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Executive Summary

The textile sector is a significant employer in Catalonia, with an estimated 90,799 workers across the value chain. Most of these jobs remain in the linear textile industry, with the largest share (38,109 FTEs) in distribution and retail. Second-hand retail is relatively small, employing just 737 people. The repair sector is more established, with 4,446 workers in 2022. However, there is little available data on employment in circular textile design, waste collection, sorting, and recycling, making it difficult to assess the full scale of the circular economy's impact on jobs.

Consumer motivations and purchasing behaviours in Catalonia vary significantly across age groups, with younger consumers driven by social media, fast fashion, and affordability, while older consumers prioritise quality, comfort, and brand loyalty. Awareness of circular options such as renting, swapping, and upcycling is low, and a 'second-hand stigma' persists. Despite numerous successful circular textile initiatives supported by national and European programmes,[1] the region's textile consumption is notably high, with nearly the same amount of textiles being purchased (21 kilograms per capita) and discarded (19.4 kilograms per capita) in the same year.

The accessibility of circular textile services in Catalonia is uneven. While around 80% of the population can access reuse, recycling, and repair services within a 15-minute walk, this figure is skewed by the high population density along the coast. More populated areas, particularly around Barcelona, have significantly greater access to these services compared to less populated areas in the west. A more detailed analysis at the municipal level is needed to fully understand accessibility challenges.

Catalonia's textile waste management faces significant challenges. Although the region has over 1,460 donation bins, the separate textile waste collection rate is just 13.2%, slightly below the EU average of 15%.[2] The majority of textile waste (82.4%) is still landfilled or incinerated, largely due to low separate collection rates. Public awareness is a key barrier, with residents often unaware of nearby collection containers or unsure about the suitability of their garments for donation. Social enterprises play a critical role in collection, sorting, and processing, but they require further support. No significant textile recycling activities are recorded in Catalonia. This represents an untapped opportunity to develop a more circular textile sector, particularly in sourcing secondary materials for local production.

The estimated climate impact of post-consumer textile flows in Catalonia is 1.65 million tonnes of CO2e per year. Environmental impacts vary depending on the type of textiles and treatment methods used, but reducing overall textile consumption remains the most effective strategy for lowering emissions. Although microplastic impacts and other environmental consequences are not yet fully integrated into available scientific models,

[1] https://circular.textils.cat/en/success-cases-cluster-circular-hub?utm_source=menu&utm_medium=navigation&utm_campaign=success_cases_cluster

[2] Capture rate for waste textiles and shoes in the EU, EEA (2025)

the data highlights the significant potential for impact reduction through circular strategies like reuse, repair, and recycling.

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1. Introduction

1.1 Context setting

The global textile industry is 0.3% circular: of the 3.25 billion tonnes of materials it consumes each year, over 99% come from virgin sources.[3] In part, this metric is bogged down by high virgin material consumption, with per capita fibre consumption rising significantly over the decades: from 8.3 kilograms in 1975 to 14.6 kilograms in 2022. This is expected to grow by a further 7.4% per year up to 2030. At the same time, textile recycling is lagging—the strong majority (61.4%) of discarded textiles are landfilled or incinerated. Just 8% is reused or exported, 6.3% ends up in cascading recycling, and 2.2% is lost during collection or sorting.

The current scale of textile consumption is linked to numerous impacts: from climate change to water eutrophication and water scarcity. Social impacts, including labour rights violations, health hazards and threats to livelihoods in producing communities, are also pronounced. The circular economy offers a means to address these challenges, through various R-strategies such as **Reduce, Reuse, Repair, Repurpose,** and **Recycle.**

1.2 SOLSTICE: 5R solutions for textile integrated circular economy

The SOLSTICE project aims to address the key social, environmental and technical challenges posed by the textile industry through a circular economy lens. Funded by the European Union's Horizon Europe research and innovation programme under grant agreement No. 101134989, SOLSTICE is taking steps towards a circular textile industry through the implementation of pilot projects in four territories: Berlin, Grenoble, Catalonia, and Prato. The project will showcase how circular economy practices can be tailored to and implemented across the textile industry.

1.3 Territory profile: goal, methodology and structure

In collaboration with the four territories studied, Circle Economy led a current state analysis of the textile ecosystem, including current circular practices. This analysis provides insight into areas where immediate action is needed and informs the selection of relevant circular practices in each of the four territories. A mixed-methods approach was used to analyse this current state: first, describing the national and local textile industry context; giving an overview of relevant national and regional textile policies; and conducting a detailed analysis for the territories in focus. This includes a material flow analysis to map textile flows across the value chain, a baseline analysis of employment in the territory's textile value chain, a consumer behaviour analysis vis a vis textile consumption and circular solutions, and an environmental impact assessment to determine the current

[3] Circle Economy. (2024). *The circularity gap report textiles*. Amsterdam: Circle Economy. Retrieved from: CGR Website

consequences of the textile value chain in each territory. The final chapter for each territory profile extracts key findings to formulate recommendations for the design of the circular textile pilot project.

2. The current state of the circular textile landscape

2.1 National industry context

The textile industry has long played a vital role in the Spanish economy, contributing 3% of the country's GDP[4] and maintaining a strong presence in the European market. Spain accounts for 8.3% of the EU's textile companies and produces 7.6% of the EU's total textile output.[5] However, despite its significance, the sector faces persistent trade imbalances, with imports exceeding exports by 30% in value.[6] This growing reliance on foreign manufacturers reflects a shifting industry landscape—one marked by the success of global fashion brands, changing production models, and increasing environmental pressures.

Spain's reputation in the fashion world surged in the 1980s, as the country became home to globally recognised brands such as Inditex, Mango, and Tendam. These companies helped position Spain as a leader in fashion design, fostering an industry that prioritised speed, efficiency, and trend-driven production. However, recent years have highlighted the challenges of maintaining this leadership. Between 2019 and 2023, the clothing sector grew by 17%, while the broader textile industry expanded by only 6%.[7] Yet, in the last year alone, from 2023 to 2024, Spain's textile exports fell from €22.3 billion to €17.2 billion, while imports also dropped from €29 billion to €22.6 billion.[8] This decline signals a growing dependence on foreign manufacturers, as Spanish brands increasingly prioritise maintaining sales value over sustaining domestic production.[9]

The sector's fragility became especially apparent during the covid-19 pandemic when retail sales collapsed to nearly half their previous levels. According to Acotex, Spain's textile manufacturing association, the market's value plunged from €18 billion to less than €9 billion in 2020. Although recovery efforts have been underway, 2023 closed with sales of

[4] https://fashionunited.com/news/business/spain-launches-pilot-for-large-scale-textile-waste-management/2024101162377

[5] https://www.elconfidencial.com/empresas/2023-07-17/recorrido-industria-textil-espanola-bra_3700625/

[6] https://www.premierevision.com/en/magazine/special-report-spain/

[7] https://www.premierevision.com/en/magazine/special-report-spain/

[8] https://www.idepa.es/detalle-cpi/-/asset_publisher/zxT81Eepo2hu/content/sector-textil-el-sector-en-espana-comercio-exterior?_com_liferay_asset_publisher_web_portlet_AssetPublisherPortlet_INSTANCE_zxT81Eepo2hu_redirect=https%3A%2F%2Fwww.idepa.es%2Fdetalle-cpi%3Fp_p_id%3Dcom_liferay_asset_publisher_web_portlet_AssetPublisherPortlet_INSTANCE_zxT81Eepo2hu%26p_p_lifecycle%3D0%26p_p_state%3Dnormal%26p_p_mode%3Dview%26_com_liferay_asset_publisher_web_portlet_AssetPublisherPortlet_INSTANCE_zxT81Eepo2hu_cur%3D0%26p_r_p_resetCur%3Dfalse%26_com_liferay_asset_publisher_web_portlet_AssetPublisherPortlet_INSTANCE_zxT81Eepo2hu_assetEntryId%3D52977

[9] https://www.premierevision.com/en/magazine/special-report-spain/

€11.3 billion—still 37% below pre-pandemic levels.[10] These figures highlight the slow and uneven resurgence of the industry, with retailers and manufacturers navigating economic uncertainty and shifting consumer behaviours.

Beyond economic concerns, Spain faces mounting challenges in textile waste management. Currently, only 12% of used clothing is collected separately, while a staggering 88% ends up in landfills. On average, each Spanish resident discards 20 kilograms of clothing per year, significantly exceeding the European average of seven kilograms per person.[11] This issue has become increasingly urgent as new EU regulations on textile waste approach. By January 2025, selective collection of textiles is mandatory across all EU member states.[12] In preparation, Spain's leading fashion retailers began a voluntary pilot programme in April 2024, implementing clothing collection initiatives to manage textile waste before the regulations took full effect in 2026.[13]

To meet these regulatory requirements, Spain will need to expand its textile waste infrastructure significantly. Estimates suggest that one textile waste container will be required for every 1,200 residents.[14] Proper disposal methods will include a combination of fixed, mobile, and neighbourhood recycling points ('*puntos limpios*'), as well as public collection containers located on streets or municipal facilities. Additionally, shoes and textiles must be separated to streamline recycling efforts.[15]

2.2 Local industry context

In the 18th century, the region around Barcelona witnessed the emergence of a fledgling textile industry, with production centred on wool and linen.[16] This modest beginning laid the groundwork for a dramatic transformation in the 19th century, spurred by the Industrial Revolution, after which the textile industry grew in Catalonia, with various factories dedicated to printing light fabrics. However, it was cotton production that gave the industry a modernising push.[17] Cotton became the fabric of choice as steam engines and mechanised looms revolutionised production processes.[18] Large textile factories began to

[10] https://www.premierevision.com/en/magazine/special-report-spain/

[11] https://www.reuters.com/sustainability/spains-top-fashion-retailers-launch-trial-collect-clothes-waste-2025-2024-10-10/#:~:text=In%20Spain%2C%20just%2012%25%20of,kilos%20in%20Europe%2C%20authorities%20say.

[12] https://www.reuters.com/sustainability/spains-top-fashion-retailers-launch-trial-collect-clothes-waste-2025-2024-10-10/#:~:text=In%20Spain%2C%20just%2012%25%20of,kilos%20in%20Europe%2C%20authorities%20say.

[13] https://sigmaearth.com/spains-largest-fashion-companies-to-launch-textile-waste-collection-initiative-in-april-2025/

[14] https://www.reuters.com/sustainability/spains-top-fashion-retailers-launch-trial-collect-clothes-waste-2025-2024-10-10/#:~:text=In%20Spain%2C%20just%2012%25%20of,kilos%20in%20Europe%2C%20authorities%20say.

[15] https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/prevencion-y-gestion-residuos/flujos/domesticos/fracciones/textil-y-calzado/como-se-separan-origen-se-recoge.html#:~:text=El%20textil%2C%20el%20calzado%20y,en%20v%C3%ADa%20p%C3%BAblica%20o%20equipamientos.

[16] History of the cotton industry in Catalonia - Wikiwand

[17] https://textilbalsareny.com/blog/la-industria-textil-un-sector-con-historia/

[18] Modern and Industrial City | Barcelona Website

dot the landscape, particularly near rivers that provided the hydraulic power needed to drive these innovations.[19] Agricultural lands gave way to industrial hubs, and towns like Sabadell and Terrassa rose to prominence—Sabadell specialising in wool and Terrassa in cotton.

This era of rapid industrialisation brought not only economic growth but also social upheaval. A burgeoning working-class movement emerged, marked by labour strikes and demands for improved working conditions.[20] The early 20th century brought turbulent times for the textile industry. Economic instability, political unrest, and rising global competition created significant challenges. The Spanish Civil War (1936–1939) and the repressive dictatorship that followed under Franco further stagnated the industry. Factories struggled to modernise, and the once-thriving sector faltered.

In the latter half of the 20th century, Catalonia's textile industry faced new hurdles as globalisation introduced competition from lower-cost producers in Asia. Many traditional manufacturing operations closed, and the industry was forced to adapt. Despite dependence on imported machinery—primarily from leading industrial nations—over time, local mechanical engineering industries emerged. This led to a gradual decline in dependence on foreign machines by producing machinery tailored to the specific needs of Catalonian textile manufacturers, therefore strengthening the industry.

Remaining a key player in Spain's textile sector, the region has embraced high-value and niche markets, including technical textiles, fashion, and design, carving out a new identity in a globalised economy while continuing to honour its rich industrial heritage. Nowadays, Catalonia's economy is more diversified, yet the textile industry remains significant, accounting for 5.6% of the region's GDP and contributing €15.4 million per year.[21] Currently, Catalonia is home to 20% of Spain's nearly 20,000 textile enterprises.[22] In 2022, the region had 4,716 establishments engaged in textiles, leather, and footwear manufacturing, employing slightly over 30,000 workers.[23]

3. Governance & policy overview

3.1 National overview

Spain has taken significant steps to advance its circular economy ambitions through comprehensive legislative and strategic measures. Central to this effort is the Spanish Circular Economy Strategy, which seeks to transform waste management and resource use across the country. In 2021, Spain implemented a groundbreaking ban on incinerating or depositing unsold excess production in landfills, signalling a shift towards prioritising reuse

[19] A journey to the textile past of the river Ter | Cultural Heritage. Goverment of Catalonia.

[20] https://econ-papers.upf.edu/papers/718.pdf

[21] https://www.pimealdia.org/es/el-textil-en-cataluna-un-ejemplo-de-resiliencia-y-capacidad-de-adaptacion/

[22] https://www.pimealdia.org/es/el-textil-en-cataluna-un-ejemplo-de-resiliencia-y-capacidad-de-adaptacion/

[23] https://www.idescat.cat/industria/ei?tc=1&se=215&lang=es

and recycling over waste disposal. Key targets have been set to strengthen this transition, including ambitious goals for the reuse and recycling of municipal waste and the introduction of separate collection systems for textile waste by 2025.[24] To further reinforce its commitment, the strategy includes plans to apply an Extended Producer Responsibility (EPR) to textile waste. This initiative, which holds producers accountable for the entire lifecycle of their products, is slated for implementation three years after the new waste law comes into effect in 2025.

In 2022, Spain built on this foundation with the enactment of the *Law on Waste and Contaminated Soils for a Circular Economy*. This legislation provides a robust framework for achieving the country's circular economy objectives by addressing waste generation, promoting sustainable resource management, and ensuring the remediation of contaminated soils.[25] Together, these initiatives position Spain as a leader in integrating circular economy principles into national policy, laying the groundwork for a more sustainable and resilient future.

3.2 Regional overview

Catalonia has emerged as a leader in advancing circular economy principles within its textile sector, guided by a comprehensive *Strategy for the Prevention and Management of Municipal Textile Waste* (2020–2025). Catalonia took another significant step forward in January 2024 with the launch of its "*Plan of Action 2024-2026 of the Roadmap of the Circular Economy in Catalonia (FRECC) 2030*", which prioritises textiles as a key sector.[26] [27] This roadmap integrates EPR schemes for textile waste in compliance with EU legislation. It should be noted that Catalonia is not expected to introduce a separate EPR scheme, but rather align with the national framework, where, based on Law 7/2022 on waste and contaminated soils for a circular economy, the country is required to establish an EPR system for textiles by April 2025[28][29]. FRECC outlines four actions that are especially relevant to bolster circularity within the region: 1) to prepare stakeholders for the introduction of Digital Product Passports, 2) map key players in eco-design to foster strategic alliances, 3) identify legal and administrative barriers to industrial symbiosis, and 4) establish an exchange platform to facilitate the sharing of resources, waste, and inputs across industries.

In 2022, Catalonia's regional government introduced a voluntary initiative aimed at promoting circularity in the textile sector: the Circular Fashion Agreement[30]. The initiative brings together stakeholders across the textile value chain, including municipalities, consumers, brands, and waste management providers, to develop regional circular models

[24] circular fashion pact

[25] circular fashion pact

[26] Approval of the roadmap for the circular economy in Catalonia, and now what? - inèdit

[27] https://mediambient.gencat.cat/web/.content/home/actualitat/2024/docs/Pla-accio_Consell-Tecnic_.pdf

[28] https://geoinnova.org/blog-territorio/las-obligaciones-de-la-industria-textil-ante-la-ley-7-2022/

[29] https://www.boe.es/buscar/act.php?id=BOE-A-2022-5809

[30] Circular Fashion Agreement - GenCat

and increase demand for recycled components. The Agreement involves over 100 industry stakeholders and was initially planned as a two-year initiative, with its continuation beyond this period contingent on the progress of the national EPR system.

The circular economy transition in Catalonia is supported by a diverse network of stakeholders. The *Generalitat de Catalunya*, particularly the Department of Business and Knowledge, plays a pivotal role in overseeing the textile sector, supporting business internationalisation, and attracting foreign investment. Local governments in textile hubs such as Terrassa, Sabadell, Mataró, Manresa, and Igualada contribute by promoting industrial innovation and business development.[31] [32]

Industry associations, including the *Confederació de la Indústria Tèxtil* (Texfor), provide a platform for manufacturers,[33] while research institutions such as the *Institut d'Investigació Tèxtil i Cooperació Industrial de Terrassa* (INTEXTER) and the *Escola Superior Disseny i Arts Plàstiques Catalunya* (ESDAP) lead in innovation and education. Trade unions like *Comisiones Obreras* (CCOO)[34] and *Unión General de Trabajadores* (UGT)[35] advocate for workers' rights, conduct research on circular economy practices and offer training programmes.

Retailers, start-ups, second-hand stores, and digital platforms such as Wallapop and Vinted also contribute to this evolving ecosystem. Other initiatives, such as the Club EMAS, focus on facilitating workshops and collaborations to exchange best practices on circular solutions and connect businesses so that waste from one company becomes a resource for another.[36] The region's circular economy efforts are further bolstered by urban planning policies that integrate zoning, regulation, and comprehensive planning, as well as social protection, labour, and education policies.

4. Regional analysis

4.1.1 Methodology

Approach

This spatial analysis examines the distribution of key locations within Catalonia's circular textile ecosystem and their accessibility to residents. Accessibility refers to the ease with which people can reach a location or 'point of interest' (POI). The analysis follows a structured approach, beginning with the compilation of an inventory of POIs related to the circular textile ecosystem. This is followed by the calculation of travel times to these POIs

[31] Reindustrialización, la llave del 28M para Sabadell y Terrassa, 'hubs' históricos del textil | Modaes

[32] Textile Industry Barcelona, Catalonia | Cooperatèxtil

[33] Mapatge de la cadena de valor del sector tèxtil de Catalunya. Access here: link

[34] https://www.ccoo-servicios.es/archivos/catalunya/conveni-comerc-textil-bcn-2022-2024.pdf

[35] https://ugtficabcn.cat/convenio-colectivo-general-de-trabajo-de-la-industria-textil-y-de-la-confeccion/

[36] https://green-business.ec.europa.eu/news/circular-solutions-how-club-emas-transforming-waste-resources-catalonia-2024-12-18_en

using open-source road data, considering both walking and driving. Finally, the analysis assesses how many people have good access to these POIs based on population and socioeconomic data, exploring potential links between accessibility and socioeconomic profiles. A more detailed explanation of the methodology is available in the Methodology Document.

Territory and socioeconomic inputs

This spatial analysis focuses on the region of Catalonia. The selected travel times for walking and driving were determined using predefined thresholds. The maximum acceptable travel time to reach a POI is 15 minutes by walking and 10 minutes by driving. These thresholds reflect typical expectations for accessibility in urban and suburban areas. To examine whether accessibility varies across population strata, we employed data on the gross disposable household income per comarca (comarca/comarques are equivalent to county/counties) in Catalonia.[37] The latest year available for the data is 2021.

POI collection

To compile an inventory of POIs within Catalonia's circular textile ecosystem, publicly available bottom-up sources were collected. Additionally, establishments related to secondhand clothing shops and textile and apparel repair services were identified through queries to the Google Places API.[38] The analysis focuses on four 'R-categories' of POIs: reuse, repair, rental, and recycling. Reuse locations facilitate textile reuse through selling, exchanging, or giving away used textiles, including secondhand shops, donation points, and clothing swap initiatives. Repair services extend the lifespan of textile products and include clothing and shoe repair shops, repair cafés, and cleaning services. Rental providers offer textile rental services, such as clothing and costume rental businesses. Recycling locations involve textile waste management and recycling, including textile collection bins and stores with take-back services.

This analysis is limited to consumer-oriented POIs, considering only locations accessible to the general public. Facilities primarily serving industrial or business purposes within the circular textile value chain, such as sorting facilities, are excluded. Furthermore, the study does not differentiate between specific textile-related products, such as shoes, carpets, clothing, or bags. Depending on the data source, a POI may be classified under multiple categories. For example, a vintage store offering repair workshops is categorised under both reuse and repair, while a collection bin supplying secondhand stores contributes to both reuse and recycling.

POI inventory

A total of 5,634 POIs were found for Catalonia (see Table 1). The data consists of two main sources, with the remainder extracted from the Google Places API. The first dataset includes

[37] Statistical Institute of Catalonia. (n.d.). Territorial Gross Disposable Household Income. Retrieved from gencat.cat Information, procedures, and services of the Government of Catalonia.

[38] Google. (n.d.). Places API. Retrieved from Google Maps Platform.

collection bins and stores managed by the organisation *Roba Amiga*, comprising around 2,051 textile waste collection containers scattered throughout the region.[39] The dataset also includes a small number of in-store collection points, or those located at partner sites. The second dataset is provided by *Humana Fundación Pueblo para Pueblo*, which maps approximately 1,460 donation bins and 19 secondhand stores.[40] These stores not only sell secondhand clothing but also accept donations of clothes and shoes, offering another avenue for textile collection in the region.

	Reuse	Recycle	Repair	Rental	Total
Count	4,166	3,517	1,494	0	5,634

Table 1: Overview of the bottom-up collected points of interest in Catalonia.

4.1.2 Results

Accessibility

The analysis reveals distinct spatial patterns in the accessibility of circular economy services across Catalonia. In general, more populated comarques, particularly along the coast, have greater access to POIs, while less populated areas in the West experience significantly lower accessibility. This disparity is most pronounced in driving accessibility. Within a ten-minute drive, residents in Barcelona and surrounding areas can reach up to 400 POIs, whereas accessibility drops sharply to fewer than 100 POIs further inland and away from coastal regions (Figure 1). In contrast, walking accessibility is more evenly distributed. With a 15-minute walk, most comarques share similar levels of access, apart from the most populated areas, which still have a slight advantage (Figure 2). Overall, Catalonia has a fairly extensive coverage of reuse, recycling, and repair POIs, though accessibility remains unevenly distributed across the territory.

[39] Roba Amiga Cooperativa. (n.d.). El contenidor taronja. Retrieved from: Roba Amiga website.

[40] Humana. (n.d.). Donate Clothing. Retrieved from: Humana website.

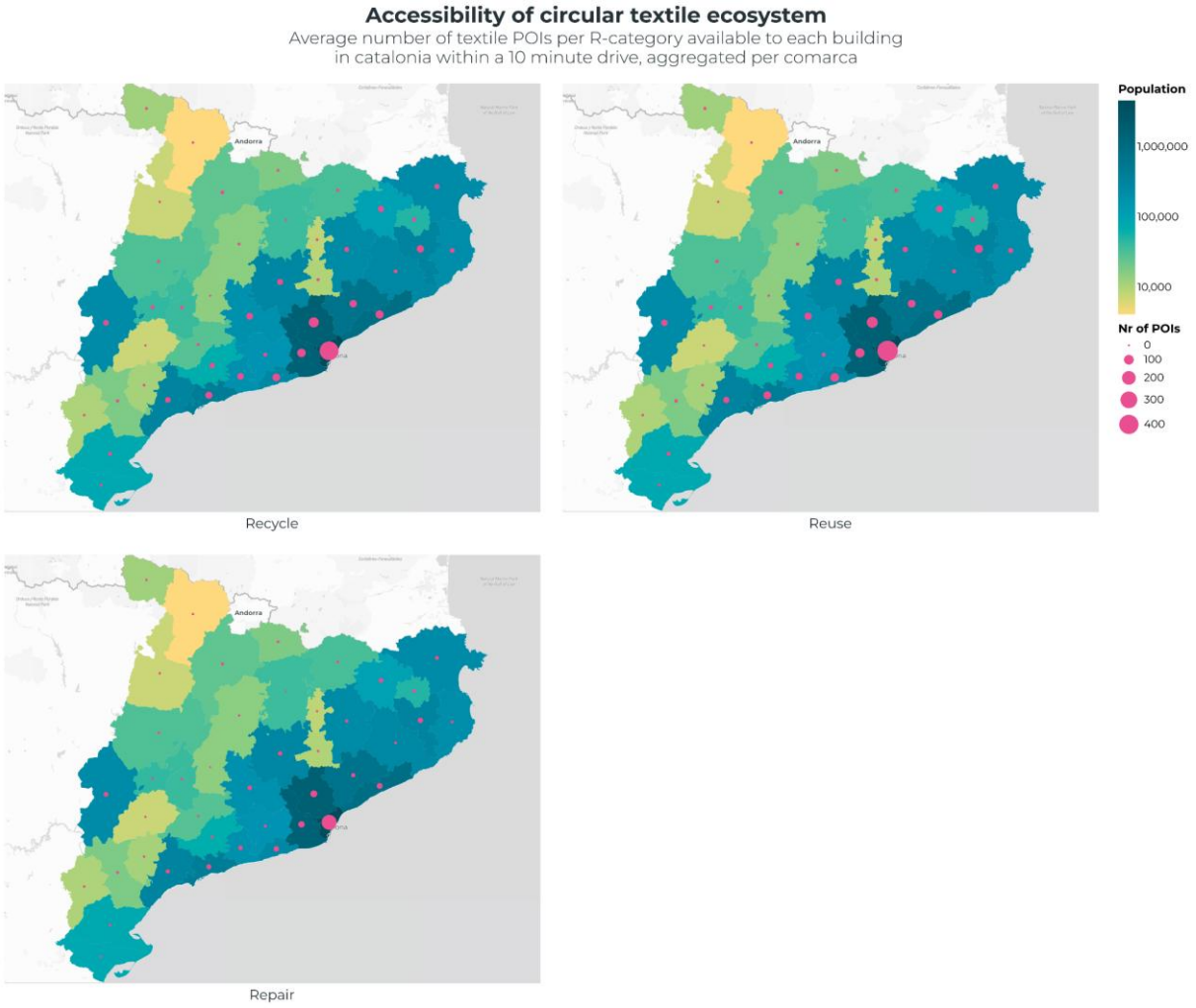

Figure 1: Accessibility maps showing the average number of recycle, reuse, and repair POIs reachable within a ten-minute drive across comarques in Catalonia. Bubble size represents accessibility, with larger bubbles indicating more POIs, while darker shades indicate higher population levels. The maps highlight spatial patterns and potential disparities between population density and service accessibility.

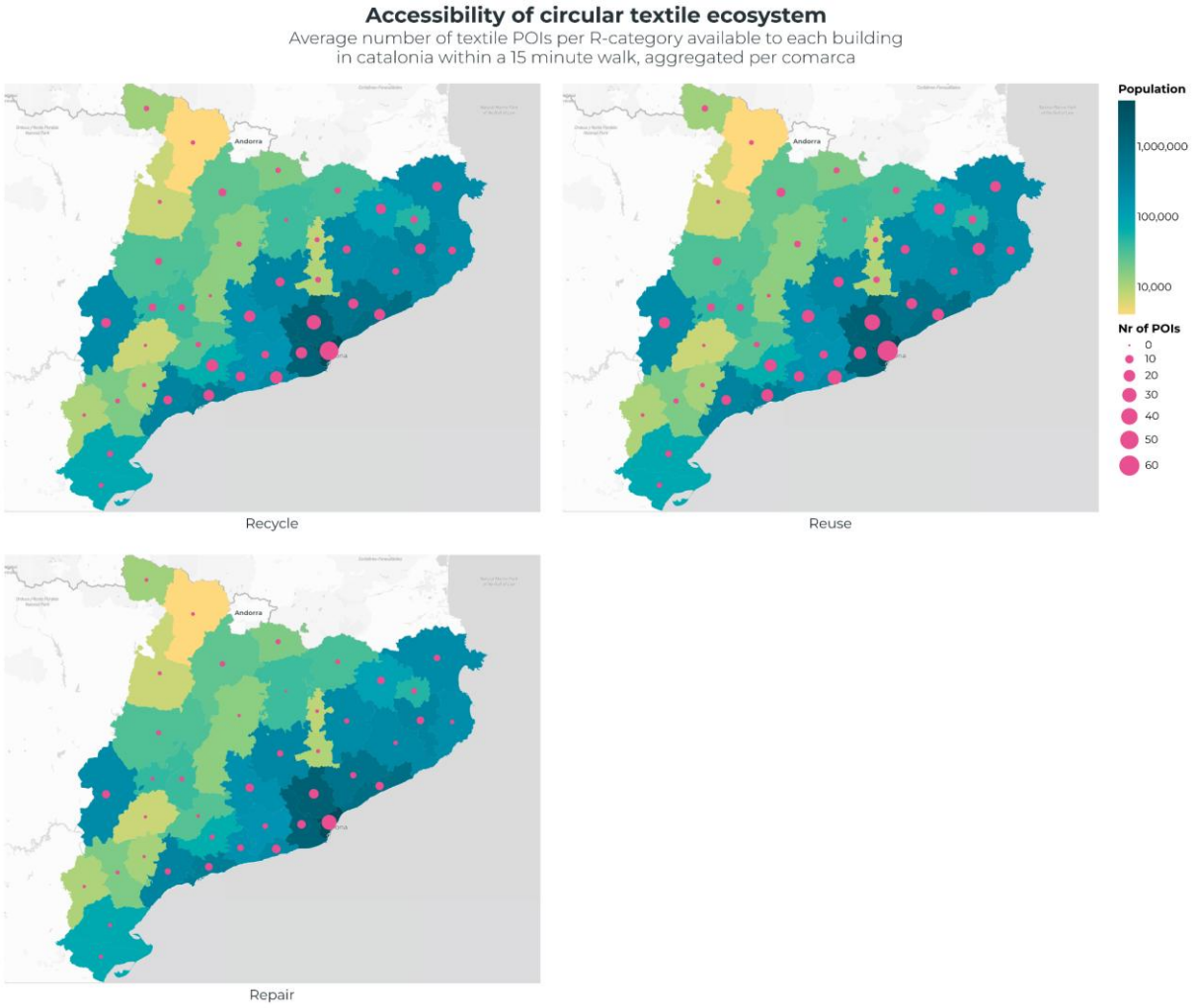

Figure 2: Accessibility maps showing the average number of recycle, reuse, and repair POIs reachable within a 15-minute walk across comarques in Catalonia. Bubble size represents accessibility, with larger bubbles indicating more POIs, while darker shades indicate higher population levels. The maps highlight spatial patterns and potential disparities between population density and service accessibility.

Travel time

The analysis shows that 50% of Catalonia's population can reach at least one circular economy POI within six minutes and 55 seconds on foot or two minutes by car (Figure 3). However, accessibility varies significantly, with some residents facing much longer travel times—the maximum distance to the nearest POI is one hour and 55 minutes by walking and 24 minutes by driving.

When considering access to all three R-categories (recycle, reuse, and repair), coverage appears extensive. 93% of the population (7,240,144 people) can access all categories within a ten-minute drive, while 81% (6,290,827 people) can do so within a 15-minute walk. However, this apparent accessibility is largely driven by high population density along the coast. As the above accessibility maps illustrate, service availability is strongly concentrated

in these urbanised areas, while residents in less populated Western areas face significantly lower access.

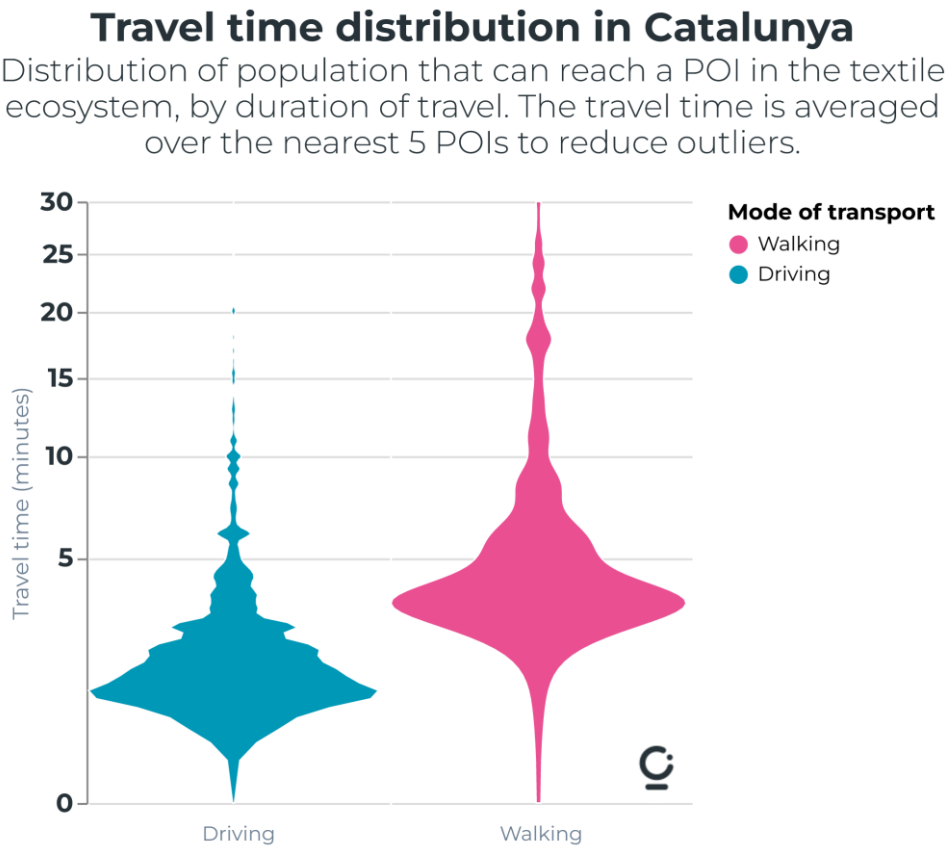

Figure 3: The chart shows the distribution of travel times for Catalonia's population to reach a circular textile POI, by driving (blue) and walking (pink).

Socioeconomic factors

The analysis suggests that some of the most affluent comarques in Catalonia have the highest accessibility to circular economy services. However, accessibility does not appear to be solely linked to affluence (Figure 4). Comarques with a similar gross disposable household income of approximately €18,000 per year experience varying levels of access—those near Barcelona and the coast can reach over 1,000 POIs, while comarques with the same income level in the North have access to fewer than 500 POIs within a 15-minute walk. This suggests that proximity to urban centres plays a more significant role in accessibility than income alone.

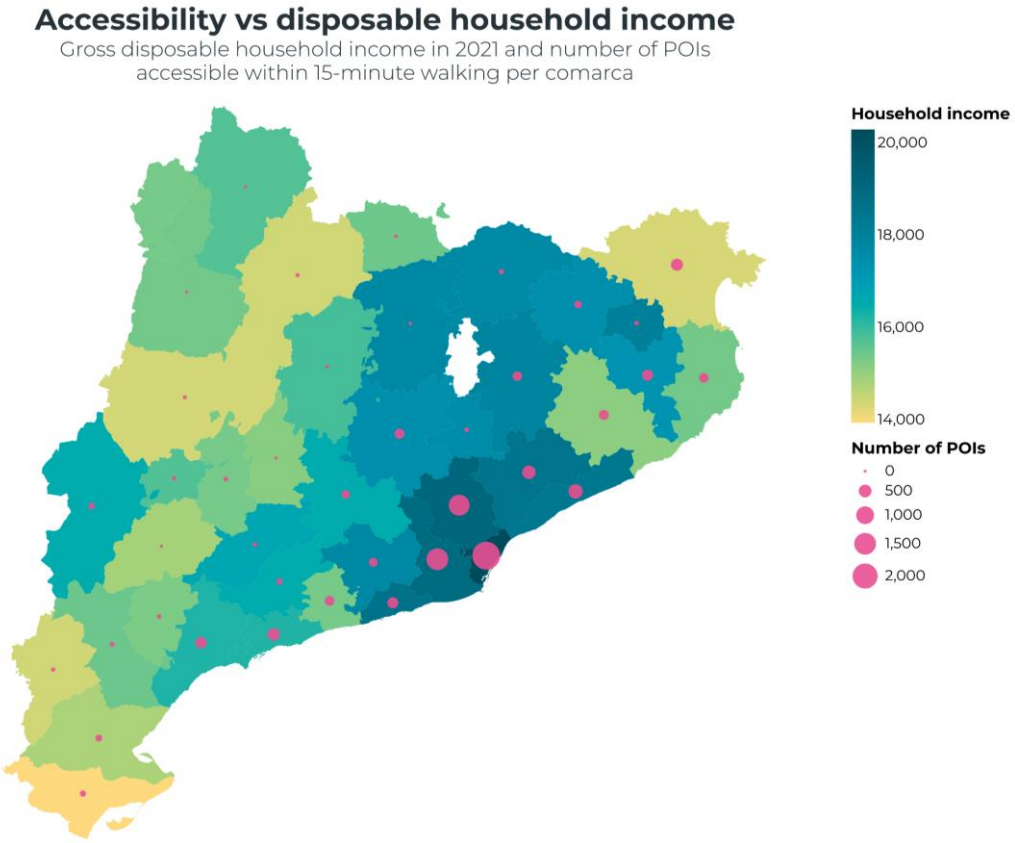

Figure 4: Choropleth and density bubble map showing that darker shades (higher income) are in coastal areas with the highest accessibility, while lighter shades (lower income) are in central and Western areas with limited accessibility. Accessibility is more influenced by location than socioeconomic factors.

4.2 Material Flow Analysis

4.2.1 Methodology

In Catalonia, the life cycle of textiles unfolds through five interconnected stages: fibre production, textile manufacturing, distribution and retail, use and repair, and waste management. To provide a detailed view of these stages, a Material Flow Analysis (MFA) was conducted, offering valuable insights into the region's textile flows in 2023. The analysis focused on clothing and footwear, home textiles, and technical textiles. Data on fibre production, textile manufacturing, and repair activities were retrieved using NACE classification codes (see the Methodology Document for details). The primary data source for fibre production and manufacturing was the Industrial Product Survey.[41] Data on waste generation and treatment were obtained at the regional level from the *Agència de Residus de Catalunya*, providing additional insights into the end-of-life stage of textiles.[42]

[41] Instituto de Estadística de Cataluña. (2023). *Encuesta industrial de productos*. Retrieved from Idescat website

[42] Agència de Residus de Catalunya (2023) Dades de residus industrials de Catalunya. Retrieved from Gencat website

For the distribution and retail stage, apparent consumption served as the key metric. This was calculated based on Huygens et al. (2023):[43]

$$Use = Import_{fin.prod} + Production_{fin.prod} - Exports_{fin.prod}$$

Where 'Import$_{fin.prod}$ ', 'Production$_{fin.prod}$' and 'Export$_{fin.prod}$' refer to the import, domestic production and export of finished textile products (see Methodology Document for details). To benchmark results, data was compared to the European average of 23 kilograms per person.[44]

4.2.2 Results

In 2023, fibre production in the region amounted to 99.3 thousand tonnes, with more than half (55.7 thousand tonnes) exported to other regions.[45] Regional textile manufacturing generated 144.5 thousand tonnes of finished textiles, of which 77.4 thousand tonnes—over half—were exported.[46] As Catalonia is a port region, the data on re-exports and interregional trade (textile goods shipped to other parts of Spain) caused apparent consumption figures to be overestimated at 36.6 kilograms per person. To address this, national data was used to approximate actual consumption. Since average annual spending on clothing, footwear, and home textiles is nearly identical in Catalonia (€575 per person) and Spain (€572 per person),[47] the adjusted consumption for Catalonia was estimated at 21.1 kilograms per person. This translates to a total of 168.6 thousand tonnes consumed across the region.[48]

On the waste management front, post-consumer textiles collected each year totalled 154.9 thousand tonnes, representing 4.11% of Catalonia's municipal waste.[49] Separately collected textiles accounted for 51.2 thousand tonnes, with 30.7 thousand tonnes stemming from industrial sources[50] and 20.5 thousand tonnes from municipal waste.[51] However, only 13.2% of textiles within municipal waste were collected separately, leaving an estimated 134.4 thousand tonnes embedded within mixed municipal waste.[52] Of these mixed waste textiles, 93% were sent to landfills, while 7% were incinerated.[53]

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[43] Agència de Residus de Catalunya (2023) Dades de residus industrials de Catalunya. Retrieved from Gencat website

[44] European Environment Agency (2022). EU-27 apparent consumption of clothing, footwear and household textiles. Retrieved from EEA website. Value based on the same NACE codes considered in this analysis, further explained in the Methodology document

[45] Result from the MFA model, as explained in the Methodology Document, Section 1.1

[46] Result from the MFA model, as explained in the Methodology Document, Section 1.2

[47] Instituto Nacional de Estadística. (2023). Encuesta de presupuesto familiares. Retrieved from INE website

[48] Result from the MFA model, as explained in the Methodology Document, Section 1.3

[49] Generalitat de Catalunya. Department de Teritori i Sostenibilitat (2020). ANNEX 11-Estudi de composició de la bossa tipus de residus municipals a Catalunya. Retrieved from Gencat website

[50] Agència de Residus de Catalunya (2023) Dades de residus industrials de Catalunya. Retrieved from Gencat website

[51] Data shared by the *Agència de Residus de Catalunya*.

[52] Data shared by the *Agència de Residus de Catalunya*.

[53] Data shared by the *Agència de Residus de Catalunya*.

From separately collected post-consumer textiles, approximately 21% were reused locally, amounting to 4.2 thousand tonnes, while 42% were exported for reuse abroad. Another 2% were exported for recycling, and 32% were sent overseas without classification.[54] The remaining 4% were disposed of via landfilling or incineration. Despite growing awareness of sustainable practices, repair volumes remained modest, with only 0.42 thousand tonnes of textiles repaired annually.[55]

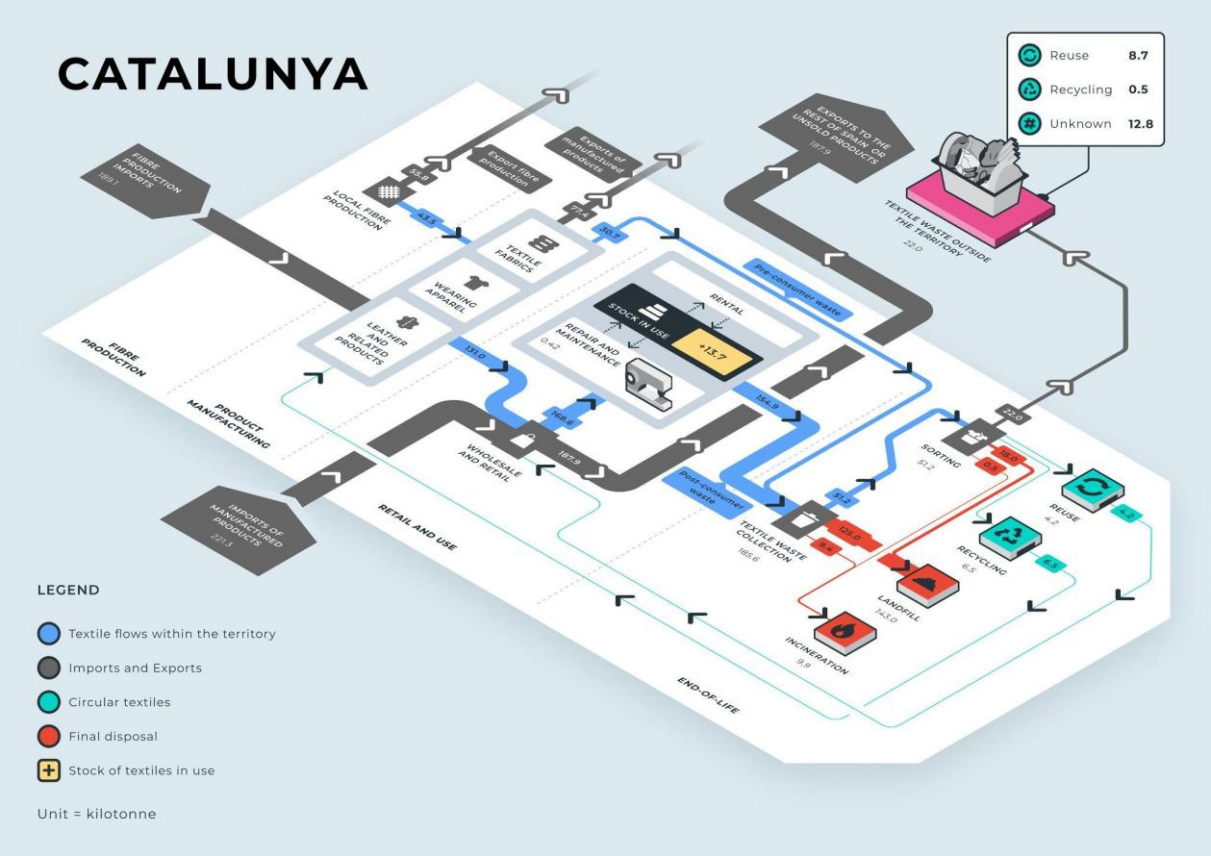


Figure 5: Material Flow Assessment results

4.3 Employment baseline

4.3.1 Methodology

A range of sources informed the baseline analysis, with full-time equivalent (FTE) data used whenever available. Where specific FTE figures were not accessible, employment data was referenced more generally under the term 'jobs'. Regional employment data was prioritised, such as figures from *Gen Cat* for manufacturing, wholesale and distribution, and retail. In cases where direct data was unavailable, estimates were derived from interviews and contextual knowledge. For example, employment in reuse, collection, and sorting was analysed collectively, drawing on data from three of the largest collectors and sorters in

[54] Data shared by the *Agència de Residus de Catalunya*.

[55] Result from the MFA model, as explained in the Methodology Document, Section 1.4

Catalonia, who also operate second-hand shops. However, no employment data was available for second-hand shops specifically.

When reporting 'zero jobs', this does not indicate a complete absence of employment but rather a lack of consistently identifiable data sources. Further details on data limitations and methodology are provided in the following section. Employment data covers the period between 2022 and 2024.

4.3.2 Results

Catalonia's textile industry is a significant economic driver, employing an estimated 90,799 people across the value chain. From fibre production and textile manufacturing to retail and recycling, this sector plays a crucial role in the region's circular ambitions. As the industry evolves to meet sustainability challenges, understanding its workforce and impact is more important than ever.

Fibre production

Fibre production is recorded as having no jobs. However, there is evidence of some fibre processing activities such as cotton spinning in the central regions and wool spinning in Western Vallès, occurring, but these fall under the manufacturing sector.

Textile manufacturing

Manufacturing accounts for a total of 31,904 jobs among wage earners and self-employed individuals, according to the regional statistics office for 2023.[56] This includes 17,355 jobs in textile manufacturing, 10,975 in the manufacturing of wearing apparel, and 3,574 in the manufacture of leather products.

Design

The design sector employs approximately 15,513 people. According to INE data on the textile, clothing, leather, and footwear sector, 5,018 of these workers are women.[57] The figures are assumed to reflect 2023, based on consistency with other data sources used in this analysis. Several major fashion brands, including Mango, Oysho, and Massimo Dutti, have their headquarters in Barcelona, which suggests that design jobs may be available within these companies. However, many of these roles are likely also captured under the broader category of distribution and retail. There is likely some overlap between design and distribution or retail jobs in Catalonia, potentially leading to an overestimation of the number of jobs overall for both these categories. For this reason, the design sector is not included in the current analysis.

[56] Gen Cat (2023) https://empresa.gencat.cat/ca/treb_ambits_actuacio/industria/industria-catalana/observatori/informe_anual

[57] Leitat managing technologies, DATOS DE OCUPACIÓN, I+D, EN EL SECTOR TEXTIL EN CATALUNYA. Internal document shared by the Region.

Distribution and retail

The distribution and retail sector is Catalonia's largest sector in terms of employment across the textile value chain, with 38,109 FTEs recorded in 2022.[58] This includes 13,291 FTEs in the wholesale of textiles and 24,818 FTEs in textile retail.

Second-hand retail

Reuse, collection and sorting activities employed approximately 737 people in 2023, based on figures provided by Humana, *Solidança*, and *Formació i Treball*, the three largest textile collectors and sorters in the region. These organisations also operate second-hand retail shops, but no separate employment figures were available for this activity. For this reason, second-hand, collection, and sorting jobs were combined in this analysis.

Use and repair

Rental

No data was available on employment in the textile rental sector in Catalonia.

Repair, upcycling and maintenance

The repair sector employed an estimated 4,446 people in 2022. Due to the absence of region-specific data for the repair of footwear and leather goods (NACE code 9523) and the washing and cleaning of textile and leather garments (NACE code 9601), employment figures were derived by downscaling national statistics to the regional level.[59] At the national level, the repair of footwear and leather goods accounted for 3.9% of all activities under the broader category of repairing personal effects and household items (NACE code 952). Applying this proportion to the 2,240 repair jobs reported in Catalonia resulted in an estimated 87 jobs in this subsector. This approach assumes that the distribution of employment across detailed NACE codes follows the same trend regionally as it does nationally. The remaining 4,359 jobs in the repair sector were attributed to the washing and cleaning of textiles and leather garments.

Waste management

Collection and sorting

Reuse, collection and sorting activities employed approximately 737 people in 2023, based on figures provided by Humana, *Solidança*, and *Formació i Treball*, the three largest textile collectors and sorters in the region. These organisations also operate second-hand retail shops, but no separate employment figures were available for this activity. For this reason, second-hand, collection, and sorting jobs were combined in this analysis.

[58] Gen Cat (2022) https://www.idescat.cat/industria/ei?tc=1&se=B&ta=21&lang=es

[59] Idescat 2022, https://www.idescat.cat/eas/?tc=1&se=3&ta=23&lang=es

Recycling

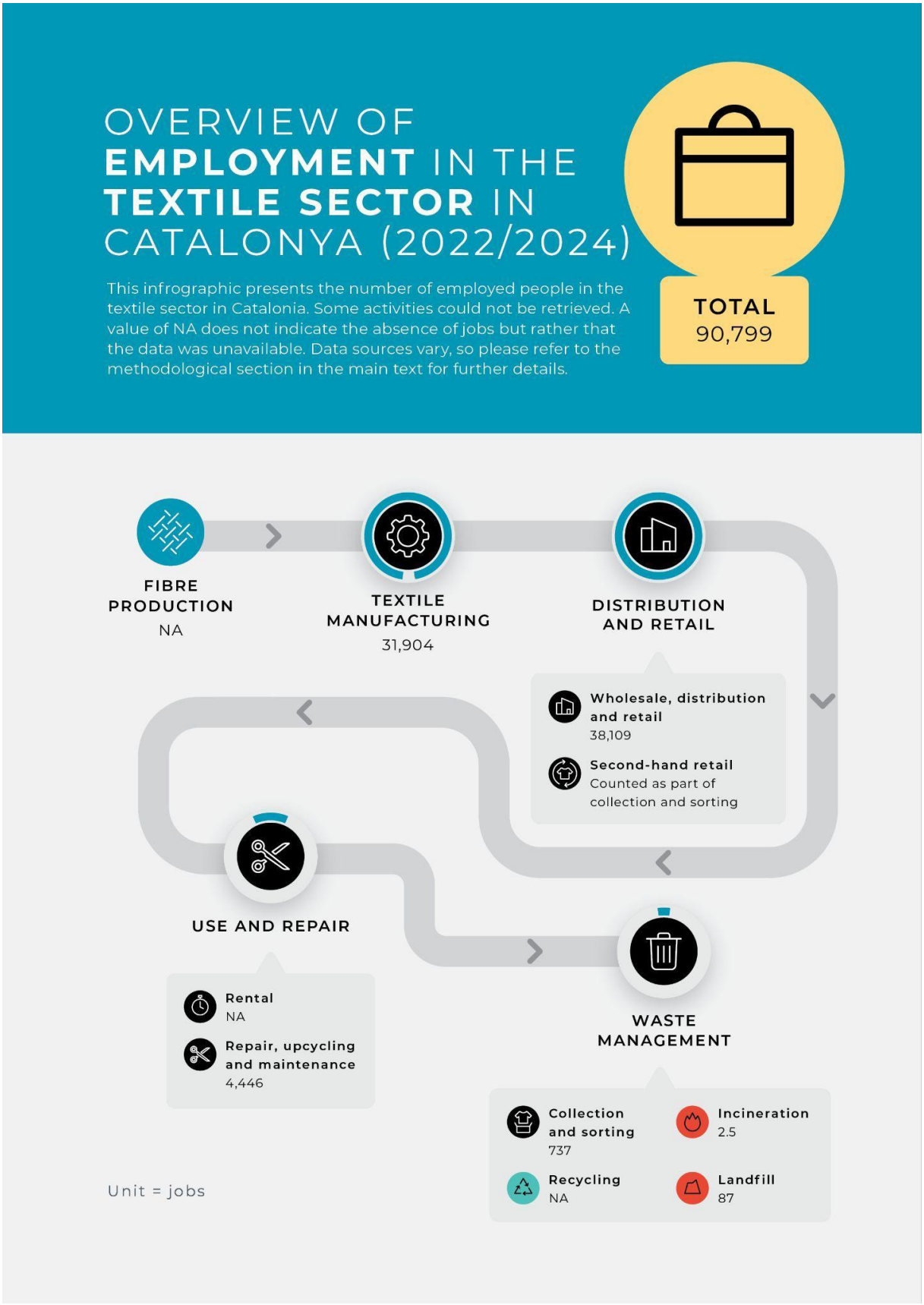
Recycling activities in Catalonia were recorded as having no estimated employment.

Landfill and incineration

Waste management related to landfill and incineration is estimated to account for 89.5 FTEs. While specific employment figures for textile waste management were unavailable, estimates were derived based on the number of FTEs required per ten thousand tonnes of waste processed. For incineration, an average of 25 FTEs is needed per ten thousand tonnes,[60] resulting in an estimated 2.5 jobs in Catalonia. For landfills, the estimated employment is higher, with six FTEs required per ten thousand tonnes,[61] leading to an approximation of 87 jobs. These figures, however, come with significant limitations, as they do not specify whether the waste treated consists solely of textiles or includes other materials. Additionally, the presence of four incineration plants and 22 landfills operating in Catalonia in 2024 suggests that these estimates are not implausible, though they likely reflect broader waste management activities rather than textile-specific operations.

[60] https://archivo-es.greenpeace.org/espana/Global/espana/report/other/100721.pdf

[61] https://www.rreuse.org/wp-content/uploads/Final-briefing-on-reuse-jobs-website-2.pdf


OVERVIEW OF
EMPLOYMENT IN THE
TEXTILE SECTOR IN
CATALONYA (2022/2024)
This infrographic presents the number of employed people in the textile sector in Catalonia. Some activities could not be retrieved. A value of NA does not indicate the absence of jobs but rather that the data was unavailable. Data sources vary, so please refer to the methodological section in the main text for further details.
TOTAL
90,799
FIBRE PRODUCTION
NA
TEXTILE MANUFACTURING
31,904
DISTRIBUTION AND RETAIL
Wholesale, distribution and retail
38,109
Second-hand retail
Counted as part of collection and sorting
USE AND REPAIR
Rental
NA
Repair, upcycling and maintenance
4,446
WASTE MANAGEMENT
Collection and sorting
737
Incineration
2.5
Recycling
NA
Landfill
87
Unit = jobs

4.4 Consumer behaviour

4.4.1 Methodology

An investigation into consumer behaviour was conducted, employing a multi-layered approach to data collection to understand consumer behaviour regarding circular textiles in Catalonia. The focus group methodology was selected through an iterative process, emerging as the most viable option in the given time frame and was deemed most appropriate to complement ongoing local research into consumer behaviour. Two focus groups were conducted involving local stakeholders from different stages of the value chain, with a total of 12 participants. These focus groups concentrated on qualitative discussions on the perception of consumer attitudes in Catalonia. The focus groups explored three key themes: purchase drivers (price, brand loyalty, and sustainability); awareness and barriers (understanding of circular solutions and obstacles to adoption). The focus group design and execution were guided by an iterative process, and informed by the initial assessment of broader consumer behaviour in Spain below.[62]

An initial assessment was conducted to map existing consumer behaviour trends in Catalonia (where applicable) and Spain. Key findings included:

- **Relatively low clothing expenditures**: Households in Spain spend less on clothing than the EU average, with annual spending of €330 compared to €490.[63]
- **Market dominance by fast fashion**: The Spanish fashion market is primarily dominated by brands like Zara, Mango, Primark, Nike, and Adidas, which together account for 80% of all clothing purchases. This shows that fast fashion still leads in market share.[64]
- **Purchasing drivers**: Consumers prioritise price, taste, and brand when making clothing purchases, with quality being a less significant factor in decision-making.[65]
- **Sustainability awareness**: According to a study from ACEI, 90% of respondents are familiar with sustainable fashion, indicating growing awareness in the market.[66]
- **Consumer concerns on textile waste**: An IBM survey revealed that many respondents are worried about textile waste. More than half consider sustainable fashion important, particularly among women under 50 years old with higher household incomes.[67]

[62] The initial approach included a survey on consumer behaviour in order to gather insights directly from consumers, in light of time and resource constraints a focus group was selected as a sufficient method to gather consumer insights.

[63] Consumo de Ropa en España

[64] Drivers and barriers for sustainable fashion consumption in Spain: a comparison between sustainable and non-sustainable consumers

[65] Catalan youth and their consumption of clothes and complements

[66] WHAT DRIVES OR HINDERS SUSTAINABLE FASHION CONSUMPTION?

[67] Consumers' awareness and attitudes in circular fashion

- **Willingness to pay more for sustainability**: Nearly half of consumers are willing to pay 1% to 5% more for sustainable fashion products.[68]
- **Barriers to sustainable fashion**: The main barriers to purchasing sustainable fashion include high costs, limited availability, and a lack of trust in sustainability certifications.[69]
- **Lack of awareness on textile disposal**: Consumers have little knowledge about what happens to textiles after they are disposed of.[70]

4.4.2 Insights and key results

Consumer motivations and profiles

Consumer motivations and purchasing behaviours in Catalonia are shaped by price, trends, personal expression, and comfort. Younger consumers (12–25) are heavily influenced by social media and peer opinions, prioritising fast fashion and affordability. In contrast, older consumers (40+) prioritise quality, comfort, and brand loyalty, making them more inclined to purchase from familiar retailers. Despite these differences, a common trend among all participants was a preference for new textiles over second-hand, with second-hand clothing often carrying a stigma. Additionally, participants agreed that no single consumer profile could accurately capture the diversity of behaviours across age and gender groups.

Shopping habits also varied by demographic and product type. Popular shopping locations included malls, online platforms, and major shopping streets. While younger consumers favoured the convenience of online shopping, older participants were more likely to support local neighbourhood stores. The type of clothing also influenced purchasing choices—essentials such as underwear and socks were typically bought locally, whereas fashion items were more commonly purchased in malls or online.

The focus groups identified several circular interventions to align with these preferences. One promising intervention is the introduction of second-hand corners in shopping malls, which could provide greater visibility and accessibility to preloved clothing within mainstream retail spaces. Additionally, increasing the availability of repair kits could empower consumers to extend the lifespan of their garments, making repair a more convenient and routine practice.

Awareness of circular solutions and barriers

Consumers demonstrated a high awareness of common circular practices such as donation, recycling, and second-hand shopping. However, knowledge of less conventional solutions—including renting, swapping, and upcycling—remained low. Textile recycling uptake was also minimal, indicating a gap between awareness and action. Notably, urban

[68] Consumers' awareness and attitudes in circular fashion

[69] Drivers and barriers for sustainable fashion consumption in Spain: a comparison between sustainable and non-sustainable consumers

[70] https://mediambient.gencat.cat/web/.content/home/ambits_dactuacio/empresa_i_produccio_sostenible/economia_verda/Obs-economia/moda-circular/Circular-Fashion-Pact_220419_summary.pdf

populations displayed a greater understanding and engagement with circular practices than their rural counterparts.

Several key barriers hinder the broader adoption of circular textiles. The cultural stigma around second-hand clothing continues to pose a significant challenge. Accessibility was another concern, particularly in rural areas where repair and second-hand services were limited. Lastly, price sensitivity remained a major factor, as circular products and services were frequently seen as more expensive than conventional alternatives. To address these barriers, the focus groups recommended targeted awareness campaigns and social media-driven initiatives. Given the strong influence of social media on younger consumers, gamification strategies and influencer-led initiatives were seen as crucial tools for shifting perceptions and normalising second-hand shopping.

Opportunities for circular textiles

Across both focus groups, participants emphasised that education, awareness campaigns, and public support for circular business models are key levers in reducing textile consumption. Awareness, in particular, was highlighted as essential for facilitating a broader cultural shift toward sustainability and must involve both public and private sector collaboration—without this, efforts would likely struggle to gain traction.

When evaluating different circular strategies, participants identified 'Reduce/rethink' as the solution with the greatest added value. This approach is broad enough to integrate other circular actions such as swapping and repair while also addressing systemic issues, such as reimagining clothing stores to incorporate swapping options or designing garments with repairability in mind. Moreover, participants agreed that the more seamlessly a circular solution fits into consumers' existing routines, the more likely it is to succeed. Circular interventions must align with established shopping behaviours to encourage widespread adoption.

4.5 Environmental assessment

4.5.1 Methodology

This chapter estimates the environmental effects of Catalonia's textile flows. Using a life cycle assessment (LCA) approach, the method builds on the results of the MFA, connecting the identified quantities of material flows to their associated environmental impacts. The goal of this assessment is to highlight key priority impact areas within the textiles value chain, as well as laying the foundation for estimating the impact reductions as a consequence of the potential circular pilot solutions. These pilots are co-designed, tested and evaluated per territory in WP3.

The proposed methodology for this baseline environmental assessment of the current textile flows in each region consists of the following steps (see *Figure* 6): (1) desk research on the environmental impacts of textiles (2) identifying relevant MFA data (selecting the textile flows in scope for the assessment) (3) approximate the composition of the textile

flows (4) apply the LCA method to estimate the textile flows' relevant impacts (5) present quantitative estimations on the environmental effect of the to-be-introduced pilots.

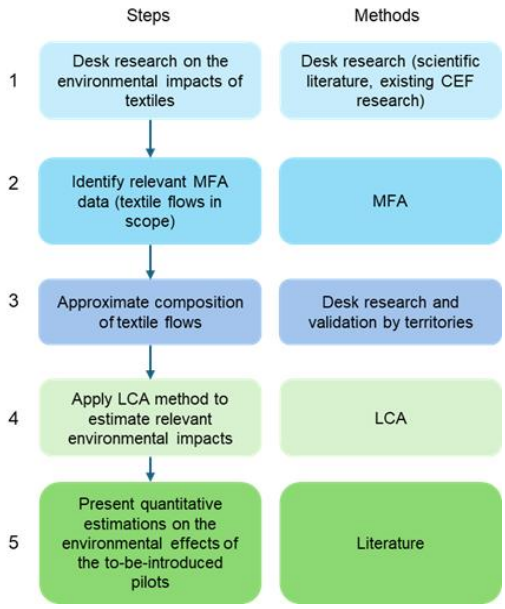


Figure 6: Description of the methodology steps for the baseline environmental assessment

Step 1: An introduction to the environmental impact of textiles

The global textile industry is largely linear: of the 3.25 billion tonnes of textile materials consumed each year, over 99% come from virgin sources, making it only 0.3% circular (Circle Economy, 2024). The textile industry also has a high environmental impact, in particular with high demand for water, land and energy required to produce fibres and textile products: around 4-6 % of the EU's environmental footprint across a range of impact categories is caused by the consumption of textiles, with the large majority of those impacts occurring elsewhere in the world (Köhler et al., 2021). Key impact categories to look at when assessing the environmental impact of textiles are global warming, water consumption, land use change, water and air pollution, and the release of microplastics into terrestrial and aquatic environments.

The textile life cycle stages - not including the use phase - with the highest environmental footprint are typically material extraction, processing, and product manufacturing (Circle Economy, 2024). At the same time, textiles' end-of-life stage is problematic, as post-consumer textile waste is still largely characterised by incineration and landfilling instead of reuse, repair or recycling pathways. In fact, a large share of used textiles separately collected in the EU and sorted for recycling ends up being traded and exported to Africa and Asia with a highly uncertain fate (EEA, 2024).

Textiles are a heterogeneous group of materials. Clothing and household textile items are composed of a variety of materials, each with highly distinct origins and manufacturing processes, and therefore different environmental impacts. The origin of textile fiber can be

natural (cotton, wool, linen, silk), synthetic (polyester, nylon), or semi-synthetic (rayon), with many textiles being composed of blends between different natural and synthetic fibers. Additives and colouring agents cause additional material complexity. The textile industry is increasingly using fossil-fuel-derived synthetic fibres like polyester, currently making up 63% of the raw materials used in textile production (Circle Economy, 2024).

There are multiple scientific methods to calculate materials' environmental impacts. One of the most widely used is life cycle assessment (LCA), which allows to evaluate the environmental impacts of a product, process, or service throughout its life cycle, from "cradle to grave" (i.e., from raw material extraction through manufacturing, use, and end-of-life disposal or recycling). The LCA process is typically carried out by (1) setting the goal and scope, (2) inventorying data on resource inputs (energy, materials) at each stage of product life cycle, (3) assessing the product's impacts, often expressing them in midpoint indicators[71] such as global warming potential (GWP), measured in CO_2 equivalents, and (4) interpreting the results.

LCA results are often complex to interpret, as most conventional impact assessment methods report on many midpoint impact categories[72]. To produce results that are understandable and in line with policy makers' goals, we propose to select a limited number of impact categories, based on which impact categories are most relevant to the domain of focus. Several existing methodologies and references are available to do so (see Higg MSI tool or Quantis report), and previous work by Circle Economy will be used to align the selected impact areas with (CGR Textiles, CGR Quebec). The selected impact categories on which we present the general impact results for the material types are:

- **Global Warming Potential, expressed in kg CO2e/kg material**
    - The industry contributes almost 3.5% of global greenhouse gas (GHG) emissions linked to climate change, with material production, including fabric and trim manufacturing and finishing, accounting for 55% of the industry's GHG emissions, largely due to energy-intensive wet processing.
- **Energy Use, expressed in non-renewable energy consumption MJ/kg material**
    - As expressed above, various steps of the textiles value chain, in particular fibre production, and product manufacturing and finishing are quite energy-intensive, and to a large degree still rely on fossil energy sources.

- **Water consumption, in m3 water/kg material**

[71] Midpoint indicators measure environmental impacts in specific categories, such as climate change (GWP), ozone depletion, resource depletion, and others. Midpoint indicators are useful for assessing the relative contribution of different stages of a product's life cycle to specific environmental issues. The midpoint method looks at the environmental impact earlier along the cause-effect chain before the endpoint is reached. For example, the midpoint method might look at the global warming impact, which later on may relate to different endpoint impacts, such as damage to human health or ecosystems.

[72] The ReCiPe midpoint method, for instance, presents results for 18 midpoint categories.

- Additionally, the industry accounts for 3.5% of the total water scarcity impact caused by all global manufacturing activities, often operating in regions already facing water shortages. Factors such as geographical constraints, population growth, and competing industrial and domestic demands worsen water scarcity. The dyeing and finishing stages of the textile value chain are especially water-intensive, consuming approximately 93 billion cubic metres of water annually (Circle Economy, 2024).

- **Land use change, m2a crop/kg material, and microplastics emissions**
  - Land use change concerns the clearing of native vegetation to establish new agricultural grounds, for example for the production of cotton. Such changes lead to various interlinked environmental issues, such as increased GHG emissions through soil degradation and biodiversity loss. Cotton is also linked to deforestation (Solidaridad, 2023).
  - For synthetic materials, land use change issues are less material, but emissions from microplastics become relevant. While research to include quantifiable midpoint-indicator results for microplastics in the LCA method is very new (TNO, 2024), it is clear that the textile industry significantly contributes to microplastic pollution through materials and embellishments used in garments, such as prints, coatings, buttons, and glitter. Synthetic plastics, including those in textiles, take decades to degrade, particularly in marine environments (Circle Economy, 2024).
- **Marine and freshwater eutrophication, in kg P and N/kg material**
  - Textiles contribute to over 5% of marine eutrophication and over 4% of global freshwater eutrophication, primarily due to fertilizer runoff from cotton farming and the chemicals used in dyeing processes (Circle Economy, 2024).

The impact factors for 1 kg of each fibre type for the different impact categories mentioned above were retrieved using the LCA software SimaPro and the ecoinvent database. For all impact indicators, the ReCiPe 2016 midpoint (H) method was used, except for Energy Use, for which the Cumulative Energy Demand V1.11 method was used. The impact factors are summarised in Table 2 below.

Impact Categories per kg of fibre	Global Warming Potential (kg CO2e/kg)	Energy Use (non-renewable, fossil, MJ/kg)	Water Consumption (m3/kg)	Land Use (m2a crop eq/kg)	Freshwater eutrophication (kg P eq/kg)	Marine eutrophication (kg N eq/kg)
Cotton	12	111	5.52	7.32	0.0093	0.0534
Polyester	5.78	104	0.0389	0.201	0.002	0.000276
Polyamide	9.82	114	0.069	0.00199	0.000294	0.000313
Wool	52.2	N/A	0.851	58.2	0.0126	0.0443
Polypropylene	3.15	87.2	0.011	0.0371	0.000711	0.0000615

Viscose	3.33	36.4	0.0636	0.996	0.00132	0.000123
Acrylic	3.73	81.2	0.0469	0.0342	0.00111	0.00315
Other fibres	N/A	N/A	N/A	N/A	N/A	N/A
Non-textile material	N/A	N/A	N/A	N/A	N/A	N/A

Table 2: Summary of environmental impact factors per kg of textile fibre, per type of textile fibre

Step 2: Identifying the relevant MFA data

The collected MFA data contains estimated textile flows for each region. Several stages of the textile value chain are included, from fibre production, textile manufacturing, distribution, and retail to repair/rental/secondhand and, finally, waste management. The granularity of this MFA data—i.e., its availability for different value chain stages—allows quantifying textile flows that are most relevant to Catalonia. To combine MFA results with the life cycle impact assessment, we decided to use the post-consumer stage as a reference value chain step, therefore the baseline environmental impact factors are multiplied by the total amount of textile waste collected (in mass), which in Catalonia amounts to a total of 185.6 thousand tonnes (of which 30.7 thousand tonnes come from industrial waste, and 154.9 thousand tonnes are considered local post-consumer textile waste).

Step 3: Approximate composition of textile flows

Virtually no country-level information is available on the composition of textiles. Often, estimations are complicated by different definitions and scopes. Several reports and studies conducted in recent years present different estimations of the composition of textiles in Europe, distinguishing between production, import, and exports of fibres, yarn and textile products. A common finding is that there seems to be a relatively large uncertainty with regards to the exact composition of textiles at these stages (Köhler et al. 2021),[73] possibly due to the fact that textile products are made of blends of different fibres. In recent research by Circle Economy for the JRC[74], 18 tonnes of textile waste across 3 countries (Czech Republic, Romania and Italy) were sampled, it was found that 28.7% consisted of "other blends", with many other composition categories also consisting of textile blends (such as 80-99% Cotton and 40-95% Polyester).

Despite these limitations, the decision was made to use recent data presented in the JRC report by Huygens et al. 2023, as it appeared to be the most robust fibre composition estimation available at the time of the assessment, and it was required to establish a baseline composition estimation. The composition breakdown and absolute figures for Catalonia are summarised in Table 3 below and cover over 82% of all post-consumer textile

[73] More than 50 % of production, imports and exports of fabrics are undefined with respect to fibre composition.

[74] BAKOWSKA, O., MORA, I., WALSH, S., VAN DUIJN, H., NOVAK, M., CHERUBINI, G., JOSHI, R., MORBIATO, A., VISILEANU, E., VESELÁ, A., RYŠAVÁ, E. and HOLICKY, M., Fate and Composition of Textile Waste from Italy, the Czech Republic and Romania, HUYGENS, D. editor(s), Publications Office of the European Union, Luxembourg, 2025, https://data.europa.eu/doi/10.2760/3332076, JRC141441.

waste collected (in mass), and at least 90% of all fibre types used in the production of textile products used in the EU.[75]

Fiber type	Fibre composition of new products	Fibre composition of post-consumer waste	Breakdown of textile waste by type of fibre in Catalonia (in thousand tonnes)
Cotton	33.3%	33.7%	62.4
Polyester	29.3%	29%	53.9
Polyamide	7.3%	7.1%	13.2
Wool	3.9%	3.9%	7.2
Polypropylene	3.1%	3.2%	5.9
Viscose	3.1%	3.1%	5.8
Acrylic	2.8%	2.7%	5.0
Other fibres	6%	5.9%	11.0
Non-textile material	11%	11.5%	21.2

Table 3: Summary of the fibre composition in post-consumer textile waste in Catalonia

4.5.2 Results

Step 4: Estimation of environmental impacts in Catalonia

To produce quantitative results, the MFA data for post-consumer textile waste (tons of textile waste flows) in Catalonia will be used as reference mass inputs to the LCIA, providing insights into the life-cycle impacts of the textile flows relevant to the End-of-Life stage. The reason for selecting this particular stage (instead of production, manufacturing, or textiles put on the market) is to be able to conduct some scenarios regarding different post-consumer textile treatments and fates (repair, reuse, recycling, etc.) at a later stage of the project.[76]

The preliminary results of the baseline environmental impact assessment of post-consumer textile flows in Catalonia are summarised in Table 4 below. Note that "other fibres" and "non-textile material" are missing more granular information to estimate their respective contributions to different environmental impacts, which is why they were left out of the baseline calculation.

[75] The fibre composition of pre and post-consumer textile waste in the EU is assumed to be representative for the fibre composition in Catalonia

[76] An example of this type of result: based on the literature review and LCA, it is estimated that the secondhand activities in Catalonia would lead to a reduced consumption of new textiles products, reducing GHG emissions by X tons CO2e, water consumption by X m3, and land use by X m2a.

Impact by fibre	Global Warming Potential (kt CO2e)	Energy Use (non-renewable, fossil, GWh)	Water Consumption (hm3)	Land Use (hectares crop eq)	Freshwater eutrophication (tonnes P eq)	Marine eutrophication (tonnes N eq)
Cotton	749	1925	344.58	45695	580.5	3333.5
Polyester	312	1558	2.10	1084	107.8	14.9
Polyamide	130	419	0.91	3	3.9	4.1
Wool	378	NA	6.16	42127	91.2	320.7
Polypropylene	19	143	0.06	22	4.2	0.4
Viscose	19	58	0.37	573	7.6	0.7
Acrylic	19	114	0.24	17	5.6	15.9
Other fibres	NA	NA	NA	NA	NA	NA
Non-textile material	NA	NA	NA	NA	NA	NA
Total	1625	4217	354	89521	801	3690

Table 4: Baseline environmental impact assessment of post-consumer textile flows in Catalonia

While the table above provides quantitative estimates of the total life-cycle footprint of different textile fibres, it is worth reviewing what the scientific literature tells us about key environmental hotspots across the textile value chain.

The largest sources of impact occur at the earlier stages of the value chain.[77] [78]

- **Raw material extraction and production** is a major impact hotspot, especially for natural fibres like cotton and wool. At this stage, the main environmental impacts occur in the impact categories of land use and water consumption, but also in the form of pollution like eutrophication due to irrigation runoff and pesticide use. For synthetic fibres, this stage is also an important contributor to fossil fuel extraction and energy consumption (with important associated greenhouse gas emissions) during polymerization processes.
- **Fibre production and garment manufacturing** stages are one the largest sources of impact. At these stages, energy and chemical-intensive processes like spinning and dyeing contribute substantially to GHG emissions, eutrophication. Some waste is already generated at these stages, in particular during garment manufacturing, and is accounted for as “pre-consumer” waste in the MFAs.

[77] InvestNL. (2024). Towards a Dutch Circular Textile Industry: Exploring the common thread. Retrieved from: InvestNL website

[78] Gözet, B., & Wilts, H. (2022). The circular economy as a new narrative for the textile industry: An analysis of the textile value chain with a focus on Germany’s transformation to a circular economy (Zukunftsimpuls no. 23). Wuppertal Institute

Wholesale and retail are responsible for a smaller fraction of the environmental impacts, which at these stages consist mainly of energy consumption and associated emissions, mainly from transport, or during operational phases of retail (e.g. electricity consumption in stores).

Although the **consumption and product-use phases** are outside of the scope of the environmental impact results show in in the table above, it must be noted that, over the long run, they can be responsible for a significant share of water and energy use due to washing/drying processes, and also for the release of microplastics for synthetic fabrics.[79] It is also a step of the value chain which is characterised by short lifespans induced by fast-fashion, which therefore contributes to amplifying the absolute environmental impact of textiles production (as product turnover cycles occur more rapidly, leading to more demand for new products).

Finally, it appears that the environmental impacts associated with **textile waste End-of-Life processes** are relatively small compared to the full life cycle impacts of textiles (largely influenced by production and manufacturing processes).[80] However, due to the large volumes of textile waste and poor End-of-Life management systems, it remains crucial to find circular solutions, like reuse or repair, that aim at minimising new consumption (and therefore, new production).[81] This is the focus of the following step (*Step 5*).

Step 5: Impact reductions as a result of the to-be-implemented circular solutions (pilots)

In WP3, we will utilise the baseline environmental impact results as a reference to conduct a comprehensive Life Cycle Assessment (LCA)-based modelling of the estimated impact reductions that would result from the hypothetical changes in the value chain, tested in Catalonia selected pilot project. This analysis will focus on either of the following R-strategies:

- **Refuse:** Refusing unnecessary consumption is arguably the most effective strategy for reducing environmental impacts. However, this approach involves complex considerations, such as Rebound effects (e.g. reduced consumption may lead to increased spending in other areas), or behavioural change challenges in shifting consumer habits.
- **Reuse**: Reuse strategies offer significant potential for impact reduction, but assessing their true additionality is challenging. As highlighted in a CE Delft report:[82] "It is very uncertain how much less new textiles consumers will buy if they buy more second-hand.

[79] Huygens, D., Foschi, J., Caro, D., Caldeira, C., Faraca, G., Foster, G., ... & Tonini, D. (2023). *Techno-scientific assessment of the management options for used and waste textiles in the European Union: JRC Science for Policy Report*. Publications Office of the European Union.

[80] InvestNL. (2024). Towards a Dutch Circular Textile Industry: Exploring the common thread. Retrieved from: InvestNL website

[81] EuRIC (2023). LCA-based assessment of the management of European used textiles. Retrieved from: EuRIC website

[82] https://open.overheid.nl/documenten/ronl-e02e486cdb962a2280987b7f5456c0ab94c4b3da/pdf

- **Repair**: Extending product lifespans through repair can substantially reduce environmental impacts by delaying the need for new product manufacturing.
- **(Optional) Recycling and other End-of-Life treatment:** While not a primary focus of the pilots, our analysis may touch upon recycling and end-of-life strategies. For instance, we will consider how these approaches can help avoid high-impact disposal methods like incineration, potentially leading to significant environmental benefits.

Work Package 3 will aim to provide quantitative assessments and detailed analyses of these strategies, offering valuable insights into their potential for reducing environmental impacts across various product lifecycles.

5. Key findings and recommendations

5.1. Summary of key findings and recommendations

Catalonia is a key player in the Spanish textile landscape, housing 29% of all textile-oriented businesses in the country.[83] This concentration underlines the region's strategic importance in advancing the circular textile economy. While numerous successful interventions—often supported by national and European funding[84]—are already in place, they have yet to drive a broad transformation of consumption habits or shift the industry away from linear models.

1. Consumption

Per capita textile consumption in Catalonia is notably high, with residents purchasing an average of 21 kilograms and discarding nearly as much—19.4 kilograms—annually. This suggests both high turnover and limited retention or reuse of textile products.

Recommendation:

- Launch public awareness and education campaigns aimed at reducing textile consumption and promoting sustainable consumption habits.

2. Waste collection and infrastructure

Catalonia landfills or incinerates 82.4% of its post-consumer textile waste, largely due to low separate collection rates (13.2%, slightly below the EU average of 15%).[85] Although there are over 1,460 donation bins in place, many citizens are unaware of their proximity or unsure which garments are suitable for donation. At the same time, Catalonia has relatively strong

[83] https://circular.textils.cat/en/context-circular-hub/

[84] https://circular.textils.cat/en/success-cases-cluster-circular-hub?utm_source=menu&utm_medium=navigation&utm_campaign=success_cases_cluster

[85] Capture rate for waste textiles and shoes in the EU, EEA (2025)

infrastructure for circular textile services: an estimated 80% of the population can access reuse, repair, and recycling services within a 15-minute walk. However, this figure is skewed by the population density in coastal and urban areas, with rural and western regions significantly underserved. Accessibility correlates more strongly with proximity to urban centres than with household income levels. The estimated climate impact of post-consumer textile flows is 1.65 million tonnes of CO2e per year, underscoring the potential impact of expanding circular infrastructure.

Recommendations:

- Implement awareness and education initiatives to clarify acceptable donation standards and the environmental value of proper disposal.
- Experiment with new collection points and methods; increase geographic coverage of textile collection bins.
- Secure stable financing for local collectors and sorters.
- Support social enterprises that manage textile collection, sorting, and processing.
- Conduct detailed municipality-level analyses to identify underserved areas and guide the equitable expansion of circular services.
- Conduct detailed mapping of waste composition available in Catalonia, possibly down to facility-level analyses to identify material composition, volumes and prices of post-consumer and post-industrial waste available in Catalonia and its current destinations to understand in detail current bottlenecks, cost and revenue drivers and opportunities.

3. Public awareness of circular services

While second-hand stores and donation practices are widely recognised, there is low public awareness of other circular services such as clothing rental, swapping, and upcycling. Barriers include the 'second-hand stigma', limited rural access, and the relatively high cost of circular and sustainable alternatives.

Recommendation:

- Promote broad education and awareness-raising efforts towards general public, youth, as well as industry and marketing professionals, alongside public-private support, to encourage lower textile consumption—arguably the most effective way to reduce environmental impact.
- Learn from existing best practice in piloting community led repair projects, that build on human-centered design[86].

4. Policy landscape

The Circular Fashion Agreement (*Pacte per la Moda Circular*) offers a system-wide approach to catalyse collaboration and address textile challenges beyond isolated pilot projects. It provides signatories with a mechanism to demonstrate commitment and

[86] Innovate UK (2025) Next Door Repairs in Hackney. Access here

progress, making them more attractive to investors. However, without targeted policies to intentionally slow linear production and consumption, circular providers remain disadvantaged against the dominant business-as-usual model.

Recommendation:

- Develop and implement policy instruments that discourage linear practices and incentivise circular models, enabling circular businesses to compete fairly and thrive.
- Provide tailored coaching and awareness-raising programmes to help local businesses transition to circular services and adopt sustainable materials at scale, while maintaining or increasing competitiveness.
- Support and launch public-private partnerships focused on circular textile innovation and infrastructure.
- Improve access to capital investment for circular businesses.
- Advocate for favourable tax, trade, and policy incentives in Catalonia and Spain to give circular service providers a competitive advantage over linear models and competing EU textile regions.

5. Employment and labour dynamics

The textile industry remains a key economic driver in Catalonia, employing approximately 90,799 people across the value chain. However, most of these jobs are still concentrated in the linear economy. Fibre production has largely disappeared from the region, but textile manufacturing continues to be active, employing around 31,904 workers—though the share engaged in circular design and practices is unclear.

The retail and distribution segment employs 38,109 full-time equivalents (FTEs), yet second-hand retail accounts for fewer than 1,000 jobs (737). The repair sector employs around 4,446 people, based on scaled national estimates. There are currently no recycling jobs recorded in the region, suggesting an untapped opportunity to further develop this type of local employment.

Recommendations:

- Improve data collection on employment in circular textile activities such as design, repair, rental, sorting, and recycling.
- Conduct labour studies to better understand the current workforce and identify opportunities for reskilling and upskilling.
- Explore the potential to establish recycling operations locally, leveraging the existing manufacturing base and the supply of post-consumer textiles.

5.2. Areas for immediate action: Key considerations for pilot design

Given the high textile consumption and disposal rates in Catalonia, immediate action is needed to test and roll out circular services, especially in rural areas where access to sustainable options remains a challenge. The proposed pilots—Didaltruck, Renova, and

Ressò—offer promising solutions to this issue, but several factors need to be considered for their success:

- **Test routes for Didaltruck**: Identify the most attractive and efficient routes to maximize impact and reach.
- **Effective communication methods**: Explore the most engaging channels and strategies to drive participation and behaviour change.
- **Focus on services of interest:** Determine which circular services are most appealing to pilot users and tailor offerings accordingly.
- **Partnerships with local festivals and influencers**: Collaborate with local events and influencers to amplify the project's reach and visibility.
- **Flexible planning for innovators**: Allow room for adaptation and iteration as new ideas and models are tested and refined.
- **Secure funding for pilot innovators**: Provide support to help innovators obtain the necessary budgets to implement their pilot projects and to remain successful after.

These considerations will guide the effective design and rollout of circular textile 4R pilots, ensuring that they meet the needs of Catalonia's diverse communities and drive progress towards a more sustainable, circular textile economy.

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