooks the portion of textiles that are separately collected and sorted but ultimately end up being incinerated or landfilled due to factors such as low quality, fibre composition or economic viability.
- The number of jobs does not provide information on the quality of employment, including working conditions for these “new circular jobs” and the composition of the workforce, such as whether underprivileged workers or high-skilled workers are being employed.

3.2.2 Performance

A revised RACER assessment was conducted, with the following justification for the scoring:

Relevance: This indicator aligns fully with the EU Strategy of Sustainable and Circular Textiles to support the European textile recycling sector and create sustainable growth and local jobs.

Acceptability: Measuring job creation in the CE is widely accepted by key stakeholders as a metric, and an overall indicator of jobs in the recycling, repair and reuse sector is part of the CEMF. However, key stakeholders like EURATEX currently use this indicator to estimate how many jobs *could be created*, and not for an assessment of the jobs that exist already today.

Credibility: An extensive methodology for this indicator has been developed by McKinsey, but the methodology and assumptions regarding the job estimate are not publicly available. However, the initial estimate by McKinsey included jobs in the textile reuse sector, and due to a lack of more precise data, a relatively rough estimate of the share of jobs allocated to reuse vs. recycling was used by our team.

Ease: The cost of data collection is very high since segregated data on employment in the textile recycling value chain is not available in national statistics. It is therefore based on a highly complex assessment of material flows and the labour needed to process these at each stage of the value chain. Additionally, some of the company data used for this indicator is protected by non-disclosure agreements and hence very difficult to collect.

Robustness: The methodology developed by McKinsey & Company is very comprehensive and effectively mitigates the various existing data gaps. However, due to the many challenges in data collection, it can only be considered as an estimate and not an absolute number. Moreover, the calculations made by our team for the jobs in the recycling sector excluding reuse have been based on a relatively rough estimate, due to a lack of more specific data.

Due to the lack of replicability of the methodology applied to this indicator, it is not possible to measure the progress over time. The 2030 base-case scenario developed by McKinsey & Company allows for some forecasting of the development in the future, this comes with substantial uncertainty. The job growth will be influenced by technological progress, as some labour-intensive processes might be automated.

While this indicator, based on a material flow analysis, reflects both social and environmental facets of circularity, a more comprehensive social impact assessment is needed. It would be beneficial to not only quantify job creation, but to also evaluate the nature and conditions of these "new circular jobs". For example, it would be relevant to assess whether the working conditions in garment collection and recycling are safe and fair (Schröder & Howarth, 2019).

Table 14 provides an overview of the RACER evaluation for this indicator, before and after the completion of the testing programme.

Table 14. RACER evaluation

Stage of project	RACER criterion					Score
	Relevance	Acceptability	Credibility	Ease	Robustness	
Task 4 (original RACER assessment)	3	3	2	1	2	11
After Task 5 (following testing)	3	2	2	1	1	9

3.3 CHALLENGES AND LESSONS LEARNED

3.3.1 Challenges

A fundamental challenge is the lack of transparency in the textile recycling industry, making it inherently difficult to collect reliable data (Van Duijn et al., 2022). Existing platforms, such as the Recycler's Database by Fashion for Good, were created to overcome this fundamental challenge. However, the Recycler's Database does not include any information related to jobs, and the companies listed there were unwilling or unable to respond to our data collection request.

Currently, the only publicly available data related to jobs in textile recycling are estimates of jobs that *could* be created based on estimates provided by EURATEX and McKinsey & Company. Neither of the two reports included a clear methodology regarding the estimate of jobs. Thus, our team had to rely on more detailed information provided by one of the authors from the McKinsey study, which was provided orally via an expert consultation.

3.3.2 Lessons learned

The main lessons learned from the testing of this indicator are as follows:

- Sector fragmentation and data collection challenges: The most feasible approach to assessing jobs in textiles recycling was to correlate job numbers and volumes processed at each stage of the recycling value chain. This approach has its limitations and uncertainties, as volumes are not openly disclosed and do not fully correlate to job numbers, but it is still deemed superior to other tested methodologies.
- Interlinkage of reuse and recycling jobs: Distinguishing between jobs in the reuse and recycling sectors is difficult, as these value chains are closely intertwined. Considering them together offers a more holistic view of the circular aspects of the post-consumer textile ecosystem. This approach would better reflect the interconnectedness and shared value chain stages of the textile reuse and recycling sectors. However, the problem of the high cost of data collection remains.
- Importance of transparency in volumes of used textiles/textile waste: Enhanced transparency regarding the volumes of used textiles and textile waste processed at each value chain stage is crucial for providing more reliable job estimates. Better visibility into these volumes would not only increase the precision of the data, but also help identify industry trends and opportunities for strategic development and policy support.

3.4 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that this indicator is not considered for further development.

Considering that job numbers are a common employment indicator for the circular economy, and textile recycling a key focus of the EU Strategy for Sustainable and Circular Textiles, measuring the "number of jobs in textile recycling" was initially deemed appropriate. In the CEMF, circular jobs are measured as the "number of persons employed" in the following three sectors: the recycling sector, repair and reuse sector and rental and leasing sector, but more granular data on these activities across different product types and materials is not available[33].

This case study has shown that this indicator demands extensive data collection based on a material flow analysis, and faces many challenges related to the indirect approach followed and the limited availability and reliability of data on collection rates and textile waste volumes being processed across Member States. Non-disclosure agreements for company data further impede its replicability. The outcome of this indicator should be understood as an estimate rather than an absolute figure.

Considering the interconnectedness of the post-consumer textile value chain, it appears preferable to assess employment in the recycling and reuse sectors together. In practice, however, the cost of data collection may also be a barrier to this approach. Even if the indicator's scope is narrowed to the chemical and mechanical recycling process - excluding the collection, sorting and pre-processing stages - data collection would necessitate either company-based data or assessment based on recycling volumes, none of which are readily available. Additionally, this approach would focus on the stage of the textile waste value chain with the fewest jobs due to automation, offering limited insights despite high data collection costs. Therefore, neither of these alternative options is deemed worthwhile to pursue further.

Instead, it might be more relevant to monitor investment in textile recycling infrastructure across EU geographical regions, as this would better reflect increased recycling capacities than job numbers. Textile recycling is not expected to occur in all EU countries; rather, it will likely be clustered in regions close to textile production centres or other relevant infrastructure. Therefore, investment monitoring could offer insights into economic growth and regional development. Additionally, a more nuanced analysis of regional impacts is recommended, moving beyond quantitative employment assessments. For example, studying the social impacts of increased textile recycling in European hubs[34] could offer insights into qualitative aspects like working conditions in the industry. This is particularly relevant, as jobs currently classified as circular (such as within waste collection and recycling activities) do not necessarily offer decent working conditions (Circular Economy Indicators Coalition, 2023).

Lastly, it is important to increase overall transparency and data availability across the post-consumer textile value chain. This involves establishing a unified definition of textile waste and implementing an EU-wide reporting system for the processing and volumes of used textiles at various stages. This should be accompanied by the setting of specific targets for the prevention, collection, reuse and fibre-to-fibre recycling of used clothes and other textile waste, as called for by the European Parliament (European Parliament, 2023). Additionally, establishing an EU-wide feedstock platform connecting textile waste sellers and buyers, as suggested by McKinsey (Hedrich et al., 2022), could further facilitate transparency in this sector.

[33] See the EU Circular Economy Framework (CEMF): https://ec.europa.eu/eurostat/web/circular-economy/monitoring-framework

[34] This could be part of the ReHubs initiative by EURATEX, which aims to establish five hubs to process textile waste in Europe, creating new jobs across Europe.

Table 15. Summary of recommendations for T2

Type of recommendation	RACER Score addressed	Recommendation	Timeline	Key stakeholders or partners
R&D	This would not improve the RACER score for this indicator but provide a more robust picture of the employment in the textile recycling sector in general.	Qualitative impact assessment of employment conditions in the European textile recycling sector.	Short (0.5 – 1.5 years)	Circular Economy Indicators Coalition and EURATEX / Re-Hubs initiative as possible project leads or in collaboration with each other or other research projects
Development of guidance	This would not improve the RACER score for this indicator but provide a more robust picture of the textile waste streams in the EU.	Guidelines and harmonisation of the collection approaches and reporting standards across Member States.	Medium (1.5 – 5 years)	EC, EU Member States
Legislation	This would not improve the RACER score for this indicator but increase transparency and accountability in the textile waste management in the EU.	Development of binding targets for the separate collection and processing of textile waste, including fibre-to-fibre textile recycling.	Medium (1.5 – 5 years)	EC, EP, EU Member States to implement them at national level; EEA to monitor progress.

Type of recommendation	RACER Score addressed	Recommendation	Timeline	Key stakeholders or partners
Development of guidance	This would not improve the RACER score for this indicator but increase transparency across the post-consumer textile value chain.	Establishment of an EU-wide platform to connect textile waste sellers and buyers.	Medium (1.5 – 5 years)	EC, EURATEX with financial contributions from PRO organisations

4. INDICATOR 3 – TOTAL AMOUNT OF SEPERATELY COLLECTED TEXTILES

This indicator monitors the total volume of separately collected used textiles and textile waste by EU Member States in tonnes per year.

The separate collection of textiles, as opposed to mixed with general municipal waste, is a prerequisite for reuse and boosting the availability of textile waste for recycling, including fibre-to-fibre recycling. Currently, more than 15 kg of textile waste is generated per person in Europe annually, 85% of this stemming from consumers, and the remaining share from industry, commercial use and other non-household sources (Hedrich et al., 2022). Most of the textile waste generated goes to mixed municipal waste and is consequently incinerated or landfilled instead of reused or recycled (ibid.). This contributes to the consumption of virgin materials to produce new textiles. The revised EU WFD requires EU Member States to separately collect textile waste from 1st January 2025. This is expected to significantly increase the tonnage of post-consumer textiles available for reuse and recycling. The EC also proposed harmonised EU rules for EPR for textiles (European Commission, 2023b), providing the opportunity for the creation of EU-wide financing systems and infrastructure for the handling of textile waste, including the collection, sorting, preparing for reuse and recycling (Boiten, 2022).

The main benefits of measuring the volume of separately collected used textiles and textile waste are:

- It measures the absolute volumes available for sorting for reuse and recycling, reflecting the priorities of the EU Strategy for Sustainable and Circular Textiles and of the revised WFD.
- It provides insights into the efficiency of national collection systems, allowing to monitor progress after the mandatory implementation of separate collection in EU Member States
- It supports the assessment of the effectiveness of EPR schemes in those EU Member States that have introduced an EPR scheme for textiles. Reliable data on separately collected textiles helps to assess whether producers are meeting their obligations.
- It indirectly reflects changing consumption levels, since an increase or decrease in consumption will result in an increase or decrease in discarded textiles which are available for collection.

4.1 KEY METHODOLOGY

The system boundary for measuring the total volume of separately collected used textile and textile waste is as follows:

Textiles include clothing, household textiles, accessories, and footwear (as per the EU waste statistics submitted by Member States[35]).

Separate collection includes the collection of used textiles by municipal waste companies, charity organisations via bring-banks and kerbside collection, or second-hand shops and retailers. Hence, this includes textiles collected for reuse and separately collected textile waste that will be recycled or used for other end-of-life treatment (landfilling, incineration).

Used textiles and textile waste includes both reusable and recyclable textiles that are discarded. The term “textile waste” is often applied to these used or otherwise leftover textiles that are collected, regardless of their reuse and recycling value – thus lacking the differentiation between used textiles and textile waste[36]. This does not imply that the textiles are officially declared as waste, with varying practices between EU Member States. The practical differentiation between textile waste and used textiles only happens at the sorting facilities, where used textiles are sorted for reuse, recycling, or landfill/incineration (Donatello et al., 2021). For this case study, it is suggested to include all different categories of textile waste (including used textiles), as defined by JRC (Huygens et al., 2023):

[35] Information provided by EU Member States in data set for ETC CE (Deckers et al., 2024).

[36] Reflecting the differences in terminology, the authors of this case study report use “textile waste” when referencing other institutions or actors, but use “used textiles and textile waste” in their own language and assessment.

1. Post-industrial waste generated at the manufacturing stage of textile production.
2. Pre-consumer waste that is generated at the retail stage, such as unsold textiles.
3. Post-consumer waste generated at the household stage.
4. Post-consumer waste generated at commercial or other non-household stages (e.g. hotels, hospitals).

While post-consumer waste accounts for approximately 87% of all textile waste that is generated (Huygens et al., 2023), it is still desirable to include the other waste streams to improve the overall circularity of textiles.

The testing method for this indicator was based on desk research into the available data on separate collection across EU Member States, alongside stakeholder engagement with governmental institutions in France and the Netherlands to complement the analysis.

4.1.1 Data collection method

The initial data collection plan was to limit this indicator to France due to specific legislation for the collection and processing of used textiles, including an EPR law with targets for collection, reuse, and recycling (Ministère de la Transition Écologique et de la Cohésion des Territoires, 2017). However, after further consideration and expert consultation, it was decided to broaden the data collection and testing focus to the EU level. The reasoning for this was:

- Implementing a separate textile waste collection will become mandatory for all EU Member States starting in 2025, with the roll-out of EPR schemes already underway in several Member States. The indicator will therefore be relevant across all Member States, and it was deemed valuable to investigate the current scope for this indicator and provide an analysis of how it can be designed on an EU level.
- Definitions and practices of when used textiles are considered waste differ across Member States. Thus, a broader study would provide better value for monitoring separate textile waste collection in the EU.

The European Topic Centre on Circular Economy and Resource Use (ETC CE) is tasked with presenting reliable and comparable data on the CE in Europe. The ETC CE granted access to a data set on textile waste management compiled for a forthcoming report, thereby providing the most comprehensive data currently available at the EU level.

Recent publications from other relevant organisations (such as the JRC, Fashion for Good, and previously published reports by ETC CE) further informed the analysis.

4.1.2 Calculations

The indicator was calculated based on the data collected by the ETC CE (Manoochehri et al., 2022) for a forthcoming report on Textile Waste Management. Only data from EU Member States has been considered, with European Environment Agency (EEA) member countries that are not part of the EU excluded. When possible, the most recent data from 2021 was included; otherwise, the latest available data for each country was used. Generally, the total volume of separately collected textiles is calculated as the sum of all used textiles/textile waste collected. However, what exactly is included in this calculation varies between EU Member States, reflecting the differences in how textile waste is defined and whether collectors must be registered with national and/or local authorities (Watson et al., 2020).

When assessing textile collection, the following metrics are commonly utilised, accompanied by the subsequent calculations:

Collection rate: The collection rate is commonly calculated as the quantity of separately collected used textiles (“textile waste”) divided by the volume of new textiles put on the market in a given year.

Capture rate: The capture rate is calculated as the quantity of separately collected used textiles (“textile waste”) divided by the total textile waste generated (which consists of separately collected textiles plus textiles in mixed general waste). Thereby, the volume of textiles in mixed general waste is based on waste composition analysis (WCA) performed by the respective countries. The methodology and frequency of WCA are not standardised between countries[37]. While the collection and capture rates are not directly tested here, it is essential to include

[37] Differences exist between EU Member States on whether the share of textiles and shoes are analysed separately. Clear information and data on this are not always available.

these metrics in the broader assessment of the benefits and limitations associated with measuring absolute volumes of separately collected textiles.

4.1.3 Timeline

The project timeline is shown in Table 16.

Table 16. Gantt chart for T3.

Gantt chart

WC	18/Dec	25/Dec	01/Jan	08/Jan	15/Jan	22/Jan	29/Jan	05/Feb	12/Feb	19/Feb	26/Feb	04/Mar	11/Mar	18/Mar	25/Mar
Task 1 - Initial desk research															
Task 2 - Data collection requests (France)															
Task 3 - Data collection requests (NL)															
Task 4 - Revision of data collection plan															
Task 5 - Further desk research															
Task 5 - Data collection request (ETC/CE)															
Task 6 - Data analysis															
Task 7 - Write up case study															
Review period															
Key deliverables												Initial draft case study	Draft case study		

Legend

- Task progress
- Christmas holiday
- Review period
- Key deliverable

4.1.4 Data gaps and mitigation

Consistent and robust data on separately collected used textiles and textile waste across EU countries is currently lacking. The ETC CE provided textile waste management data from all EEA Member States, but there are gaps in the dataset concerning separately collected amounts for certain Member States. To address this, missing data was supplemented with Eurostat data on household waste collection. Additionally, there are gaps in data for specific years for some Member States; this was resolved using data from the most recently available year in the calculations. Assuming that there is a general tendency towards increased separate collection of textile waste, this will likely result in an underestimation of the total volume.

Table 17 provides an overview of the identified data gaps.

Table 17. Overview of identified data gaps, limitations and mitigation efforts

	Description of data gap	Mitigation efforts	Level of confidence
1	No consistent and robust data available on the volumes of separately collected used textiles and textile waste.	Access to ETC CE data set provides the most accurate and up to date data available.	Medium
2	Not all Member States have provided data through the ETC CE questionnaire.	Data from Eurostat on annual waste reporting has been used to fill data gaps.	Low
3	Not all Member States have data available for the same years.	For each Member State, data from the most recent available year has been used.	Medium
4	Official statistics do not include illegal collection and trade of used textiles.	Previous attempts by other researchers (Watson et al., 2016) to quantify these flows have failed, so this can only be acknowledged, but not accounted for.	Low

4.1.5 Quality review of analysis

The quality review process for this indicator was conducted internally, involving one of the leading textile experts from the ETC CE. Formal stakeholder engagement was not pursued as the data from ETC CE is arguably the most up-to-date and comprehensive data available at the EU level.

The quality review process is summarised below:

- Mid-December: Internal QA on data collection plan with Project Management team.
- January and early February: Informal internal QA and sense-checking with internal textile experts and colleagues engaged in testing other indicators within this project.
- Late February: Formal QA review with ETC CE textile expert.

4.2 KEY ANALYSIS RESULTS

4.2.1 Analysis

ETC CE (Deckers et al., 2024) reports that 1,95 million tonnes of textile waste were collected separately across EU Member States in 2020[38], encompassing waste generated from households and economic activities, as reported in Eurostat waste data.

The calculations below are instead based on the consolidated data from the ETC CE dataset, which entails data provided directly by the Member States on “separately collected amounts” of textile waste. For certain countries, such as France, the reported amount of separately collected textile waste matches the Eurostat data for household waste but excludes waste from economic activities. For other countries, the reported amount of separately collected textile waste does not match the Eurostat-reported data at all; for example, it is much higher for Germany and lower for Italy. In this study, it was not possible to explore all discrepancies that illustrate the inconsistencies in existing data across sources.

Based on the ETC CE data provided for “separately collected amounts”, 2.062 million tonnes of textile waste was collected separately across the EU in 2021[39]. Germany accounted for almost 62% of the total collected; the remaining volumes were mainly collected by France (11.3%), Italy (7.5%), the Netherlands (3.9%), Belgium (3.7%) and Spain (3.4%). A full overview of separately collected textile waste by EU-27 is provided in Figure 8.

[38] The reference year for most countries is 2020, with data from 2021 included for those countries where available.
[39] For countries where no data was available for 2021, data from the last year available has been used instead.

Figure 6. Separately collected textile waste in EU-27

The figures are absolute volumes, thus not in proportion to the countries' populations, of which Germany has the largest. However, this alone cannot explain Germany's clear outlier status[40], and several factors make the data set less reliable:

- The figures provided vary in terms of the data sources used and thus in terms of validity. For instance, the figure for Germany is based on an EEA Early Warning Assessment from 2018 (due to the absence of more recent data), with no additional information provided regarding the data collection method. The data for France is based on a well-defined methodology and annual reporting system integrated into the EPR scheme for textiles — the first in the EU. Thus, the quality of the data differs significantly.
- The dataset in question lacks clarity regarding the inclusion of textile waste from non-household sources such as post-production and pre-consumer textile waste. It is unclear whether these sources are accounted for in the reported volumes and, if so, whether this applies to all Member States or only specific ones.
- The Member States have different regulations regarding what should be reported as separately collected textile waste. Austria, Germany, Italy, and the Netherlands include textile waste collected as municipal waste and textile collection through bring banks; all organisations engaging in collection via brink-banks must be registered as waste collectors and report the collected amounts in waste databases. In other countries, bring bank collection is not considered waste collection if the collector explicitly states that they only collect reusable textiles (Watson et al., 2020), and such volumes are therefore not necessarily included in data of the separately collected textiles in the ETC CE dataset.

These differences are also reflected in the collection rates[41] of Member States — ranging from 12% in Spain to 60% in Germany (Van Duijn et al.,2022), which have been linked to variations in policies, infrastructure, consumer behaviour, and economic incentives for collectors across EU countries (Lingås et al., 2023).

The data collection template is included in Appendix 7.4.

[40] It should be noted that, unlike other figures, Germany's figure is marked red in the dataset by EC ETC, but no explanation is provided.

[41] The collection rate is the quantity of separately collected used textiles ("textile waste") divided by the amount of new textiles put on the market.

4.2.2 Limitations

Besides the limitations arising from the data gaps mentioned above, the following fundamental limitations have been identified for this indicator's ability to illustrate increased circularity:

- The volume of separately collected textiles does not provide any information on the quality of the materials collected. With the mandatory separate collection of textile waste from households by 2025, it is expected that more low-value textiles will be collected and that the share of textiles suited for reuse will drop from currently 60% to 50% (Hedrich et al., 2022).
- This indicator does not provide any information on how these materials are processed further; therefore, it does not indicate the actual level of a closed-loop textile system. If textile recycling capacity is not scaled and improved recycling technology does not become available in time, there is a risk that the increase of separately collected textiles results in a higher share of them becoming landfilled or incinerated or being exported outside the EU (Deckers et al., 2024).
- This indicator does not provide information on the total volume of textile waste produced since textiles also end up in mixed municipal waste. While an increase in the amount of separately collected textiles might indicate a higher collection rate, it might also simply result from an overall increase in consumption and waste generation and, therefore, not reflect the enhanced efficiency of separate collection systems. Hence, it requires an additional waste composition analysis per country to determine the overall amount of textile waste being produced, allowing calculation of the capture rate of separately collected textiles in relation to the total amount of generated textile waste (Deckers et al., 2024).

4.2.3 Performance

A revised RACER assessment was conducted, with the following justification for the scoring:

Relevance: The separate collection of textile waste will become mandatory in 2025, and the EC has proposed implementing EPR schemes for textiles across EU Member States. The WFD is currently under revision, providing an opportunity to harmonise definitions of textile waste and reporting on separate collections across the EU. Thus, monitoring the separate collection of textiles is considered highly relevant.

Acceptability: The total amount of separately collected textiles is widely accepted as a metric by EU Member States and key public institutions such as the EC and EEA, even though the definitions of what to include vary between countries.

Credibility: EU Member States have varying definitions of what is considered textile waste, and there are no EU-wide reporting requirements for used textiles that are not classified as waste. This results in significant data gaps and inconsistencies in registering separately collected textiles between Member States.

Ease: The data collection on separately collected textile waste has been based on survey data collected from Member States by the ETC CE, and gaps have been filled with annually EU MS-reported municipal waste data that differ in scope and quality. The cost of data collection is therefore considered high. Data collection could become more manageable if mandatory reporting requirements are introduced.

Robustness: The indicator's robustness is hindered by discrepancies in textile waste definitions and data collection methods. However, enhanced reporting standards and the establishment of harmonised definitions across EU Member States could improve its future performance.

The static survey-based inputs by Member States included in the data set and the risk of changing definitions of textile waste and reporting mechanisms with the implementation of the mandatory separate collection of textiles from 2025 limit the ability of this indicator to measure progress over time.

The separate collection of textile waste has significant environmental and social implications. From an environmental perspective, increased collection is the prerequisite for increased reuse and recycling, potentially reducing waste amounts and resource consumption. However, a rise in collection volumes may also signal higher overall textile consumption, thus correlating with negative impacts from textile production and consumption. Textile collection often involves charitable organisations and social enterprises, the primary collectors in some EU Member States; however, these contributions are not always included in official statistics. With mandatory separate collection set for 2025, the economic viability of collection could decline, potentially leading to reduced collection rates by charities and other social organisations (Deckers et al., 2024).

Table 18 provides an overview of the RACER evaluation for this indicator, before and after the completion of the testing programme.

Table 18. RACER evaluation

Stage of project	RACER criterion					Score
	Relevance	Acceptability	Credibility	Ease	Robustness	
Task 4 (original RACER assessment)	3	3	3	1	2	12
After Task 5 (following testing)	3	3	1	1	1	9

4.3 CHALLENGES AND LESSONS LEARNED

4.3.1 Challenges

Alongside the limitations and data gaps already mentioned, the following challenges have been noted:

Despite the forthcoming EU-wide requirement for the separate collection of textile waste, this regulation is not accompanied by a harmonised method for reporting the collected volumes. This is a missed opportunity, as harmonised reporting is a requisite for reliable data and correct assessment, and comparison of the quality and efficiency of the collection systems in place. Reporting requirements should be based on harmonised definitions, clearly differentiating between used textiles and textile waste, and including textiles collected by municipal and non-governmental actors.

It cannot be excluded that double accounting of separately collected textile waste occurs; for example, waste separately collected from households might be counted again at the sorting stage (Deckers et al., 2024). Moreover, there is currently no reporting requirement for non-hazardous waste shipment in the EU, which may also result in double accounting when separately collected textile waste gets imported from other EU countries[42].

4.3.2 Lessons learned

Harmonised standards and improved monitoring of separate collection of used textiles and textile waste across Member States should be accompanied by specific targets for collecting, reusing, and recycling textiles. Tonnages collected by non-governmental actors should also be included in the national reporting mechanisms.

4.4 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that this indicator is considered for further development, with significant work required to facilitate its progress.

The separate collection of textile waste is the first step to ensure that the materials used for clothing, footwear and household textiles remain circulating at the highest possible level, either entering the reuse market or becoming available for recycling. It is therefore important to monitor the volumes of separately collected textile waste across EU Member States, accompanying the implementation of mandatory separate collection from 2025. Although increased quantities of separately collected textiles do not necessarily translate into increased reuse and recycling, monitoring this is nonetheless fundamental.

Through this case study, a value for this indicator has been established. However, the title “separate collection of textiles” does not adequately capture this indicator, which includes both the collection of used textiles and textile waste. The general terminology used by EU institutions is “separate collection of textile waste” but for this indicator, it would be most accurate to say “volume of separately collected used textiles and textile waste”.

[42] This concern was expressed in the stakeholder consultation with a data scientist at the Dutch Inspectie Leefomgeving en Transport.

This title would emphasise that the textiles are collected for reuse and recycling, depending on their state, material composition, properties and quality – with the remaining share going to landfill and incineration.

The specific data and its underlying methodology are characterised by several limitations, insecurities, and weaknesses. There is only voluntary reporting by EU Member States on the separate collection and preparation, as outlined in Decision 2019/1004 (European Commission, 2019). There is a lack of harmonised definitions of waste, collection activities, and data gathering across EU Member States, with only a few countries, such as France, carrying out annual, consistent reporting on this (Huygens et al., 2023). To enhance the robustness of this indicator, establishing a unified definition of "textile waste" in the EU and implementing a standardised reporting methodology for used textiles collection are essential. EU-wide developments, like the ongoing revision of the WFD, have the potential to improve the indicator's robustness through new definitions and reporting requirements. These changes may rectify data gaps and inconsistencies in textile waste collection (Huygens et al., 2023).

It is recommended that measuring absolute volumes of separately collected textile waste is complemented with relative metrics such as the capture rate, which better evaluates the efficiency of national collection systems relative to the total generated waste. Furthermore, it is essential to integrate this indicator with the development of targets for textile waste preparation in line with the waste hierarchy. This includes targets for and reporting on the share of textile waste going into reuse and recycling, to assess the environmental benefits arising from an increase in separate collection. As of now, there are no EU-wide targets for textile waste management, but the European Parliament has called for the setting of specific targets for the prevention, collection, reuse and fibre-to-fibre recycling of textile waste (European Parliament, 2023).

A harmonised approach and improved data gathering on the separate textile waste collection could complement the CEMF. The most obvious choice would be to integrate textile waste generation per capita – thus the combined amount of separately collected textiles and textiles found in general waste per capita – into the set of existing indicators on waste generation. If combined with increased monitoring of the subsequent steps in the textile waste value chain, the monitoring of separate collection could also feed into an additional waste management indicator on recycling rates for textile waste. While the CEMF currently does not include any indicators specific to reuse, it would be relevant to extend the scope of monitoring in the future. In line with the waste hierarchy, this could include an indicator of the share of separately collected textiles going into reuse.

Table 19. Summary of recommendations for T3

Type of recommendation	RACER Criteria addressed	Recommendation	Timeline	Key stakeholders or partners
Legislation	This would improve the credibility and robustness of this indicator, as it would ensure consistency of data collection and reporting between EU Member States.	Clear definition of "textile waste" should be included in the ongoing revision of the WFD.	Short (0.5 – 1.5 years)	• EC, EP and EU Member States to adopt revised WFD • Textile waste producers and waste collectors to provide input in further stakeholder consultation.
Legislation	This would improve the credibility and robustness of this indicator, as it would ensure consistency of data collection and reporting between EU Member States.	Development of end-of-waste criteria for textiles.	Medium (1.5 – 5 years)	• EC and JRC to lead the ongoing process on this.
Legislation	This would increase the ease of data collection for this indicator, since EU Member States would have to regularly report data to Eurostat.	Targets for separate collection of textile waste, preparation for reuse, and recycling should be set, and mandatory reporting should be introduced for EU Member States.	Medium (1.5 – 5 years)	• EC, EP, EU Member States to adopt targets and introduce mandatory reporting in WFD; EU Member States to implement them at national level; EEA to monitor progress.

Type of recommendation	RACER Criteria addressed	Recommendation	Timeline	Key stakeholders or partners
Development of guidance	This would improve the credibility and robustness of this indicator, as it would ensure consistency of data collection and reporting between EU Member States.	Guidelines and harmonisation of the collection approaches and reporting standards across EU Member States.	Medium (1.5 – 5 years)	• EC, EU Member States incl. engagement of textile collectors.

5. INDICATOR 4 - TOTAL VOLUME OF SECONDARY RAW MATERIAL OUTPUT FROM TEXTILE RECYCLING

This indicator is designed to monitor the total volume of secondary raw material output from textile recycling across the EU.

The indicator seeks to monitor what happens to post-consumer textile waste that is collected and processed at recycling facilities. The textile waste can be processed either mechanically or chemically and will, depending on the quality of the textile and the processing type, be recovered into spinnable fibres or pulp fit for producing new fibres or downcycled into wipes, flock, and filling material (Duhoux et al., 2021). Recyclates intended for re-spinning are often mixed with virgin fibres as part of the processing to ensure fabric durability (Duhoux et al., 2021). Not all of the collected textile waste is recyclable, as some contains zippers, buttons or hazardous chemicals from paint stains, and waste is thus also created during the production of recyclates.

Even though reducing production volumes, enhancing durability, and repairing products are arguably more efficient forms of circularity, recycling should also be monitored as it enables the recirculation of materials at their end of life. This indicator thus aims to measure the amount of textile waste that is recovered and made suitable as secondary raw material for further circular destinations.

This indicator covers the volume of recyclate actually produced with the potential to substitute virgin material, and excludes potential waste and poor-quality textiles from the process. Although circularity has only been achieved when the recycled material actually finds its way back into the economy (see Section 6), this indicator is also of interest as data might be more accessible, being more upstream in the value chain.

Some of the benefits of measuring this indicator are:

- It enables the EU to monitor the recirculation of textiles at their end-of-life stage.
- It reflects the potential supply of secondary raw materials for fibre production and thus manufacturers' potential uptake of secondary raw materials.
- As the supply of secondary raw materials is highly affected by demand from textile manufacturers, the indicator reflects market conditions and dynamics for recycling companies.
- If output from recycling is measured against the volume of input material for recycling, the indicator can monitor the technological advances and the quality of the input material.
- If the indicator includes a monitoring metric for materials, it can monitor the share of synthetic fibres and natural fibres at end-of-life and recycling stages.

5.1 KEY METHODOLOGY

5.1.1 Testing method

The system boundary for measuring the total volume of secondary raw material output from textile recycling is as follows:

Textile recycling is defined as the process of recovering fibre, yarn, or fabric and reprocessing the material into new, useful products. There are four archetypes of textile recycling: mechanical, thermomechanical, chemical, and thermochemical. For the scope of this indicator, textile recycling covers only mechanical and chemical recycling, as the other processes have a very small market share. Further, it covers only fibre-to-fibre recycling, that is, textile waste products for the purpose of making new textile products, carried out by textile recycling companies located in Europe. Processing inputs include all textile fibre types but excludes PET input even when the recycled PET (rPET) is used for creating fibres (also known as bottle-to-textile), as this is considered downcycling of plastic drinking bottles (Duhoux et al., 2021).

Secondary raw material output includes all spinnable fibre outputs. It excludes the waste generated through the process, such as flock and dust, filling and insulation outputs – also known as 'non-wovens' - as well as cut-up industrial wipers and waste-to-energy output, as these outputs are considered downcycling. The indicator is for the volume of recyclate, measured before it is potentially mixed with virgin fibres to produce more durable yarn.

The testing phase included a search for dynamic statistical data and primary data through a survey among recycling companies identified through the Recyclers Database created by Fashion for Good (n.d.). This method was followed by searching for dynamic data on proxy indicators and static data and contacting report authors.

5.1.2 Data collection method

Collecting data for this indicator was significantly challenging due to the following reasons:

- ProdCom was investigated to search for dynamic statistical data, as it provides statistics on the production of goods manufactured in the EU (Eurostat, 2023). However, no chapters or subchapters refer to recycled textiles, as textile recycling is considered waste treatment, not production, and recycling companies are, therefore, not required to report on their production volumes.
- There is no requirement in the European Waste Framework Directive for recycling companies to report on output of textile recycling. There is thus no official dynamic statistics on the matter.
- The Recycler's Database project initiated by Fashion for Good (n.d.) was investigated. However, only 16 of the 51 listed companies reported their current capacity – and in different measurements such as square meters of production floor, looms and meters of fabric. Furthermore, the database was deemed outdated, as only six companies have updated their data after 2021.
- Primary data collection was attempted through a survey of the 51 European recycling companies in the Recycler's Database. However, despite follow-up e-mails, the response rate was very low, so it was impossible to base the indicator on primary data collection (see Appendix 1).
- In light of the above, it was decided to analyse static data from publicly available study reports and improve the data through consultations with the authors. Three study reports from well-reputed organisations were found to provide data on recycling capacity (see Table 20).

Table 20. Overview of key studies on recycling capacity

Organisation and year	Title of report	Production capacity (tonnes/year)	Year of data collection	Methodology / basis of data collection
European Commission (EC), 2021	"Study on the technical, regulatory, economic and environmental effectiveness of textile fibres recycling"	121,178.4 - 244,588.4	2021	Accumulated capacity of 25 survey participants among EU-based companies doing fibre-to-fibre recycling with either mechanical or chemical processing technology and having input of post-consumer textile waste.
Swedish Environmental Research Institute (IVL), 2023	"Sustainable Clothing Futures"	1,300,000	2022	Accumulated maximum capacities collected through interviews, e-mail responses, press releases and/or website information among 14[43] EU-based recycling companies doing fibre-to-fibre recycling with either mechanical or chemical processing technology and having input of post-consumer textile waste.

[43] According to the IVL report, production capacities were identified for 17 companies. However, during conversation with one of the authors, this number was corrected to 14 companies

Organisation and year	Title of report	Production capacity (tonnes/year)	Year of data collection	Methodology / basis of data collection
European Commission's Joint Research Centre (JRC), 2023	"Techno-scientific assessment of the management options for used and waste textiles in the European Union"	200,000 - 300,000	2023	Accumulated and estimated capacity of 40-50 large companies and 36 companies with either small or unknown capacity collected through literature review of key studies, web-searches, cross-referencing from other publications and feedback from experts. All companies are EU-based and operate with the objective of fibre-to-fibre recycling (closed-loop) with either mechanical or chemical processing technology. Only some of them have input of post-consumer textile waste.

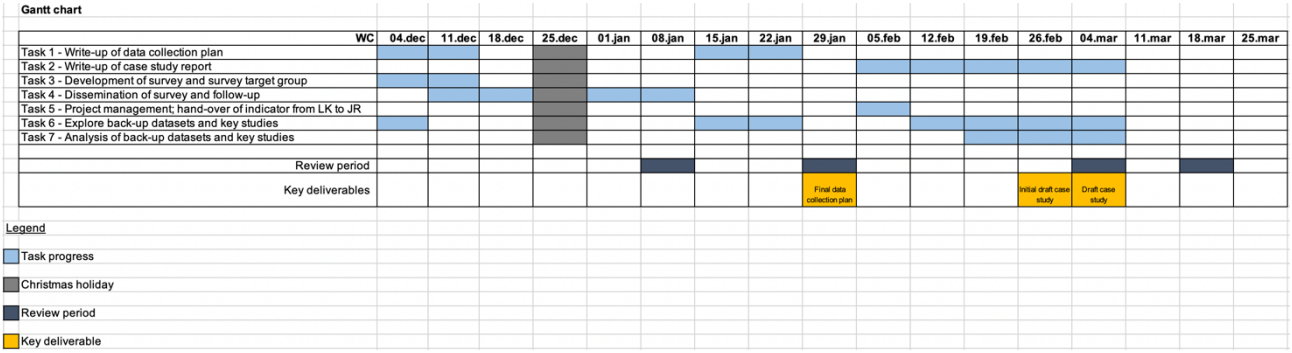
5.1.3 Calculations

The indicator is calculated by accumulating the volume of company recycling capacities, measured in tonnes per year. Due to a lack of primary data, the score fully relies on findings from others.

5.1.4 Timeline

The project timeline is show in Table 21.

Table 21. Gantt chart for T4



5.1.5 Data gaps and mitigation

There are significant data gaps for this indicator, illustrated by the fact that neither dynamic statistic data nor primary data were available. The lack of data resulted in modifying the indicator from measuring the volume of output to the volume of capacity. The limitations to this choice are elaborated in Section 5.2.3.

The three studies investigated suggest very different textile recycling capacities in the EU, spanning from capacities of 120,000 tonnes to 1,300,000 tonnes per year. Efforts were made to mitigate this very significant difference by uncovering the reasons for these gaps and consulting with the reports' authors.

The data gaps and their mitigation strategies are summed up in Table 22.

Table 22. Overview of identified data gaps, limitations and mitigation efforts

	Description of data gap	Mitigation efforts	Level of confidence
1	No data available on volume of output.	• Collected data on capacity instead.	Low
2	Capacity is not well defined.	• Engaged with report authors on their assumptions and definitions of capacity.	Medium
3	Data and results fluctuate from one report to the other.	• Close-read and compare reports on methods sections. • Conduct random checks of specific company self-reporting across reports, websites and Recycler's Database. • Engaged with report authors on their methods.	Medium

5.1.6 Quality review of analysis

The quality review process is summarised below:

- Mid-December: QA internally on data collection plan with Project Management team.
- January and February: Informal internal QA and sense-checking with internal textile experts and colleagues engaged in testing other indicators within this project.
- Mid-February: Stakeholder engagement with 1 co-author of the IVL report, stakeholder engagement with 2 co-authors of the EC report, stakeholder outreach to three co-authors of the JRC report, engagement with the author of another JRC report, and outreach to a consultant at Reverse Resources. Consultations were focused on data sources, methodology, data collection, and the authors' definitions of recycling capacity. The results of the stakeholder engagement are elaborated in Section 5.2.1.

5.2 KEY ANALYSIS RESULTS

5.2.1 Analysis and limitations

The investigated study reports estimated significantly different textile recycling capacities in the EU, and was not possible to identify an equilibrium through careful investigations and consultations with the authors. Many factors explaining these differences were identified – with important examples listed below:

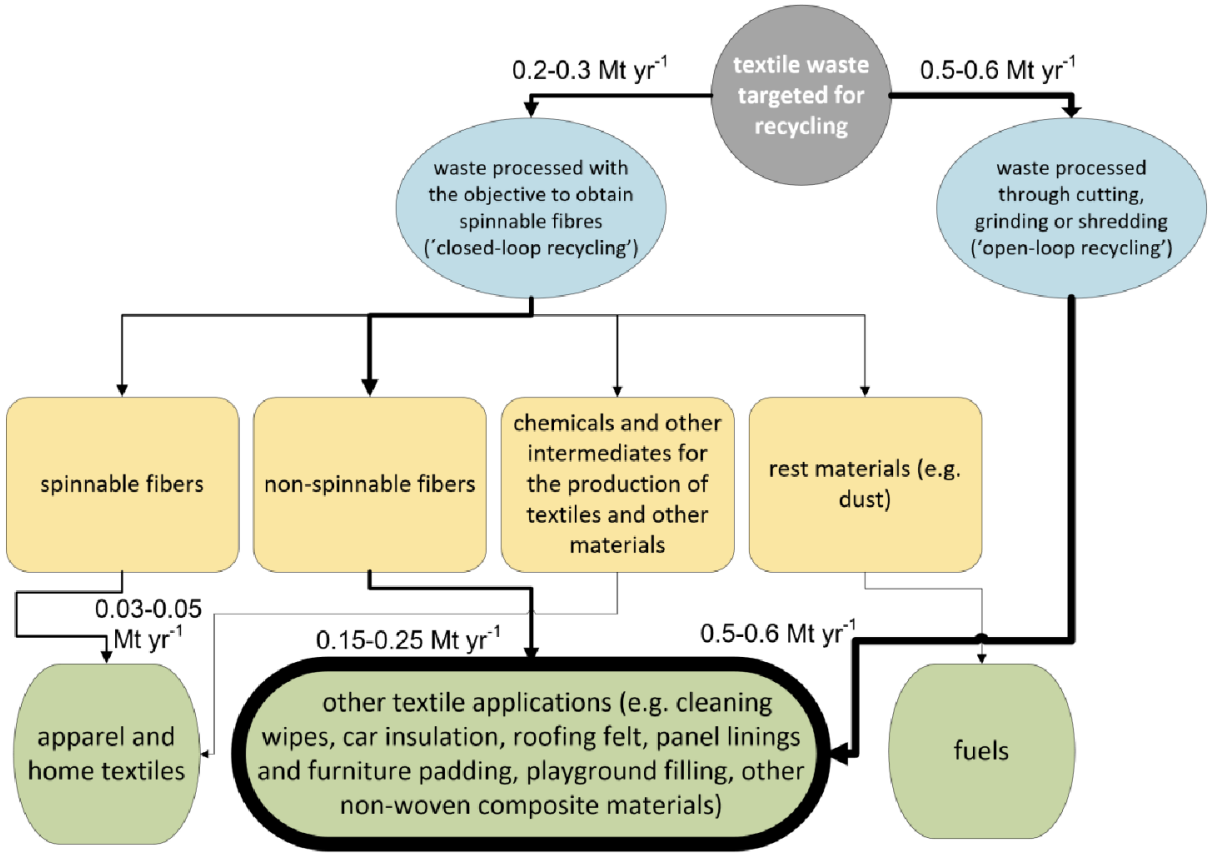
- The IVL report from 2022 estimated a total of 1,300,000 tonnes of recycling capacity (Dahlbom et al., 2023), more than ten times the lowest of the three estimates. The analysis showed that a key reason for the high estimate is a misunderstanding of the capacity of the recycling company Textil Santanderina, which in the report is stated to be 600,000 tonnes per year, but in fact on the company website is only 600 tonnes[44]. In fact, Textil Santanderina is located in Morocco and should not be included in the EU production capacity assessment.
- IVL reports Swedish company Renewcell to have a capacity of 60,000 tonnes per year (Dahlbom et al., 2023); the JRC report states a 10,000 tonnes capacity per year (Huygens et al., 2023)[45]. Renewcell recently filed for bankruptcy (Mathews, 2024).
- IVL reports the company Recover to have a capacity of 200,000 tonnes per year (Dahlbom et al., 2023), but the webpage referenced is no longer available[46]. The JRC report states a capacity of 20,000 tonnes annually (Huygens et al., 2023)[47]. In 2023, Recover stated a capacity of 50,000

[44] The alleged mistake has been brought to the attention of the authors
[45] https://www.renewcell.com/en/section/ell.com/en/section/ourour--technology/technology/
[46] https://textileexchange.org/recover-2/
[47] https://www.recovertex.com/

tonnes on Recycler's Database[48]. It is not possible to verify any of Recover's reported recycling capacities.

- The JRC report states the total production capacity of 40-50 larger companies at about 155,000 tonnes per year and the total capacity of 36 small companies at 50,000-150,000 tonnes per year (Huygens et al., 2023). The similarity of these capacity assessments is not explained.
- As for the report from EC, one specific company is reported with a capacity of 30,000-150,000 tonnes per year (Duhoux et al., 2021). As the company name is anonymous, it has not been possible to cross-check this number and consultations with the report's authors have not thrown more light on the topic.
- Another limitation of the data is that it was not possible, except for a few companies, to identify what share of the capacity was post-consumer textile waste only. In conversation with IVL, the report author confirmed that they did not find it possible to segregate post-consumer textile waste from the rest of the maximum capacity, arguing that the share of post-consumer textile waste depends on available supply and quality and thus fluctuates.
- Other sources of inconsistency relate to the identified number of recycling companies being active in the EU, incoherent reporting of capacity by the recycling companies, differing definitions of "capacity", the geographical scope of the inventories, repetition of figures from one year to another, repetition of errors from one report to the next, and potentially more factors.

Figure 5. Figure from JRC's report on mass flow of textile waste (Huygens et al., 2023)



As mentioned in Table 20, the companies mapped by JRC are divided into 40 - 50 companies with large capacity, and 36 companies with small or unknown capacity (Huygens et al., 2023). The large companies have

[48] https://airtable.com/appSHNfy7U4jB4kAt/shr4HXLP5MoJLQ8Bf/tbl3ILaQuQqA1Xxha/viwJYLY0DF5iL2KSu

a total production capacity of approximately 155,000 tonnes per year, while the companies with small or unknown capacity have an estimated total capacity of 50,000-150,000 tonnes per year (Huygens et al., 2023). It is not clear how the latter is calculated, when the capacity of these companies is defined as unknown. It is also uncertain how 36 companies of small or unknown capacity can have a total capacity up to the same size as 40-50 large companies. The authors were contacted about these uncertainties but did not respond in due time. The estimate may be explained by the mistake of IVL; according to the report, JRC have used the IVL-report as a key study in their mapping of companies (Huygens et al. 2023). As the IVL total production capacity is – by mistake - so high, JRC may have put their estimates of companies with unknown capacity higher than they otherwise would have done.

As for the report from the EC, one specific company had reported its current process capacity to be 30,000-150,000 tonnes per year (Duhoux et al., 2021). This is a very big span, especially for a single primary source, and especially considering that the general EC-figure is relatively low. As the company name is anonymous, it has not been possible to cross-check this number, and even though authors of the report have been engaged, this matter was not clarified. This means that the estimate of the report from EC could even be lower than stated.

General tendencies and biases

The scope of the IVL research was to map recycling companies and their maximum potential capacity (Dahlbom et al., 2023). In conversation, the author of the IVL-report pointed to the fact that many companies in interviews had stated that their maximum capacity was seldomly reached due to low supply and difficulty in sourcing the right input material. The author highlighted that maximum capacity is therefore more indicative for the potential of the recycling sector if supply is up to speed, than on the actual current turnover of textile waste. The author also argued that for many recycling companies with new and evolving technology, disclosing their maximum capacity in press releases is seen as a selling point to potential investors. It is not clear from the other reports – nor in engagement with their authors where possible – if they define “capacity” as maximum potential capacity as IVL does. It is therefore not possible to determine if the IVL total production capacity should be considered exaggerated in comparison to the other reports or not.

5.2.2 Performance

The three reports' lack of consistency is significant, and the RACER score for the indicators has been reduced from 11 to 7 out of 15 points (see Table 23).

Relevance: The post-testing RACER performs worse than the pre-testing RACER, because the investigations have underscored that measuring the capacity and output volume of recycling companies does not in itself indicate how much recycled material is fed back into the economy or how big a share of input material for recycling can actually be recycled. However, the indicator has high relevance in terms of policy, since the EU Strategy for Sustainable and Circular Textiles explicitly states that the textile sector should have “sufficient capacities for recycling”[49]. It is also found that the European recycling sector is in fast development at the moment with fluctuating financing, and the sector as a whole is thus relevant to monitor.

Acceptability: Unchanged lowest score (1). Even though some companies may find it beneficial towards potential investors to publish their production capacities, other companies consider the data trade sensitive or confidential. The lack of consistency and continuity in company reporting may suggest that many companies are not motivated and do not find any incentive to prioritise continuous and consistent reporting. Production output seem to not be widely accepted as a metric by companies, as most companies report on capacity instead.

Credibility: The post-testing RACER performs worse than the pre-testing RACER, and it has been given a score of 1. The significant differences in the calculations of recycling capacity and the many obvious inconsistencies radically reduce the credibility of the available data. Furthermore, it is not possible to verify the data points since publicly available information has been removed from cited websites, while other data have only been reported anonymously.

Ease: The post-testing RACER performs worse than the pre-testing RACER because there is a significant lack of reliable and primary data, and the recycling companies allegedly report their capacities and outputs

[49] https://environment.ec.europa.eu/strategy/textiles-strategy_en

inconsistently across key studies. The data situation is made worse by some of the data being considered trade-sensitive and classified by the recycling companies.

Robustness: Unchanged middle score (2). Methodologies across the three key studies vary, as one study asks companies to report on maximum potential capacity, while others seem to ask for real capacity. Measuring production capacity rather than production output should be considered a proxy indicator of output volumes.

This indicator originally aimed at tracing the potential supply of recycled material that, as secondary raw material, can be fed back into production – an important environmental aspect. When switching the indicator metric from "volume of output" to "volume of maximum capacity," the indicator's statement value is lowered. By being indirectly affected by market supply and demand, an indicator monitoring the recycling capacity indirectly impacts the economic facets of CE. There is no direct or indirect value of this indicator in relation to the social facets of CE.

Instead of measuring the total volume of output from recycling companies – an absolute number - this indicator could monitor the growth in volume of output over time or the volume of spinnable fibre output relative to the volume of non-spinnable outputs to enhance its performance in terms of the facet of the current level of CE. The indicator is also highly relevant to measure over time, as many new recycling technologies are emerging, and the financial situation of European recycling companies seems to fluctuate quickly (Köhler et al., 2021).

Table 23. RACER evaluation

Stage of project	RACER criterion					Score
	Relevance	Acceptability	Credibility	Ease	Robustness	
Task 4 (original RACER assessment)	3	1	3	2	2	11
After Task 5 (following testing)	2	1	1	1	2	7

CHALLENGES AND LESSONS LEARNED

5.2.3 Challenges

Data collection for this indicator is very difficult, and only limited data with low credibility on the secondary raw material output is available – including primary data, statistical data, research data and expert information.

The output volume from recycling companies depends on the supply of textile waste fit for recycling (input material) and the demand for the recycled product (output material). The volume is thus dependent on market mechanisms and demand for similar competing products, not only on available technology or capacity.

Compelled by the lack of relevant data on output, a related (but less informative) indicator formulation has been tested: the recycling capacity. Capacity (especially maximum capacity) should then be considered a proxy indicator, as it is more indicative of the industry's expectations than an indicator of the concrete output volume. However, data for this indicator have also been demonstrated to be very limited and of low credibility.

5.2.4 Lessons learned

The key lesson learned is that there is a dire need for a common platform for collecting consistent data that allows for measuring the volume of textile recycling. Both the Recycler's Database, the online platform created by Reverse Resources, and the Fibersort Project by Circle Economy[50] (though mostly outdated) provide good potential platforms for consistent reporting on capacity and output volumes. The platforms could thus be considered a good starting point for building a consistent, systematic, and elaborate reporting metric.

[50] https://reverseresources.net and https://www.circle-economy.com/programmes/textiles/fibersort#:~:text=The%20Fibersort%20is%20a%20technology,value%20textile%20to%20textile%20recyclers.

The investigations indicate that companies generally do not find an incentive to continue participating in voluntary self-reporting. It should be considered to which extent proper regulation is needed to secure a valid overview of the actual recycling of textiles in the EU.

5.3 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that this indicator is considered for further development, with significant work required to facilitate its progress.

The original name of this indicator was “Total volume of secondary raw material output from textile recycling.” As argued throughout this case study, it is suggested that the name be changed for further development to “Total volume of secondary raw material output from mechanical and chemical textile-to-textile recycling” to specify the materials and recycling technologies included.

It is concluded that the indicator is considered for further development because of the importance of monitoring output of recycling in CE. Being sensitive to supply and demand, an indicator monitoring the output of recycling can contribute to knowledge of the demand for circular materials. However, facilitating the progress of the indicator requires significant work because the data available at the moment is static and very inconsistent. It is also assumed that getting recycling companies to voluntarily participate in yet another survey may be difficult, and developing a business case for recycling companies to report may be necessary to ensure consistent and systematic reporting. Another option to facilitate the progress of this indicator is to recategorise recycling companies in European statistics, so they are registered as production companies rather than waste managers. The recategorisation would ensure official and dynamic statistical data, but is also a rather heavy task. Developing a proper business case for recycling companies is here considered a more realistic recommendation.

There is a potential synergy with the updated EU CEMF, specifically for the framework indicator for circular material use rate, which measures the share of material recycled and fed back into the economy - thus saving extraction of primary raw materials - in overall material use. The indicator at hand, to some degree, improves progress in the monitoring framework indicator, as it measures the volume of material recycled by recycling companies, which has the potential to be fed back into the economy.

The indicator also has the potential to measure transition away from fossil-based materials, such as PET, if PET inputs and rPET outputs as well as other material inputs and outputs are reported in surveys with recyclers.

As for the performance on the indicator, it has not been possible to pinpoint the total volume of output of recycling. Neither has it been possible to pinpoint the total recycling capacity, but according to the three key studies by IVL, JRC and EC, the total closed-loop recycling capacity for companies sourcing post-consumer textile waste is between 121,000 and 700,000 tonnes per year depending on whether one measures real or maximum capacity and depending on the year (between 2021 and 2023).

Table 24: Summary of recommendations for T4

Type of recommendation	RACER criteria addressed	Recommendation	Timeline	Key stakeholders or partners
Development of metric	This recommendation addresses the low score of RACER criteria Acceptability, Credibility and Robustness, as it addresses the motivation, consistency and methodology of reporting from recycling companies.	Development of systematic and consistent reporting platform for recycling companies. This could include reporting of material streams and material output types.	Short-term (0.5 – 1.5 years)	DG-RTD is to facilitate the work. Reverse Resources, Circle Economy and Fashion for Good should be consulted for platform development, metric design and development of business case.
Development of statistics category	This recommendation addresses the low score of RACER criteria of Credibility and Robustness, as it addresses the consistency and methodology of reporting from recycling companies.	Investigating the opportunity of re-characterising recycling companies in European statistics from waste management companies to production companies.	Long-term (> 5 years)	DG-RTD is to facilitate the work. ProdCom and national statistics should be consulted on the possibilities of re-categorisation and creation of new statistical categories.

6. INDICATOR 5 - SHARE OF RECYCLED POST-CONSUMER TEXTILE-TO-TEXTILE CONTENT PUT ON THE MARKET BY EUROPEAN BRANDS AND RETAILERS

This indicator originally aimed to measure the percentage of recycled content in the total weight of textile products put on the EU market. Since the only way to completely decouple production from the sourcing of virgin materials is to recirculate post-consumer textile waste, a slightly modified indicator formulation is suggested: to measure the percentage of post-consumer recycled textiles in the total weight of textile products put on the market by European textile brands.

Europe's consumption of textiles has the fourth highest impact on the environment and climate change, after food, housing, and mobility, and is one of the top five pressures in terms of raw material use and greenhouse gas emissions in the EU (European Commission, 2023).

It is crucial for a circular transition to stop the annual growth in sourcing conventional virgin raw materials (Cullen et al., 2023). One way to do this is to substitute virgin raw materials with recycled materials.

Some of the benefits of monitoring this indicator are:

- Monitoring the share of recycled content put on market enables the EU to monitor the recirculation of materials at their end-of-life stage
- Measuring the share of recycled material in textile production volumes indicates the performance of European brands over time on this matter, and how inclined brands are to substitute virgin raw materials with recycled materials.

6.1 KEY METHODOLOGY

6.1.1 Testing method

The scope for measuring the share of post-consumer recycled content in the total volume of annual material uptake by European textile brands is as follows:

Annual material uptake is the volume, in tonnes, of textile material used in the textile products put on the market by EU brands.

Looking at the material uptake of products *put on the market* by EU brands, as opposed to those sold in Europe, ensures that the indicator also includes the material used for products that are ultimately not sold. This can be samples, demo models, and items that are ultimately not sold due to overproduction or mistakes in forecasting demand by the brands. It is deemed important to include these as, although not sold to consumers, they still create demand for raw materials.

European textile brands include brands and retailers of apparel, footwear, and household textiles with European headquarters. This scope is chosen because data for non-European brands is presumably hard to collect, and the material choices of non-European brands can only to a limited degree be directly impacted by European politics.

Recycled content refers only to recycled material from post-consumer textile-to-textile recycling, not pre-consumer textile waste such as production floor cut-offs (referred to by JRC as 'post-industrial waste' (Huygens et al, 2023)) or non-textile recycled content, such as rPET.

The testing method included desk research and stakeholder consultations, with sample data covering all EU Member States. As European textile brands and retailers are not required to disclose their annual production volumes, the indicator relies on aggregated, voluntarily self-reported data and uses sample data from Textile Exchange.

6.1.2 Data collection method

Several approaches were used in the attempt to measure this indicator, starting with a thorough desk research for existing estimates. The following existing estimates were identified:

- European Textile Labelling regulation (Regulation 1007/2011, 2018) establishes that all textile companies are required to communicate the material composition of textile products on their care labels. The information is, however, not registered in any public database, and the categorisation of fibre types that companies can report on does not include recycled materials. It was, therefore, not possible to obtain data on the share of recycled content through any existing statistical databases.
- For EuRIC and Business Europe, no relevant reports or studies were available on the topic. In a survey, EURATEX measured the share of retail brands that expect a share of their products to include recycled content in the future (EURATEX, 2022). However, the report does not state what the share of recycled content is at present, neither does it state how big a share of recycled content the products will contain.
- The share of recycled content in new products was attempted to be estimated based on primary data from brands. The product range was limited to fashion and apparel products, preferably fast fashion brands. From the Fashion Transparency Index (FTI), 240 of the biggest fashion brands in the world were identified, and companies with European headquarters were selected (Fashion Revolution, 2023). The FTI dataset reveals whether the brands disclose production volumes and share of recycled material but not the actual volumes or percentages. A selection of brands allegedly disclosing their production volumes was investigated through sources such as the Project Just on Wikirate (n.d.-a), brand websites, annual reports and sustainability reports.
    - The method proved difficult, time-consuming and uncertain. This was due to some brands publishing their production volumes in items and others in tonnes, and there is no cross-cutting definition or standard way of reporting recycled material. The shortcomings are elaborated in Section 6.3.2.
- Textile Exchange, a global non-profit organisation, publishes an overview of global material consumption in the textile and clothing industry yearly, named the Material Change Index (MCI). MCI is based on an annual survey completed by a number of textile brands and retailers and is part of an externally verified and assessed program. Textile Exchange collaborates on MCI with Wordly, Sustainable Apparel Coalition and the Ellen McArthur Foundation. The number of companies providing input to the MCI survey is growing every year, from 57 responses globally in the first survey in 2015 to 387 (including sub-brands) in the 2022 report, continuously improving the representativeness and accuracy over time (Cullen et al., 2023). Recycled materials have been tracked in the survey for the past four years (Cullen et al., 2023). The cohort of companies participating in the survey changes annually as new companies join in while others stop participating. The MCI average can thus be considered an annual yardstick of the industry, though it changes according to the cohort of participating companies. Companies can choose not to disclose their participation and, therefore, do not necessarily appear on the participation list. The reporting provides only aggregated data, while individual responses and scorecards are confidential (Cullen et al., 2023). This may encourage more companies to participate, as their production volumes and other data considered trade-sensitive will not be publicly available.

The MCI was found to be the most consistent, representative, and reliable dataset available – however, far from perfect. As the MCI insights cover aggregated data from brands and retailers from all over the world, the index is not directly applicable to the scope of this indicator, namely material input for European brands. Textile Exchange declined to provide data on European brands and retailers only, because they found that this data appeared skewed, inconsistent and not in line with reality. Due to this, they were not comfortable sharing the data publicly at this stage (Textile Exchange, personal communication, March 3, 2024).

Changes made from the original data collection plan:

Recycled pre-consumer textile waste has been excluded from the system boundary of the indicator, as was advised by the Ellen McArthur Foundation during a consultation (see Section 6.3.2).

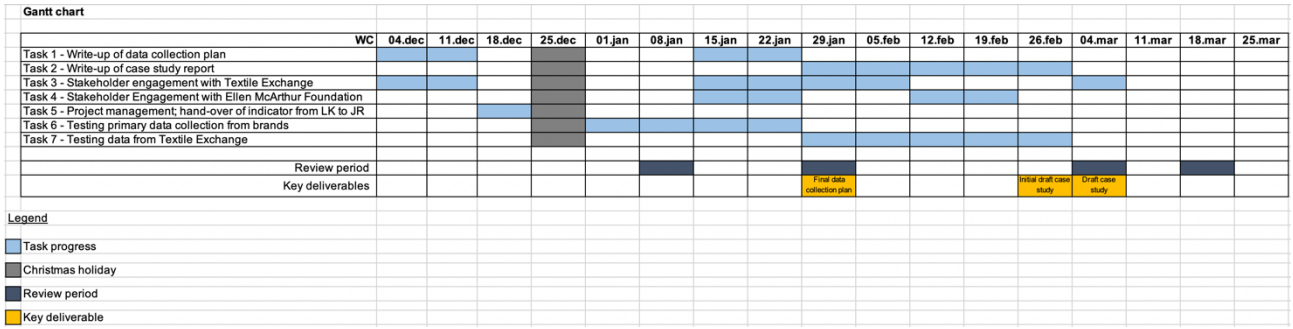
6.1.3 Calculations

The indicator is calculated by dividing the volume of recycled post-consumer textile uptake by the total volume of material uptake and multiplying by 100 to get the result in percentages. The data is based on survey responses from Textile Exchange.

6.1.4 Timeline

The project timeline is show in Table 25.

Table 25. Gantt chart for T5



6.1.5 Data gaps and mitigation

Voluntary self-reporting does not appeal to all brands and retailers, and the data gathered by Textile Exchange is therefore highly likely to be biased. In the MCI report 2022, Textile Exchange states that "*...the Index reflects the innovators, early adopters, and possibly the early majority (but not yet the late majority or laggards/ resistors."* (Cullen et al., 2023). Basing this indicator on Textile Exchange data means the indicator should be considered a representation of "better practice" and not representative of all brands and retailers. If all brands and retailers were to respond to the survey, including the "*laggards and resistors*", the share of recycled content in material uptake should be expected to be lower as brands with little use of secondary raw materials will pull down the average.

If more brands and retailers participate in the survey over time, the cohort of participants should be monitored in order to indicate a change from the representation of "better practice" to the representation of "standard practice". An important long-term strategy to mitigate the shortcomings would be 1) to require all European brands and retailers to disclose their production volumes or material uptake and share of recycled content and 2) to streamline the reporting of recycled content across companies to ensure every company use the same definition of recycled content. This requirement should be enforced through regulation and thus would take time and political will to establish and enforce.

Another gap is that the voluntary self-reported data is not verified by Textile Exchange; *"Textile Exchange does not verify the accuracy of the data or disclosures within a company's survey submission, or the process of preparing the disclosures. That responsibility remains with the participating company"* (Cullen et al., 2023). Textile Exchange, however, *"reviews all data entries, checks calculations, and carries out consistency checks"* (Cullen et al., 2023) to mitigate this. It is possible for participating companies not to have their name or company-specific data disclosed in the published Index, which should encourage companies not to exaggerate their performance.

Table 26. Overview of identified data gaps, limitations and mitigation efforts

	Description of data gap	Mitigation efforts	Level of confidence
1	Self-reported company data sample is not representative.	• Short term: Treat the indicator as a representation of "better practice" and monitor the cohort of brands annually. • Long term: Require brands and retailers to consistently disclose production volumes and uptake of recycled content.	Medium
2	Self-reported company data is not verified.	• Review all data entries. • Calculation checks. • Consistency checks. • Brands can choose not to have their name or company specific data disclosed other than in aggregated data, which encourages brands not to exaggerate their performance.	Medium

6.1.6 Quality review of analysis

The quality review process is summarised below:

- Mid-December: QA internally on data collection plan with Project Management team.
- January and February: Informal internal QA and sense-checking with internal textile experts and colleagues engaged in testing other indicators within this project.
- Early February: Interview with the Textile Exchange Benchmark team to clarify the survey process and discuss the possibility of sharing aggregated data on European brands and retailers.
- Mid-February: QA and stakeholder engagement with the Ellen MacArthur Foundation policy department on the quality of the MCI, the pitfalls of using this indicator to measure circular transition, whether to base the indicator on European brands or the European market, and whether to track the share of recycled content in material uptake or in products put on the market.
- Early March: Correspondence with the Textile Exchange Benchmark team on the final decision not to share EU-only data.

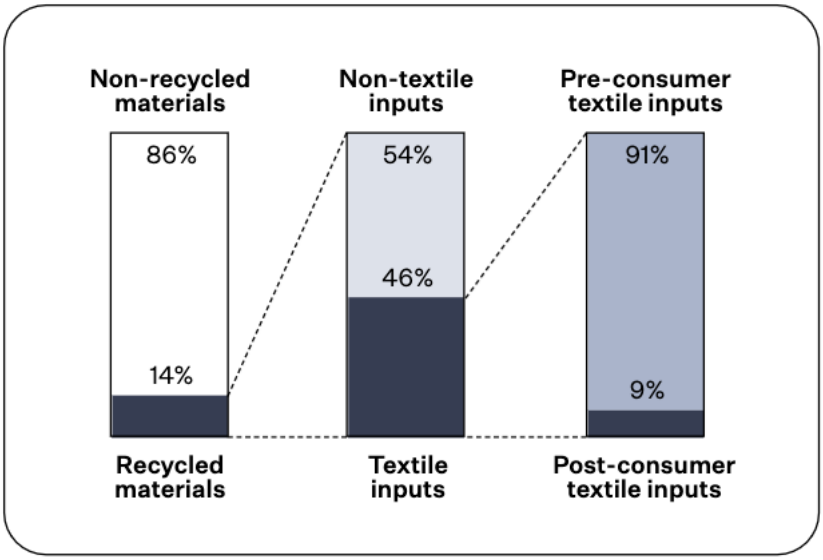
6.2 KEY ANALYSIS RESULTS

6.2.1 Analysis

The following section is based on Textile Exchange's publicly available global data and not specific data for EU companies; however, 60% of companies participating in the survey are reported to be European (Cullen et al., 2023). Thus, the global data is, to some extent, indicative of European companies.

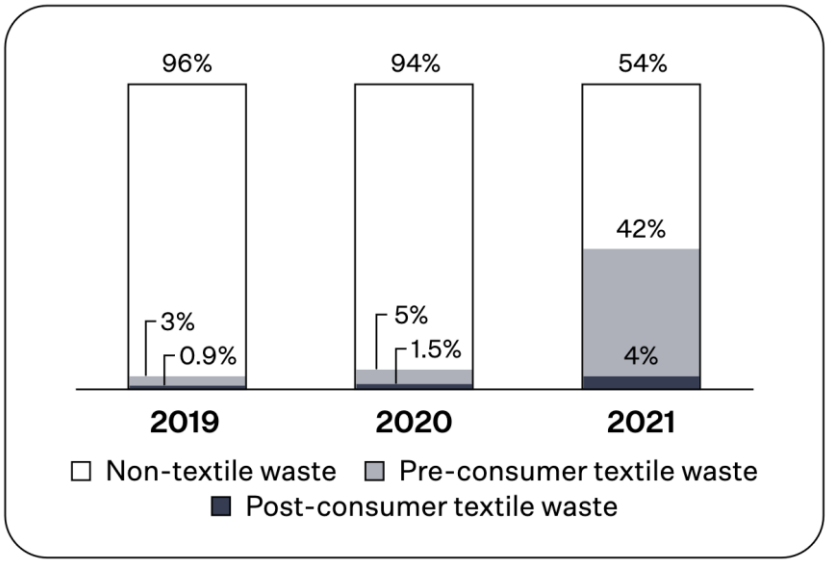
In 2022, 14% of the total material input in the global textile system were recycled materials, of which 54% were reported to be recycled non-textile inputs (such as PET bottles) and 46% were recycled textile inputs. Of the 46% recycled textile inputs, 91% were *pre-consumer* textile inputs, while 9% were *post-consumer* textile inputs (Cullen et al., 2023).

Figure 6. Figure from Textile Exchange on recycled content (Cullen et al., 2023)



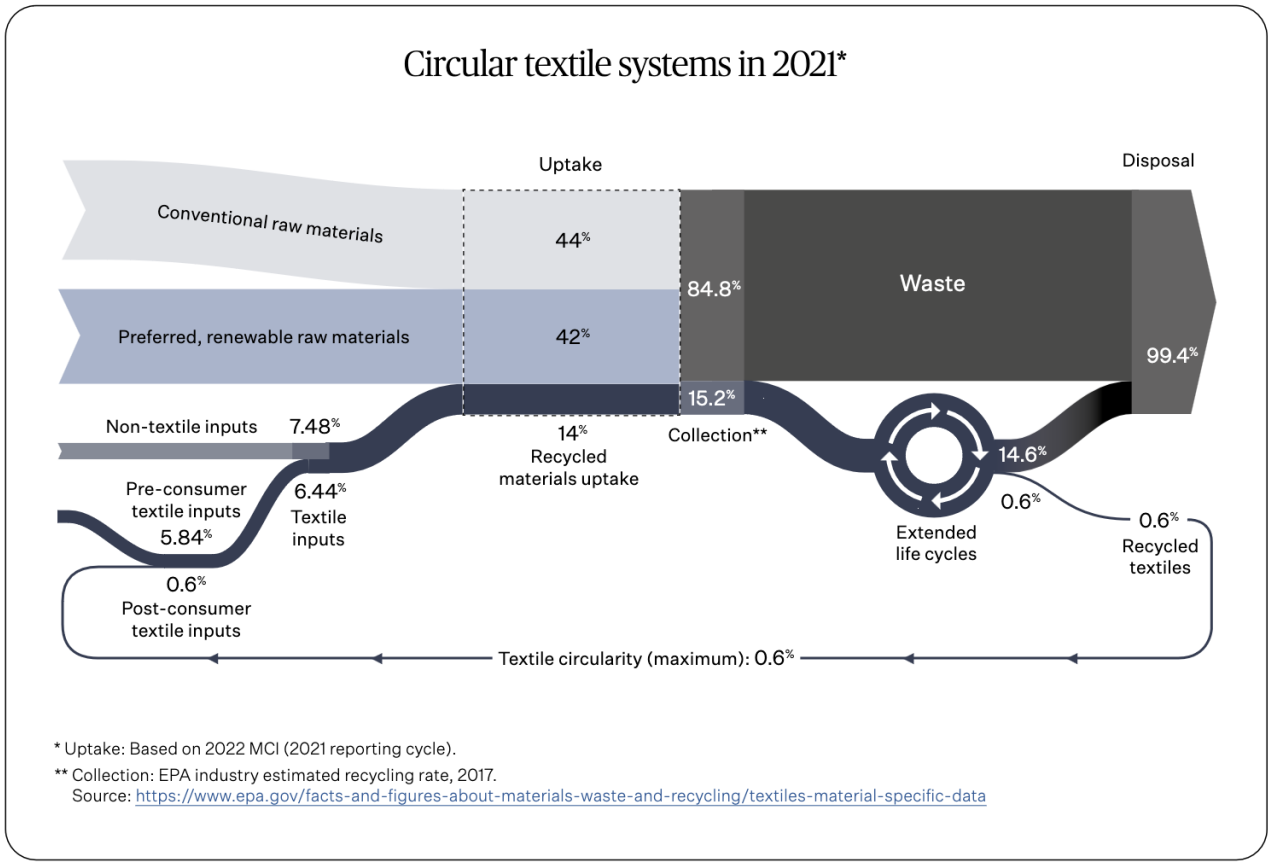
As Figure 7 summarises below, of all the recycled material inputs, 54% was non-textile inputs, 42% was pre-consumer textile input and 4% was post-consumer textile input (Cullen et al., 2023).

Figure 7. Figure from Textile Exchange on recycled materials (Cullen et al., 2023)



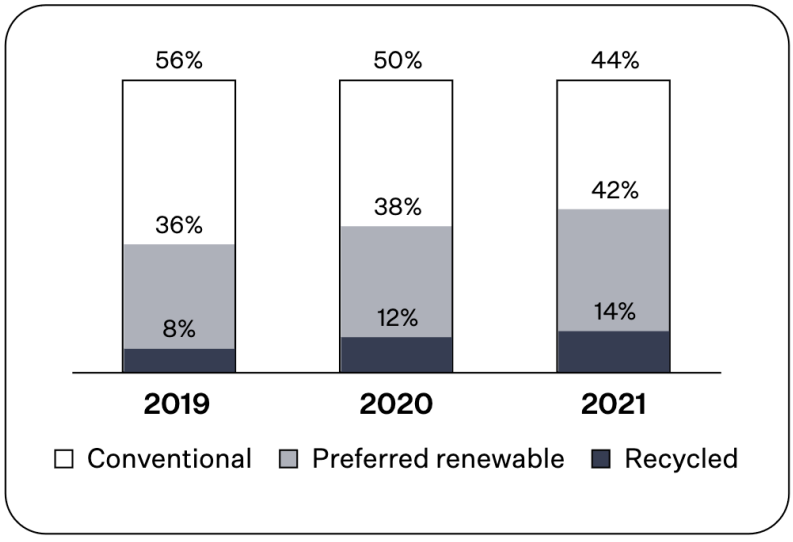
In the bigger picture, this means that of the total material uptake (recycled and virgin), 7.48% was recycled non-textile input, 5.84% was recycled pre-consumer textile input, and a maximum 0.6% was recycled post-consumer textile input (see Figure 8) (Cullen et al., 2023).

Figure 8. Figure from Textile Exchange on circular textile systems in 2021 (Cullen et al., 2023)



The share of recycled post-consumer textile-to-textile content in the total uptake of recycled materials has grown from 0.9% in 2019 to 4% in 2021 (see Figure 9). The share of (all kinds of) recycled content in the global annual material uptake has also grown from 8% in 2019 to 14% in 2021 (Cullen et al., 2023):

Figure 9. Figure from Textile Exchange on uptake of recycled materials (Cullen et al., 2023)



Through this testing programme, several factors have been identified which contribute to the low content of recycled material:

- The infrastructure for collecting post-consumer textiles for recycling is still not very advanced, and the input of post-consumer textile waste for recycling is low (Duhoux et al., 2021).
- The lack of technological refinement in recycling processes, especially mechanical recycling processes, means the majority of the output recyclate is not of sufficient quality for it to be respun into yarn because the fibres become too short after the shredding processes (Duhoux et al., 2021). This means that only a small fraction of the recyclate from post-consumer textile waste qualifies as suitable secondary raw material input in producing new textiles.
- Brands and retailers may be more inclined to use rPET and other non-textile waste recyclates to produce new textiles, as these materials are cheaper and of better quality due to their longer fibres (Duhoux et al., 2021).
- The dominant use of rPET compared to recycled natural fibres reflects the growing popularity of polyester fibres in the fashion industry. Brand demand for plastic-based fibres - recycled or virgin - is thus dominating the material uptake overall (Textile Exchange, n.d.).

6.2.2 Limitations

It is important to note that Textile Exchange - found to have the best quality of self-reported data – is not confident that its data on European companies actually represents the reality of the industry; it calls for new initiatives beyond voluntary self-reporting.

The growth in uptake of recycled content over the 2-year span may indicate that the same participating companies are sourcing more recycled content in 2021 than in 2019, but it can also mean that the cohort of survey participants has changed over the years, so better-performing companies have joined later and increased the MCI average.

6.2.3 Performance

The RACER score for the indicator is reduced from 11 to 9 out of 15 points and is evaluated as follows:

Relevance: The score remains unchanged for Relevance, since it is found highly relevant for circularity to monitor how much textile recyclate is actually put back on the market in the production of new products. It thus supports a better understanding of true circularity and supports higher value-added opportunities, since it monitors the reduction in share of virgin materials in new products.

Acceptability: The score remains unchanged for Acceptability, since the indicator is accepted by some companies with ambitious transparency and sustainability agendas, who find it beneficial to publish this data. However, for other companies, production volumes remain a trade sensitive subject. Through the research it was evident that the Textile Exchange survey design secured some level of acceptability, since company-specific trade sensitive data remained confidential.

Credibility: The post-testing RACER has performed worse on credibility against the pre-testing RACER, because Textile Exchange data is not European but global, and because Textile Exchange found their European data skewed and not representative of the industry. This calls for an EU-wide defined methodology and streamlined reporting format.

Ease: The score remains unchanged for Ease, since Textile Exchange was not willing at the moment to share European-only data. Also, collecting primary data from brand websites, annual reports and sustainability reports proved highly time-consuming and difficult. The relevant data should thus be considered not readily available.

Robustness: Even though the Textile Exchange dataset is based on a one-dimensional indicator, the post-testing RACER has performed worse on Robustness against the pre-testing RACER. This is because the Textile Exchange dataset for now should be considered biased towards better-performing companies who are willing to self-report, and does not include companies that resist or fall short on circularity initiatives.

This indicator clearly illustrates an environmental impact, as it measures the substitution of virgin raw material with secondary raw material with significantly lower environmental impact. It was also found that there is an economic side to the indicator, as rPET is currently a cheaper secondary material than recycled post-consumer textile waste. When companies substitute virgin materials for rPET instead of substituting them for recycled

post-consumer textile waste for economic reasons, this will be reflected in the performance of the indicator. This indicator has no direct impact on the social facets of CE.

Since the indicator measures the uptake of recycled post-consumer textiles relative to the uptake of other types of recycled material and virgin materials, it performs well in terms of the facet of the current level of CE. The indicator also performs well in terms of the CE facet of development over time, as the MCI data is expected to be generated every year, providing an opportunity to measure this indicator repeatedly.

Table 27 provides an overview of the RACER evaluation for this indicator, before and after the completion of the testing programme.

Table 27. RACER evaluation

Stage of project	RACER criterion					Score
	Relevance	Acceptability	Credibility	Ease	Robustness	
Task 4 (original RACER assessment)	3	2	3	1	2	11
After Task 5 (following testing)	3	2	2	1	1	9

6.3 CHALLENGES AND LESSONS LEARNED

6.3.1 Challenges

There are several challenges connected to using Textile Exchange as the data source for the indicator. They are as follows:

- Specific data for European brands and retailers is not available at this stage. Textile Exchange may be willing at a later time to provide data on European companies only, assumingly making a potential time series dependent on repeated requests.
- The data is likely biased and not necessarily comparable across years due to the changing respondents.

6.3.2 Lessons learned

Technically speaking, pre-consumer textile waste is traded among manufacturers across industries as secondary raw material input, allowing them to recycle it and thus decouple their production from sourcing of virgin materials. However, pre-consumer waste should, according to Ellen MacArthur Foundation be considered more a matter of production inefficiency than recyclability. When the material has not been on the market or in the hands of consumers, it should thus, according to the Foundation, not be considered recycled, at least not as an indicator of circularity. This is in line with the EC policy priority of recycling of post-consumer textile waste. A lesson learned through the conversation with the Ellen MacArthur Foundation is, thus, the need to exclude rPET and pre-consumer textile waste from the scope. The only way to completely decouple production of textiles from sourcing of virgin material fibres is by recirculating post-consumer textile waste. As for PET and rPET from plastic drinking bottles, plastic drinking bottles must comply with stricter quality criteria under food contact regulation, and using this material as input for textiles thus devalues the material and downcycles it, lowering its status in the waste hierarchy. Thus, the share of rPET and similar non-textile recyclates in new products should not be considered an indicator of circularity in textiles.

The case study shows that the only available data source is global data from the industry that is reported voluntarily to the Textile Exchange. Manual extraction of data directly from brands was burdened by several factors, including:

- Difficulty in understanding what brands account for: It was often unclear whether brand data and strategies accounted for all subsidiaries in a holding company or for one subsidiary only.
- Lack of (readily available) data on production volumes: Very few companies disclose their production volumes, and if so, reports are not easily located on the official websites. Furthermore, some companies only state their production volumes indirectly, for example, by the number of garments produced.
- Inconsistency in units: When brands disclose their production volumes, some report it in items and some in tonnes, with no clear way to consistently convert between them (Simpliciano et al., 2023). There is also a lack of consistency in the reporting on recycled material, for example, whether figures for recycled contents exclude recycled pre-consumer textile waste or bottle-to-textile recycling.

To obtain reliable, representative, and repeated data, the brands should be legally required to disclose both production volumes and material consumption and composition, including fibre. This data should be publicly available through government or EU statistics (the highest source on the ladder of legitimacy).

It is worth considering measuring the uptake of secondary materials by European brands and retailers, rather than specifically in products put on the European market. Uptake by brands is easier to measure than product uptake, as the data is more available. Also, tracing European brand performance compared to brands from the rest of the world will encourage companies to perform better and take responsibility for the industry.

6.4 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that this indicator is considered for further development, with significant work required to facilitate its progress.

The original name of this indicator was “Share of recycled content in textile products put on the European market” As argued throughout this case study, it is suggested that the name be changed for further development to “Share of recycled post-consumer textile-to-textile content put on the market by European brands and retailers”. This means a specification of materials as well as a change in scope (European brands and retailers rather than the European market), which was found to be necessary to facilitate realistic progress for the indicator.

It is recommended that this indicator is considered for further development due to its potential efficiency in measuring circularity in new textiles. The data from Textile Exchange is considered consistent, but biased towards better-performing brands. If it is found sufficient to use voluntary self-reported aggregated brand data, it will require a limited amount of work to facilitate its progress, as the data is currently only available at a global scale. However, if voluntary self-reporting is considered insufficient, it will require significant work to ensure that all brands and retailers report their production volumes and share of recycled content in a consistent reporting format. Voluntary self-reporting is considered a more realistic recommendation than legislative actions and requirements. However, the lack of data on textile production volumes poses a significant challenge globally to any studies attempting to measure the environmental and climate impacts of the textile industry. Thus, the necessity – and impact - of legislative measures extends beyond this specific indicator to all efforts in measuring the textile industry's climate impact, and the recommendation should thus still be seriously considered. The recommendations below reflect the general conclusion that voluntary self-reporting has not at any time proved a viable method, even for a best-practising data collector like Textile Exchange, and that regulation on disclosure of production volumes is needed.

There is a potential synergy with the updated EU CEMF, specifically for the framework indicator for circular material use rate, which measures the share of material recycled and fed back into the economy in overall material use. The indicator at hand directly reveals progress (or lack thereof) in the monitoring framework indicator, as it directly measures at what rate European textile brands and retailers substitute primary raw materials uptake with secondary materials.

As for the performance of the indicator, only 0.6% of the material uptake by brands and retailers globally is found to be recycled post-consumer textile waste. According to a report by EURATEX, “*43% of retail brands’*

respondents expect that recycled fibres will be included in more than 30% of their products by 2025" (EURATEX, 2022). Monitoring the share of recycled post-consumer textile waste in material uptake is thus an important reality check against industry expectations and metrics.

To improve the indicator in the long term, we recommend one of two ways to go forward:

- Implement legislation requiring all European companies to report their production volumes and the share of recycled post-consumer textile waste in them, also split by country. In this way, the indicator will not have to rely on voluntary self-reported aggregated data.
- As part of implementing textile EPR legislation in all EU Member States, require all textile brands and retailers who put products on the European market to report the volumes of textiles sold on the European market and the share of recycled post-consumer textile waste in them. In this way, the indicator can be based on products circulating in the European market rather than the performance of European brands, and thus, it can be a better fit for policy-making. This requires all EPR systems to set the same reporting metrics.

Table 28. Summary of recommendations for T5

Type of recommendation	RACER criteria addressed	Recommendation	Timeline	Key stakeholders or partners
Investigation of possible legislation	This recommendation addresses the score of RACER criterions Acceptability and Credibility, as it addresses the motivation and consistency of brands and retailers to report production volumes.	Investigate whether it would be possible to require European textile brands and retailers to report their production volumes and share of recycled post-consumer textile waste in material uptake, split by country.	Medium (1.5 – 5 years)	DG-RTD is recommended to initiate the work and facilitate the investigation. Member States should be engaged in setting up possible national registries and legislation. Textile Exchange, Textile Revolution and Ellen McArthur Foundation could be consulted on the design of reporting against this metric.
Investigation of possible legislation	This recommendation addresses the score of RACER criterions Acceptability and Credibility, as it addresses the motivation and consistency of brands and retailers to report production volumes.	Investigate whether it would be possible to require textile brands and retailers putting products on European market to report their sale volumes and share of recycled post-consumer textile waste in material uptake, split by country.	Medium (1.5 – 5 years)	DG-RTD is recommended to initiate the work and facilitate the investigation. Member States should be engaged in setting up possible national registries and legislation. Textile Exchange, Textile Revolution and Ellen McArthur Foundation could be consulted on the design of reporting against this metric.

7. APPENDIX

7.1 INDICATOR 1 - DATA COLLECTION TEMPLATE

See MS Excel document “DGRTD_T1_Data Collection_V01.00“ provided alongside this report.

7.2 INDICATOR 2 AND 4 - EMAIL SURVEY FOR RECYCLING COMPANIES USED

Dear [name of company],

I am writing to you on behalf of two EU research projects, in which NORION Consult is currently involved. Both projects aim to measure progress towards circularity in the EU, including the development of new circularity indicators and methods for calculating the quality of recycling. In alignment with the Circular Economy Action Plan (CEAP), textiles are key product areas in both projects.

For this, I am hoping that you would be able to provide data on your company and your operations. The data will be anonymized and only be shared publicly on an aggregated industry level.

If possible, we are interested in the following data, on a yearly basis, and preferably for as many years as are relevant for you:

1. *Quantities of recycled textiles (in tonnes per year)*
2. *Type of recyclate (fibre, non-woven or other)*
3. *How the recycled material is used, or types of buyers of the material (if known)*
4. *Are all of your employees engaged in textile recycling? If not, could you please indicate the approximate percentage or number of employees (in full-time equivalents) that are?*

*If possible, we would love to have your input by the **15th of December**. Your data will be invaluable in enhancing our understanding of the current state of circularity in textiles, providing important insights for shaping future EU monitoring schemes, policies and practices in this sector.*

We are happy to provide you with more information about these projects if you are interested. The letter by the European Commission attached to this mail provides some more information on the overall objectives of one of the projects.

If you have any other questions or inquiries, please don’t hesitate to reach out.

7.3 INDICATOR 2 - DATA COLLECTION TEMPLATE

See MS Excel document “DGRTD_T2_Data Collection_V01.00“ provided alongside this report.

7.4 INDICATOR 3 - DATA COLLECTION TEMPLATE

See MS Excel document “DGRTD_T3_Data Collection_V01.00“ provided alongside this report.

7.5 RACER ASSESSMENT MATRIX

Criterion	Description	1 (Poor)	2 (Neutral)	3 (Good)
Relevance	Refers to whether the indicator is closely linked to the objectives to be reached.	Does not support a better understanding of true circularity.	Supports a better understanding of true circularity.	Highly supportive towards gaining a better understanding of true circularity.
		Supports no value-added circular opportunities.	Supports lower value-added opportunities (i.e. metrics related to waste generation, recycling, waste management, etc.)	Supports higher value-added opportunities (i.e. all R-strategies above remanufacturing) and wider systemic change (e.g. indicators that encourage PSS or circular design).
		Not linked to the project objectives and/or European policy objectives (existing or upcoming).	Linked to the project objectives, but not to European policy objectives (existing and/or upcoming).	Fully aligned with project objectives and European policy objectives (existing and/or upcoming).
Acceptance	Refers to whether the indicator is perceived and used by key stakeholders (such as policymakers, civil society, and industry).	Poorly accepted by key stakeholders, e.g. due to the use of confidential data.	Relatively accepted by key stakeholders as the benefits of measuring are clear.	Key stakeholders are motived to report this indicator, due to mandatory legislative requirements (current or upcoming), potential commercial benefit or being in the public interest.
Credibility	Refers to whether the indicator is transparent, trustworthy and easy to interpret.	No defined methodology associated with this indicator and/or interpretation of the indicator is ambiguous.	Methodologies have been proposed or currently existing, but not for this particular indicator (e.g. in a research article).	There is an EU defined methodology.
		Difficult to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are not familiar with).	Moderately easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are aware of but are not confident in practical use).	Easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders already use and are confident in applying).
Ease	Refers to the easiness of measuring and monitoring the indicator.	No defined methodology associated with this indicator and/or interpretation of the indicator is ambiguous.	Methodologies have been proposed or currently existing, but not for this particular indicator (e.g. in a research article).	There is an EU defined methodology.
		Difficult to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are not familiar with).	Moderately easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders are aware of but are not confident in practical use).	Easy to understand and communicate to stakeholders (e.g. units or measurement of something that stakeholders already use and are confident in applying).
Robustness	Refers to whether data is biased and comprehensively assesses circularity.	No consistent methodology and dataset are available.	A consistent methodology and dataset available.	A consistent methodology and dataset available.
			A composite/aggregated indicator (based on multiples dimensions).	A one-dimensional indicator.
			A proxy indicator.	

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