# STUDY ON THE ENVIRONMENTAL IMPACTS OF THE USED CHF EPR SECTOR FROM HOUSEHOLD CONSUMPTION

Re\_fashion



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#### **GLOSSARY**

**Cutting into wiping cloths:** Recovery of used textiles and household linen into wiping cloths, mainly intended for heavy industry or households.

**Garnetting:** Production of fibres and clumps by deconstructing the fabric.

**Mechanical or thermomechanical pelletizing:** Production of single- or multi-component granules following the grinding, densification and extrusion stages (with or without the application of external heat or additives).

**Preparation for recovery:** Stage carried out upstream of recycling to remove the disruptors from recycling and put the products in a format adapted to the targeted recovery solution (cutting, shredding, etc.).

**Recycling:** A material recovery operation by which waste is reprocessed into substances, materials or products for their original function or for other purposes. Waste-to-energy operations, waste-to-fuel operations and backfilling operations cannot be qualified as recycling operations (Article L 541-1-1 of the French Environmental Code).

**Reuse after collection:** Operation that allows high grade reusable used CHF extracted from used CHF after collection, which has not yet reached the status of waste, to be used again without any change in its initial use (in France or abroad).

**Reuse after waste status:** Operation that allows high grade reusable used CHF, which has reached the status of waste, to be used again without any change in its initial use (in France or abroad).

**SDB:** Self-Deposit Bank is a location where a citizen can deposit their used CHF. It can correspond to:

- the presence of containers on the public road, a private space, in a waste collection centre,
- a structure for the recovery of used CHF in an association premises, a CHF second-hand store,
- a CHF recovery event in the marketplace or at a market,
- door-to-door collection.

**Second-hand:** Reuse or reuse of used CHF.

**SRF:** A solid recovered fuel is "solid recovered fuel is non-hazardous solid waste, composed of waste that has been sorted in such a way as to extract the fraction that can be recovered in the form of material under the current technical and economic conditions and prepared in order to be used as fuel" according to Article R541-8-1 of the French Environmental Code

**Waste:** any substance or object, or more generally any movable property, which the holder discards or intends or is obliged to dispose of (Article L 541-1-1 of the French Environmental Code).

# **ACRONYMS**

CHF	Clothing, Household linen and Footwear
EPR	Extended Producer Responsibility
SDB	Self-deposit bank
SRF	Solid Recovered Fuel



## **SUMMARY**

In accordance with its specifications, Refashion has carried out a study on the environmental impacts of the used CHF EPR sector from household consumption.

This report was written by REFASHION, based on work conducted by Deloitte Conseil. Refashion thanks all the stakeholders consulted, who all contributed to the enrichment of this study.

### 1. Context

Refashion is a producer responsibility organisation (eco-organisation) responsible for the Clothing, Household linen and Footwear ("CHF") EPR sector, created in 2008. It fulfils the obligations of marketers in terms of prevention and treatment of waste from their products. Its mission is to federate and support all the players in production, from consumption to regeneration, to reduce impacts and create value<sup>1</sup>.

As part of its accreditation, Refashion has set up an **Environmental, Economic and Social Observatory**. The latter aims, among other things, to assess the environmental impacts of used CHF and to accelerate the transformation towards the circular economy.

In this context, in 2024, Refashion decided to update the previous environmental assessment based on the activities of 2020 (Rapport : Synthèse de l'Analyse environnementale de la filière des textiles et linges de maison usagés, RDC Environment). Several notable changes compared to this study should be noted, including:

- The collection of data from actors in the entire EPR sector (collection operators, sorting operators et recovery operators);
- The inclusion of footwear collection, sorting and processing in the scope of the study;
- The evaluation of 16 impact indicators compared to 3 in the previous study;
- The submission to critical review process of the present study.

Thus, the present study has tried to integrate the main remarks and areas for improvement identified by ADEME in 2022. However, due to differences in approach, the comparability of these two studies and their results is not possible.

This environmental assessment is based on the Life Cycle Assessment (LCA) methodology and covers the collection, reuse after collection, sorting, reuse after waste status and recovery of used CHF, integrating the **impacts generated and avoided** by the CHF EPR sector. The study, which complies with the ISO standards in force at the time of publication was subject to critical review. It aims to provide a structured reference for the environmental impact assessment of the CHF EPR sector.

The main objective of this study is to provide a multi-criteria view of the environmental impacts of the different stages of the life cycle of used CHF. This study also aims to:

- Provide Refashion and the actors of the sector with reliable and objective information on the impacts generated and avoided by the stages of the life cycle and the recovery pathways studied;
- Identify the "hotspots" for each stage of the life cycle and CHF segments analysed, i.e. the main contributor to environmental impact in order to identify areas for improvement;
- Raise awareness of environmental impacts among the sector's stakeholders and the various audiences, by communicating the results in a clear and educational way.

The study focuses on used CHF from household consumption collected only in France and traced by Refashion through the contracted actors.

This document is the summary of the environmental assessment **based on 2023 data**. The full and detailed report is available on request to Refashion.

<sup>&</sup>lt;sup>1</sup> Mission and Objectives of Refashion, the eco-organization of the textile industry



# 2. Scope of the study

## 2.1. Scope of the study

The study focuses on the environmental impact of the CHF EPR sector and is characterised by the following service provided:

"Collecting, sorting and processing used CHF from household consumption collected in 2023 in France and traced by Refashion"

In order to present the impacts of the sector in more detail, the flow of used CHF from household consumption is divided into two segments: Clothing and Household linen (CH) and Footwear (F).

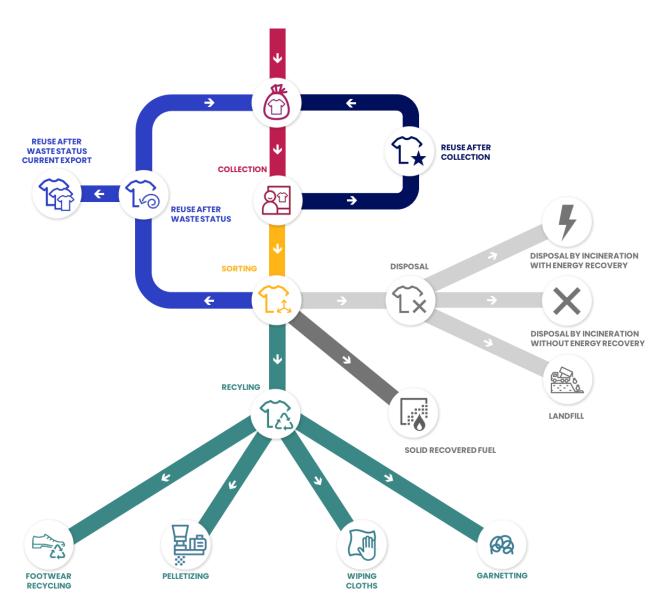
The three main stages covered are<sup>2</sup>:



The following figure shows all the stages of the life cycle from collection, sorting to second-hand and recovery of used CHF. It should be noted that the recovery solutions selected in this study do not cover all existing technologies for recovering used CHF<sup>3</sup>. The results presented are related to the data collected in this study.

 $<sup>^2</sup>$  The stages of manufacture, distribution and use of CHF are outside the scope of the study, which considers only CHF from SDB deposition.

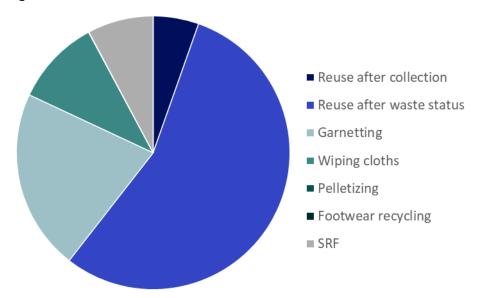
<sup>&</sup>lt;sup>3</sup> In particular, chemical recycling, due to the insufficient maturity of this technology, and closed-loop wire-to-wire recycling, recovery in equestrian soil, brick, concrete/cement, flocking material, composite materials and the assembly of textile pieces/coupons due to the too low volumes in these ways, are excluded.



Life cycle stages covered in the study



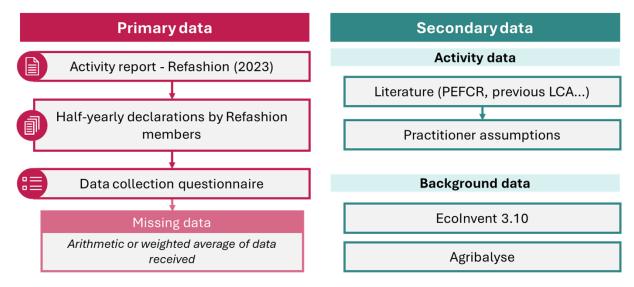
The distribution of the volumes of used CHF towards the different second-hand and recovery solutions is presented in the figure below.



Distribution of CHF volumes collected in 2023 to second-hand and recovery solutions

#### 2.2. Data used

Primary and secondary data were used for this study.



The data collected enabled 90% of the mass flow collected and 75% of the mass flow sorted by contracted operators contracted to be covered. This rate varies according to the recovery solution.

In the absence of primary data, secondary data from literature sources were used. Where no literature data was available, assumptions were applied. For the background processes, inventories from ecoinvent v3.10 and Agribalyse databases were used.

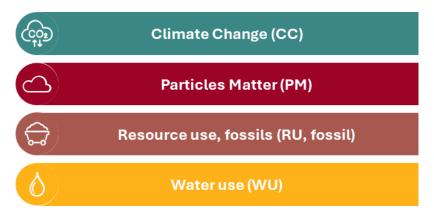


## 2.3. Calculation methodology

#### 2.3.1. Categories and impacts indicators

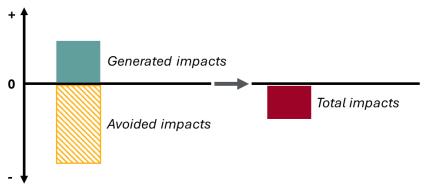
The choice of the impact categories selected for this study was made mainly based on the recommendations of the European Commission in its report of 15 December 2021<sup>4</sup> in connection with the **Product Environmental Footprint** (PEF) framework. The impact categories, indicators and characterization models selected for the study are taken from the EF3.1 version of the PEF<sup>5</sup>.

Thus, the calculation covers all the recommended impact categories, but only a limited selection of indicators was analysed in depth. The calculation of the single score thus highlighted the following impact categories as the most relevant to analyse in this study:



#### 2.3.2. "Generated", "avoided" and "total" impacts

All the stages lead to so-called "generated" impacts (linked to direct activities in collection, sorting and second-hand and recovery) and "avoided" impacts (linked to substitution of production with second-hand and the recovery of used CHF). Thus, the impacts generated are summed up to the avoided impacts to obtain the total impacts. All avoided impacts are attributed to the stage at which the substitution occurs.



#### 2.3.3. Presentation of the results

The results are presented for all the CHF collected as well as for one ton of CH and one ton of F. Caution is required regarding these impacts per ton, as the total impact is not linear to the tonnage treated: scale effects inevitably come into play. For a quantity of less or more than the tonnage of CH or F treated in 2023, the total impacts of one ton of used CH or F could change.

<sup>&</sup>lt;sup>4</sup> European Commission, Commission Recommendation (EU) 2021/2279 of 15 December 2021 on the use of environmental footprint methods to measure and report the life-cycle environmental performance of products and organisations, 2021.

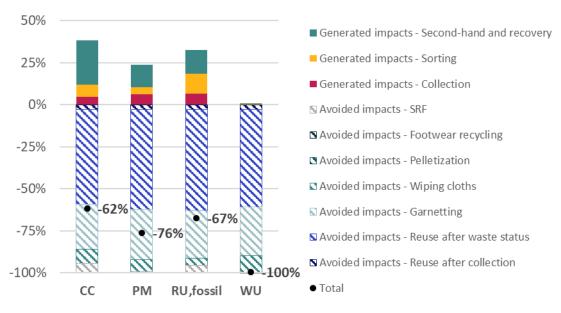
<sup>&</sup>lt;sup>5</sup> European Commission, "Environmental Footprint reference packages", European Commission, 07, 2022. [Online]. Available: https://eplca.jrc.ec.europa.eu/LCDN/developerEF.html. [Accessed 29 08 2024].



# 3. Key results and limitations

#### 3.1. Overall conclusion for the CHF EPR sector

On all the pathways studied and for the selected indicators, the impacts avoided by the sector exceed the impacts generated, which confirms the environmental benefits provided by the CHF EPR sector.

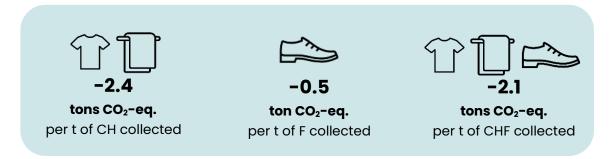


Results for all CHF collected in 2023

In particular, the collection, sorting and treatment of nearly 200,000 tons of used CHF from household consumption in 2023 avoided the emission of 420 kt  $CO_2$ -eq, i.e. 2.1 t  $CO_2$ -eq. per ton of CHF collected.



This environmental benefit is also observed for both clothing and household linen (2.4 t  $CO_2$ -eq. avoided per t of TL collected) and for footwear (0.50 t  $CO_2$ -eq. avoided by t of C collected).



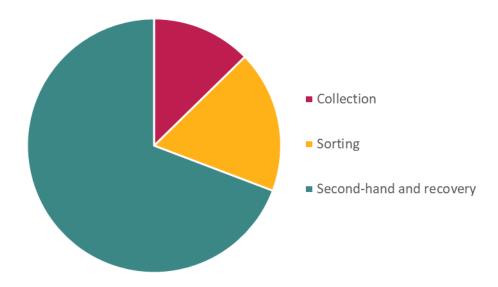


## 3.2. Focus on climate change: generated impacts

On climate change, the second-hand and recovery stages contribute to more than two-thirds of the impacts generated by the CHF EPR sector, mainly due to transport to reuse and  $CO_2$  emissions during the combustion of CHF recovered in SRF.

The impacts generated by the **collection** stages are mainly due to the transport of used CHF collected in SDB while the impacts generated by **sorting** are mainly due to the production of plastic bags used for the packaging and shipment of sorted CHF.

The following graph represents the distribution of generated impacts on climate change by the three main stages covered.

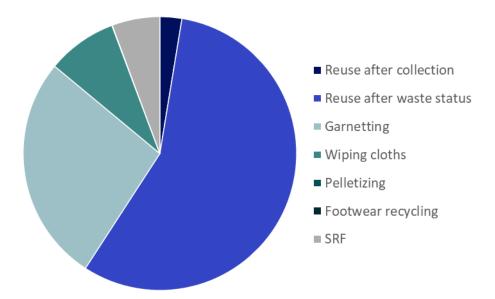


Distribution of generated impacts on climate change for all CHF collected in 2023

# 3.3. Focus on climate change: avoided impacts

On climate change, the second-hand and recovery routes avoiding the most impacts are those dealing with the largest volume of CHF (see section 2.1). Thus, the **reuse of used CHF** is the largest contributor to the avoided impacts, followed by **garnetting**. The following diagram represents the relative contribution to avoided impacts, that can be correlated with a "**volume effect**".





Distribution of avoided impacts on climate change for all CHF collected in 2023

The sensitivity analyses carried out show that the results obtained at the level of the CHF EPR sector are sensitive to certain parameters such as:

- The **effective second-hand substitution rate**, which represents the number of first-hand purchases that were avoided by the purchase of a second-hand product. Thus, if this rate increases, the impacts avoided by second-hand increase, thus reducing the overall impact of the sector;
- The **quality factor**, which represents the ratio between the quality of the replacement material and the new material considered.



# 4. Go further

On the basis of this study, Refashion has already identified ways to improve the robustness of the next environmental analyses of the CHF EPR sector.

#### 4.1. Perimeter-related areas

The scope of the study could evolve for a more global analysis of the environmental impacts, such as:

- The integration of new recovery solutions (e.g. chemical recycling, closed-loop wire-to-wire recycling, etc.);
- The integration of non-collected CHF that are treated as residual household waste;
- The integration of repair;
- The integration of a wider range of actors and more granular recovery solutions for shoes.

In addition, a separate study of the environmental impacts of the entire CHF sector, including the production and use phases of the CHF, could provide a broader perspective and a more general analysis.

#### 4.2. Data-related areas

Depending on the results obtained and the relative influence of certain parameters, the data leads are:

- Obtaining average collection and/or sorting distances that allow for the use of more precise values than those currently used;
- Getting more accurate data on the different packaging of CHF at the different stages;
- Traceability beyond the first buyer and up to the final use of the product for reuse after collection and reuse after waste status;
- Improvement of effective substitution rates for reuse after collection and reuse after waste status;
- Refinement of quality factors and their possible variability;
- Precise characterization of the material compositions of the avoided CHF;
- Obtaining specific data for recycling in wiping cloths.

These points are in line with improving the traceability of the CHF EPR sector.

## 4.3. Methodological areas

The methodological areas for improvement are:

- The integration of an indicator related to plastic pollution;
- The integration of other environmental indicators (e.g. marine eutrophication) in the four analysed in the study to follow the recommendation of 80% of the PEF single score;
- The harmonization of the "manufacturing" part of the avoided impacts;
- Improving modelling related to SRF.

These points are in line with improving the robustness of the study.