Circular Transition Indicators (CTI)

→ *Sector guidance - Fashion and Textile*

World Business Council for Sustainable Development

CTI

Contents

Foreword

Foreword

Companies in the fashion sector are strengthening sustainability and circularity in their operations in response to brand positioning and consumer expectations. With businesses operating in a complex landscape of rapidly evolving regulations and technological advances, the bridge to secure a profitable future is often challenging to map. The need to find a common methodology to unlock value chain collaboration in circularity is key to tackling these common challenges and outlines the spirit of this sector guidance.

The Circular Transition Indicators (CTI) are a sector-agnostic framework developed by WBCSD and proven across industry sectors globally in leading sustainability companies. We have now tailored it to fashion sector specificities through extensive consultations with actors across the full value chain, for which we'd like to thank all the stakeholders involved.

These tailored metrics are poised to redefine how the fashion and textiles value chain assesses circularity and help rally companies around common targets.

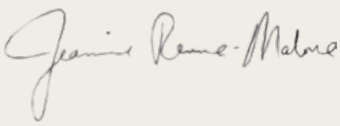
CTI provides a transparent, quantitative and comparable framework for measuring circular performance. It helps companies evaluate risks, identify effective actions to enhance circularity and understand the impact of their circularity strategies on their sustainability goals.

These metrics can help businesses drive change by:

- → Defining circularity roadmaps and measuring progress based on credible quantitative baselines;
- → Driving strategic decision-making and planning cycles based on the benefits and trade-offs of different circularity strategies;
- → Providing a clear view of sustainability impacts – whether on climate or nature – and underscoring the tangible outcomes of circularity initiatives;
- → Promoting accountability and transparency with a foundation in quantitative measures and supporting corporate disclosure efforts.

We call on companies across the fashion sector to act on this guidance and accelerate action on your circularity agenda and your leadership. We will build on this first stage guidance further with sector support.

Diane Holdorf
Executive Vice President, World Business Council for Sustainable Development



Jeannie Renne-Malone
Vice President Sustainability, VF Corporation

Giovanni Faccioli
Senior partner Deloitte, Fashion & Luxury Sector

Thank you to the companies and organizations that contribute to the CTI Fashion Initiative:

Supported by:

Executive *Summary*

Executive Summary

The circular economy is gaining momentum across sectors and fashion stakeholders must proactively prepare for this transition. Increasing regulatory pressure and evolving consumer and investor demands are some of the trends driving the fashion industry toward circularity. To navigate this change effectively, a tailored and consistent approach to measuring circularity within the sector is essential.

Currently, the fashion industry grapples with a significant challenge when it comes to circularity, with less than half of all discarded clothes finding their way to reuse or recycling and a mere 1% transformed into new garments.

While leading on innovation, the industry finds it difficult to transition to circularity and still largely depends on a linear business model. Misaligned incentives and reward systems that do not factor in externalities prevent progress on the more circular and sustainable use of resources. Current incentives do not support the transition to circularity and companies lack actionable decision-making information.

A standardized framework can help redefine a company's measure of success, develop action roadmaps for higher degrees of circular resource use and develop strong accountability systems that enable data-based reporting to regulators and transparent communication with stakeholders.

We propose leveraging WBCSD's Circular Transition Indicators (CTI) to tailor metrics specifically for the fashion industry and substantively scale up the circular economy. CTI is a comprehensive and flexible circularity measurement framework that is publicly available to companies from all sectors and of all sizes.

Shaped by 50+ members of the World Business Council for Sustainable Development (WBCSD), CTI helps answer questions like:

- How circular is the company, a facility or product group?
- How to set targets for improvement?
- And how to monitor improvements resulting from circular activities?

To answer these questions, CTI focuses on the circular and linear mass that flows through the company, in which design, procurement and recovery models are crucial levers to determine how well it performs. While CTI is an industry-agnostic framework, this publication introduces a customized iteration crafted to address sector-specific challenges in fashion.

We have designed this report to support companies from the fashion value chain as they embark on the journey to achieve higher circularity in their product portfolio, processes and company-wide operations. The objective is to scale-up a circular economy for fashion and help all players in the value chain deliver products that can be used more, made again and made from safe and recycled or renewable inputs.[1]

This guidance is directed at all stakeholders in the fashion value chain. Starting upstream, from players involved in production such as the textile manufacturers to brands and retailers downstream, CTI can help build baselines, identify the strategies with the highest impact and monitor improvements.

Beyond improving the circularity of their resource use, companies can rely on CTI to understand which circular strategies bring the most positive impacts on their carbon reduction and biodiversity restoration roadmaps. An upcoming version of the methodology will include metrics on social impact.

We invite all stakeholders in the fashion value chain to review this guidance and adopt CTI as their preferred framework for circular performance. By speaking a common language and adopting a unified way to measure success, we can transform the fashion value chain to a value cycle.

Linear fashion *is going overboard*

01.

01. Linear fashion *is going overboard*

Apparel, accessories and footwear refers to entities involved in the design, manufacturing, wholesaling and retailing of products, including adult and children's clothing, handbags, jewelry, watches and footwear.[2] In 2021, the market amounted to some USD $2.4 trillion dollars, making it one of the most important industries in the world.[3] But today, the industry operates on an outdated "take-make-waste" linear economic model that is both wasteful and polluting.

The linear economy model in fashion is unsustainable. However, even if circularity is an opportunity to mitigate the impacts of its activity, the fashion industry is progressing slower than expected. Actors in the sector collect less than half of used clothes for reuse or recycling when people no longer need them and recycle only 1% into new clothes.[4] **Despite the efforts of many companies globally to adopt circular business models,[5,6] circularity remains a niche opportunity.** Progress reflects difficult challenges. Goals and incentives are misaligned. Supply chains are fragmented. There are only a few examples of profitable circular business models at scale due to the absence of strong alliances and the need for technological development.[7] **One important element in lagging circular progress is the lack of proper measures for success.** A company's inability to understand its sustainable and circular performance makes it challenging to monitor the impact of a circular initiative, compare company efforts or make decisions in an informed manner.[8]

This aspect is particularly important for the fashion sector as it has yet to formally adopt any frameworks or tools to measure and quantify circularity. For instance, without proper circular indicators and metrics, it is highly challenging for a fashion company to improve its take-back systems and understand which approach would best drive scalability while reducing environmental impacts.

Against this background, **a standardized approach to measuring circularity can help rally companies in the industry around common targets**. Businesses in the sector need a methodology that can credibly quantify the impact of circularity on net-zero, nature-positive and equity targets. **We propose the Circular Transition Indicators, developed by the World Business Council for Sustainable Development (WBCSD), as the methodology to answer this need.**

The Circular *Transition Indicators*

02.

02. The Circular Transition *Indicators (CTI)*

Transparency and alignment are critical to establishing a common language across industries and value chains when developing strategies and measuring progress. For this reason, 50+ global companies have come together through WBCSD to develop the Circular Transition Indicators (CTI).

CTI has proven applicable across industries and value chains. It is comprehensive yet flexible, complementary to a company's existing sustainability efforts and agnostic as to material, sector or technology.[9] Central to CTI is a self-assessment that determines a company's circular performance to help it find opportunities and become more circular in the future. CTI focuses primarily on the circular and linear mass that flows through the company, in which design, procurement and recovery models are crucial levers to determine material flows.

We published a first version of the CTI methodology in 2020 and developed the framework based on four modules, each addressing different, but complementary, aspects of circularity:

1 *Close the Loop*

This module calculates the company's effectiveness in closing the loop on its material flows.

2 *Optimize the Loop*

This module provides insights on material criticality, resource-use efficiency and higher value recovery strategies.

3 *Value the Loop*

This module illustrates the added business value of a company's circular material flows.

4 *Impact of the Loop*

This module measures the difference in impact between the company's current circular performance versus 100% circularity.

Built for business by business, CTI provides companies with a common language for internal decision-making and communication with key stakeholders. It aligns with voluntary and mandatory regulatory standards, such as the Global Reporting Initiative (GRI 301 and 306), International Organization for Standardization (ISO) 59020 Circular Economy standard and Corporate Sustainability Reporting Directive (CSRD), that focus on the circularity of resource use and its impact on sustainability. Since its launch, companies from all sectors, geographies and sizes have adopted CTI. **The framework is currently in its fourth version and the methodology in continuous development to support companies' needs in a constantly evolving regulatory landscape.**

2.1 Measuring circularity is coming into fashion

Through this guidance, businesses and key stakeholders in the fashion industry value chain are joining forces to develop a standardized sector approach to measuring circular performance. WBCSD, VF Corporation, Deloitte Switzerland and industry leaders such as Avery Dennison and Aditya Birla are spearheading the CTI Fashion Initiative. It equips value chain stakeholders in the fashion industry with the means to use the set of circularity metrics for business included in CTI and helps companies mitigate risks, demonstrate value creation and report their progress on circularity. This guidance is dedicated to all actors in the fashion value chain, from manufacturers to brands and retailers. It aims to facilitate the use of CTI to promote accountability, create value and operationalize circularity roadmaps.

Accountability

Ambitious circular goals require substantial investment, impactful actions and the monitoring of results. **Using quantitative metrics and data-driven insights can help companies attract investments and report credibly on their progress on circularity.** The CTI Fashion Initiative aims to support them in adapting circularity indicators to the specificities of the fashion sector to enable accountability. It will allow each value chain actor to communicate transparently on its circularity efforts, giving buyers a clear and holistic picture of the circular performance of the product and service purchased.

Value creation

The CTI Fashion Initiative framework uncovers new value creation areas and unlocks the opportunities behind them. **Through this framework, all stakeholders can look at the life cycle of fashion products and processes through the lens of circularity, understanding material flows, manufacturing processes and life-cycle enhancements (durability, reusability, reparability, etc.).** Each of these areas presents opportunities for new value creation through innovative business models and positive impact on the planet and business profitability. CTI offers an opportunity to measure circularity with quantitative indicators while exploring qualitative elements that spark a new way of thinking.

Operationalization

The operationalization of circularity is critical in anchoring circularity at every stage of business decision-making. It democratizes the pursuit of circularity targets and empowers people across the business to make the right decisions using fact-based scenario modelling. Regardless of the purpose or value proposition of the company, CTI offers a varied set of metrics and a flexible approach. It allows to aggregate results that serve diverse objectives. This supports and enhances the company's current strategies and processes, guiding them to become more circular, and improves product performance – giving the company a competitive advantage.

Defining best practices and tangible actions is vital. Changing supply chains takes time, energy and investment. But establishing circular business models has proven to be profitable and a source of competitive advantage for many companies across industries.[10]

Governance

Regulations on sustainability performance and circular design for fashion are growing worldwide. They are driving the way fashion should shape its offering and the pathways to use to improve environmental and social impacts. The European Union's Ecodesign for Sustainable Products Regulation (ESPR), Corporate Sustainability Reporting Directive (CSRD) and Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regulation are examples that will have an important influence on fashion processes and ecosystem. Additionally, the European Commission has proposed targeted amendments to the EU Waste Framework Directive, with a primary focus on textile waste. The amendments aim to improve circularity and the avoidance of textile waste through the introduction of extended producer responsibility (EPR) for textiles. EPR implements the "polluter pays principle" and makes producers liable for managing waste at the end of the product life cycle. The EU's deforestation-free supply chain regulation prohibits the sale of commodities like soy, beef, palm oil, wood, cocoa, coffee, rubber – and some of their derived products, such as leather, chocolate, tires or furniture – in the EU or their export from the bloc unless they have a due-diligence statement confirming that the products are deforestation-free and have been produced in compliance with the legislation of the country of production. **CTI helps clarify how companies may use sets of metrics and data-driven insights to build capacity for compliance with current and upcoming circularity regulations.**

2.2 Using CTI for the fashion sector

Using and leveraging the CTI methodology for fashion has many benefits for all actors in the value chain. Following the best practices presented here should allow companies to:

- → **Develop a common circular language:** Having a common language for circularity enables fashion value chain actors to intensify efforts on common goals, reward mechanisms and measures for success.
- → **Measure and monitor circular efforts:** Establishing a pathway to measure circular performance enables fashion companies to monitor their circular efforts and define which strategies to prioritize to maximize circular performance.
- → **Quantify ambition and target achievements:** Clarifying what targets are most relevant to drive circularity for the company and across the value chain can support fashion companies in understanding the level of effort to allocate to achieve a circular roadmap.
- → **Empower the designers and sustainability teams:** Selecting the right design for circular products in fashion boosts design and sustainability as CTI helps companies recognize and reward more circular approaches. This empowers designers to privilege products that support repair and maintenance, as well as sourcing strategies that substitute linear sourcing inputs with circular inputs.
- → **Adapt to compliance and regulations:** Increasing regulatory pressures are incentivizing the transition to a circular economy in the fashion industry. The CTI Fashion Initiative aligns with current and upcoming regulations, enabling users to report and comply with them and collaborate on new circular pathways.
- → **Accelerating the fashion industry's circular economy transitions:** Implementing CTI equips the fashion sector with a framework that can help it drive its circular transition for a more sustainable future. With the use of indicators for elements such as nature (land use and land use change) and greenhouse gas (GHG) impacts, it becomes apparent that favoring a circular pathway has a positive influence on the environment compared to a linear one.

2.3 Accelerating the transition to circular fashion

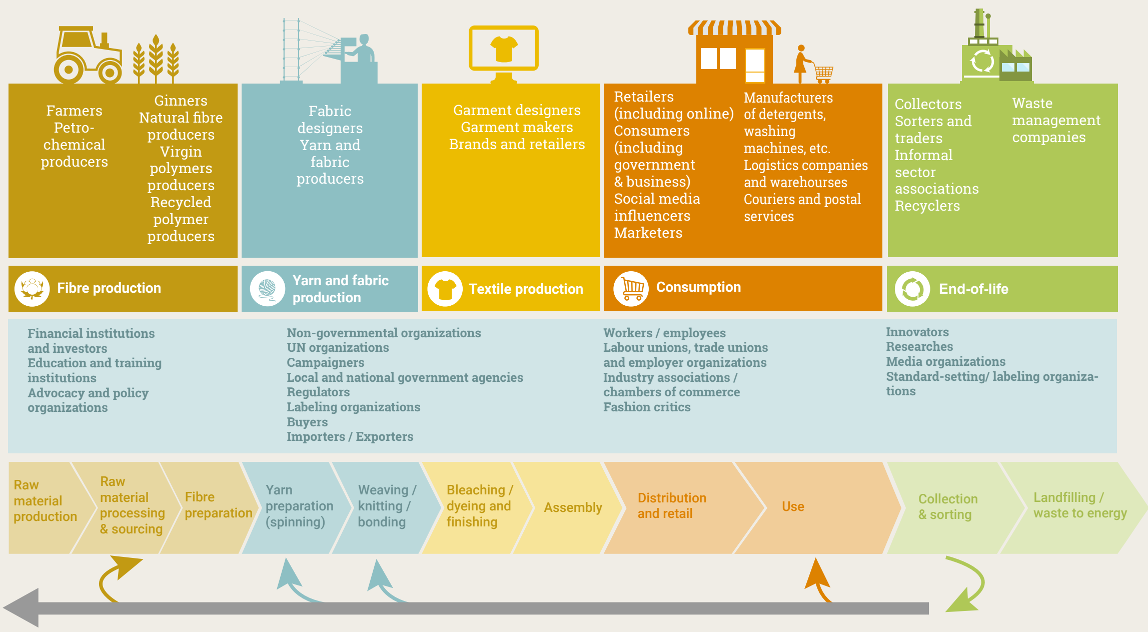
Overall approach and scope of the work

The CTI Fashion Initiative is an industry-wide collaboration that aims to promote circularity and transparency in the fashion and textile value chain by providing aligned standards, metrics, data and best practices. This will enable accountability, value creation and the operationalization of circularity.

This guidance is directed at all stakeholders in the fashion value chain. Starting upstream, from players involved in production such as the textile manufacturers, to brands and retailers downstream, coherent use of circular metrics can help build baselines, identify the strategies with highest impact and monitor improvements.

This work uses WBCSD's Circular Transition Indicators (CTI v4.0) and wide-ranging stakeholder consultations as its foundation.

Figure 1: Stakeholders associated with the textile value chain



Source: United Nations Environment Programme (2020). Sustainability and Circularity in the Textile Value Chain: Global Stocktaking. https://wedocs.unep.org/20.500.11822/34184.

2.4 The methodology behind the Circular Transition Indicators

CTI is based on material flows through the company. By analyzing these flows, the company determines the potential to minimize resource extraction and waste material. It entails the assessment of the flows within the company's boundaries at three key intervention points:

Sourcing/procurement

→ **Inflow:** How circular (non-virgin or renewable, sustainably managed) are the resources, materials, products and parts sourced?

Product/material design

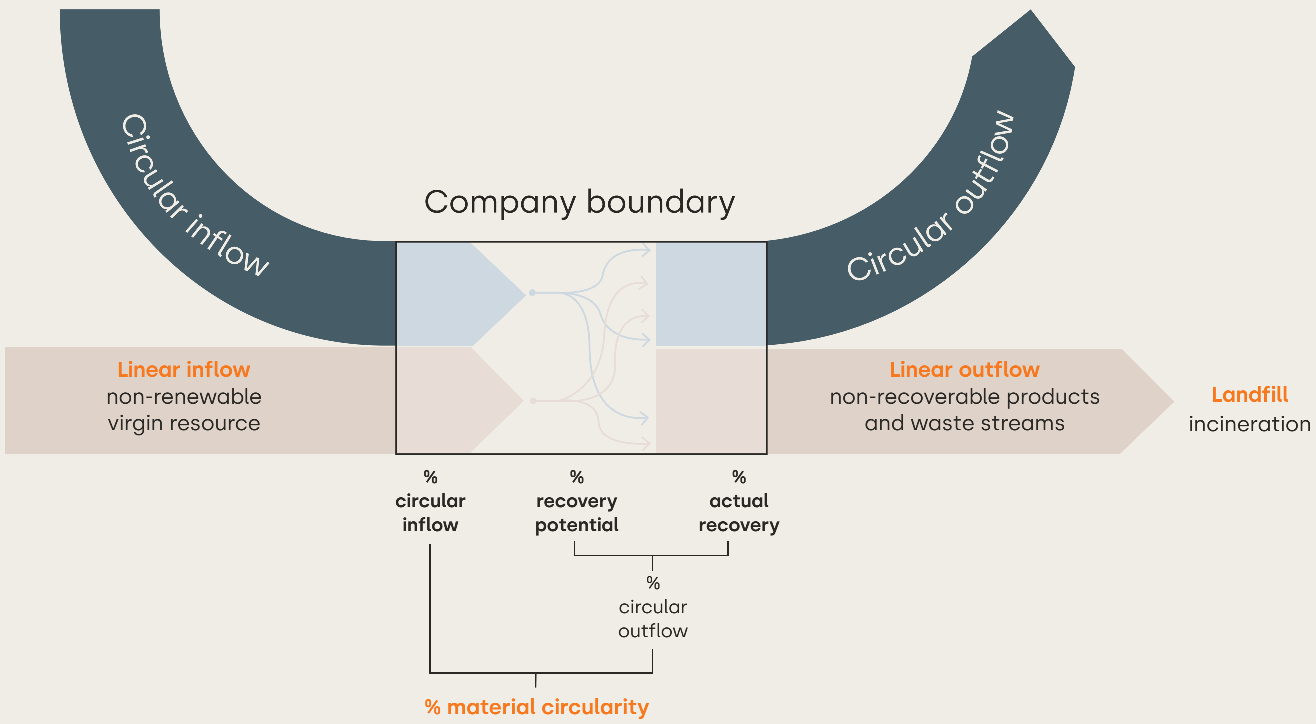
→ **Outflow — recovery potential:** How does the company design its outflows so that it is technically feasible and economically viable to bring them back for use again (as a material, product part, etc.) preserving a similar function to the previous cycle (functional equivalence – see glossary)? For example, by designing for disassembly, repairability, recyclability, etc., or seeing their safe return to the environment so that they can generate new resources, through, for example, biodegradability.

Product/material recovery

→ **Outflow — actual recovery:** How much of the outflow does the company recover? The outflow includes products, by-products and waste streams. Companies can improve actual recovery rates through closed loop business models or mandatory or voluntary open loop recovery scheme efforts.

These three pillars combined determine a company's performance in closing the loop, expressed in the % of material circularity, calculated as the weighted average between % circular inflow and % circular outflow.

Figure 2: **Illustration of material flows**



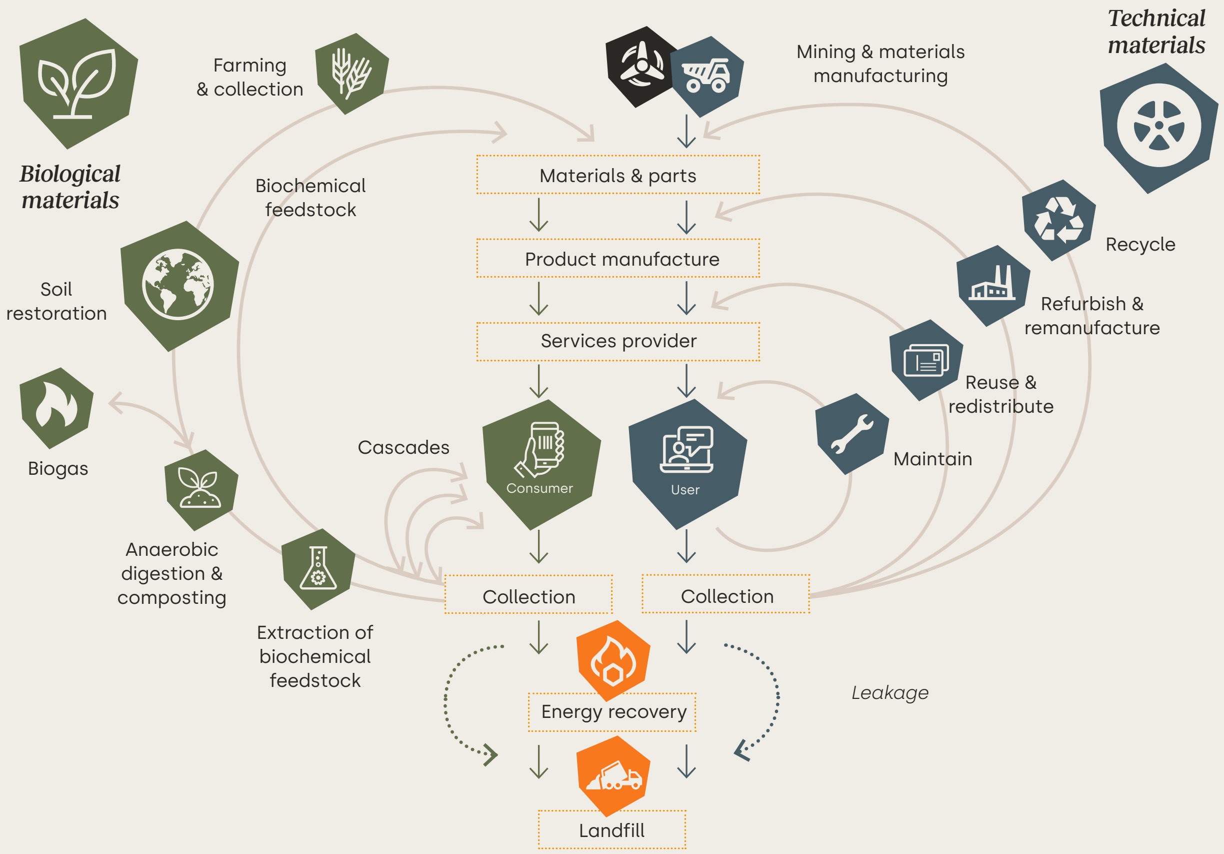
Technical and biological cycles

Leveraging cradle-to-cradle design principles and the Ellen MacArthur Foundation's Butterfly diagram, CTI recognizes two distinct sides to recovery cycles, as shown in Figure 3.

- In the **technical cycle**, products and materials remain in circulation through processes such as repair or maintenance, reuse, remanufacturing and recycling (see glossary for definitions).
- In the **biological cycle**, bio-based resources follow a different recovery path, as depicted on the left side of the recovery diagram. They circle back into the biological cycle at their end of life to reuse their nutrients in a new cycle. It is important to note that bio-based resources are limited in supply and need to originate from sustainably managed sources.

Some of the materials used for apparel and footwear originate from the biological cycle (e.g., cotton, wool or rubber) then go into the technical cycle for several loops (e.g., reuse, refurbish). They then end their lives in the technical cycle through recycling or, most often, in landfill or incineration. Recovery through the biological cycle, via composting or biodegradation, remains challenging for the industry due to material composition, treatment and a lack of pathways for the safe return of nutrients to the environment.

Figure 3: Technical and biological recovery cycles



Source: Adapted from the Ellen MacArthur Foundation[11]

The technical cycle for fashion

Synthetic materials such as polyester and nylon comprise approximately 60% of clothing.[12] Additionally, industry actors use more than 1,900 chemicals in the production of textiles.[13] For the technical cycle, companies can implement various recovery strategies to drive the circularity of fashion products. **We encourage companies to design their products and business models to enable those recovery strategies that retain the highest value of the materials used.** In line with the EU Waste Framework Directive, CTI recommends that, whenever possible, companies design products for durability and disassembly to enable reuse or refurbishment and extend their lifetime.

Maintain

Companies should strive to maintain products in use for as long as possible to reduce the need to purchase new items.[14] Reducing the creation of waste by preventing the need to produce and purchase additional items is the most important strategy in line with the waste hierarchy. Aligned with this vision, companies can leverage a few strategies:

- **Design:** The design of products and components should increase usability and lifespan. This may include approaches that select more durable fabrics or practices that improve the item's resistance. Designing products and the corresponding brand image to increase emotional durability is a core strategy to avoid unnecessary purchases.
- **Education:** Companies should share information and education opportunities with their stakeholders to maximize care and knowledge on how to improve usability while reducing wear.
- **Service:** Companies should provide services to their clients focusing on repair and reuse to make the leveraging of other recovery strategies easy and convenient for the company's ecosystem.

Reuse, refurbish and remanufacture

Companies should favor approaches and strategies higher in the waste hierarchy over recycling, in the following order:

- **Reuse:** Secondhand platforms or shops for clothes, clothing-swap events or sharing clothes among individuals. This should include services that enable this activity to take place, such as sorting services.
- **Repair:** Companies can extend the lifetime of fashion products by using techniques such as patching, stitching or other repairing techniques.
- **Refurbish or remanufacture:** Products or shoes that can be disassembled may provide parts for reuse in other shoes or different garments that can be sewed together to form another piece of clothing.

Recycle

Textile waste can comprise pre- and post-consumer textiles, which require distinct collection systems. Currently, three recycling processes are available for both pre- and post-consumer textile waste: mechanical (processing waste into secondary raw materials or products without significantly changing its molecular structure), thermomechanical (heating and re-spinning or reforming waste into new fibers) and chemical/advanced (returning post-use plastic/material to its basic chemical building blocks to create a new mix of plastics, chemicals, fuels, textiles and other products):[15]

- **Mechanical recycling** is currently the most used recycling technique for textiles because of the economic benefits and scalability.
- **Thermomechanical recycling** is a process to recycle synthetics through the melting and remolding of the material into a new fiber, sometimes with different properties.
- **Advanced/chemical recycling** can be seen as complementary to mechanical recycling as it brings back the materials to a quality and purity comparable to the virgin material. It is applicable to most synthetic textile fibers. Advanced recycling technologies are still in the early stages of development and technological readiness and further advancements are needed to improve their efficiency, scalability, and cost-effectiveness.[16]

The biological cycle for fashion

We encourage the industry to use regeneratively produced – or at the very least sustainably managed – bio-based materials (e.g., regeneratively produced cotton) as this reduces soil pollution and degradation, improves biodiversity, enhances water cycles and ensures the long-term availability of resources.[17] However, for the fashion industry, the biological recovery of apparel and footwear is not (yet) feasible as it requires the safe return of the nutrients comprising the product to nature. Due to the use of chemicals and processing, the selection of materials and technical shortcomings, this is an extremely rare occurrence.[18] Separating synthetic and bio-based textiles and detecting and removing residual dyes and chemicals limit this natural process,[19] making the biodegradation of fibers particularly challenging and the biodegradation of finished products almost impossible, especially when considering testing standards.[20]

CTI prefers specific certifications in place for products designed to be compostable over biodegradable as these promote more stringent standards. Cradle to Cradle Certified, Biodegradable Products Institute (BPI) and Compost Manufacturing Alliance (CMA) are examples of composting certifications.

But as long as there is no industrial composting at scale or home composting, making the claim remains a challenge. **Companies from the sector should refrain from communicating to consumers or other stakeholders that products are biodegradable.** For example, in Europe, the European Parliament issued a ban on "biodegradability" claims without detailed evidence.[21]

Companies should design packaging and all other materials from bio-based resources that enable biodegradability. This is to ensure their safe recovery into the biological cycle for conversion into nutrients, fibers or non-nutrient-rich materials in the next cycle.[22] Many companies are exploring packaging solutions that are compostable. These include mushroom- or seaweed-based packaging or plastic-alternative products. We encourage companies exploring these solutions to inform consumers on how to dispose of these materials to achieve biodegradability and the safe return of nutrients as per design.[23]

2.5 The Indicators

Any company in the fashion sector, regardless of size or position in the value chain, can use CTI. This guidance provides a menu of indicators, some of which are mandatory to provide a comprehensive picture of a company's circular performance according to CTI. Others are optional and open for selection depending on the insights the company wishes to obtain from the CTI evaluation. Indicators in the Close the Loop module in CTI v4.0 are mandatory, especially the measurement of CTI's headline indicator: % material circularity. Indicators in the additional modules offer companies further insights to support their decision-making for increased circularity.

A CTI assessment should always start with the completion of % material circularity from the Close the Loop module. Companies may then calculate indicators from Optimize the Loop and Value the Loop for additional insights. Impact of the Loop is a module that helps companies measure and understand the impact of circular strategies on their sustainability targets, such as carbon footprint or land-use and land-use change.

By reviewing and building upon CTI v4.0, this guidance aims to support companies from the fashion and textile value chain to gain concrete insights into how they can most effectively transition to a circular economy, improving accountability while creating new value for the company, nature and society.

Figure 4: CTI indicators retrieved from CTI v4.0

1 Close the Loop
- → % material circularity
- → % water circularity
- → renewable energy

2 Optimize the Loop
- → % critical material
- → % recovery type
- → actual lifetime
- → onsite water circulation

3 Value the Loop
- → circular material productivity
- → CTI revenue

4 Impact of the Loop
- → GHG impact
- → nature impact

(Refer to CTI v4.0 for more detailed information on how to calculate all indicators outlined above).

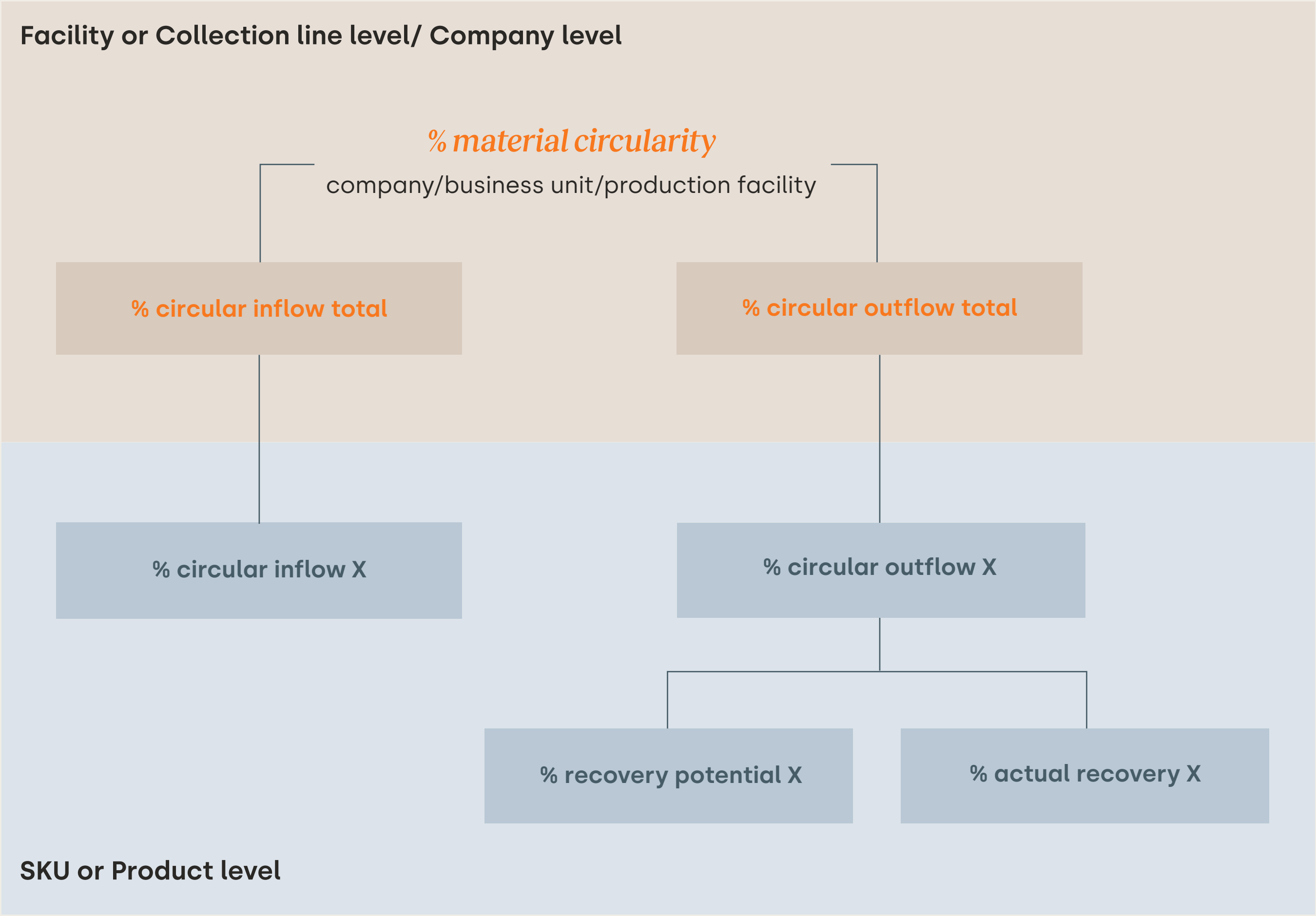
1 *Close the Loop*

This module calculates the company's effectiveness in closing the loop on its resource flows. It includes **CTI's headline indicator for % material circularity,** which **is the weighted average between % circular inflow and % circular outflow.**

The % non-virgin content (e.g., reuse products or recycled content) and % renewable content (sustainably grown bio-based sources) determine the % circular inflow. The % recovery potential (which focuses on design) and the actual recovery determine the % circular outflow. These three pillars address various business aspects: procurement for inflow, design for potential recovery, and business model innovation (closed) and legal and partnerships (open) for the actual recovery.

CTI allows for circularity assessment at different levels: company, facility or product group level.

Figure 5: Flexible system boundaries



Circular inflow: non-virgin and renewable inflow

Circular inflow – Non-virgin inflow

CTI v4.0 definition: Non-virgin inflow consists of previously used (secondary), e.g., recycled materials, secondhand products or refurbished parts.

Alignment with other regulations and standards:

- ISO 59020 defines linear inflow as any virgin materials inflow (whether renewable or not), whereas circular inflow consists of reused or recycled content and thus aligns with the CTI definition guidelines for reporting for non-virgin inflow.
- The European Sustainability Reporting Standard on resource use and the circular economy (ESRS E5), part of the new Corporate Sustainability Reporting Directive (CSRD), includes reused and recycled inputs in the definition of circular inflow. Both definitions align with CTI's definitions and guidelines for reporting.

CTI for fashion aligns with CTI v4.0's definition for non-virgin inflow for the technical cycle, which includes all previously used (secondary) content such as reused products, refurbished or remanufactured components, as well as recycled content. In addition, the definition from the Textile Exchange Recycled Claim Standard for sustainably sourced recycled materials can help understand the specificities of the sector:

"Material that is refined and reprocessed from reclaimed material by means of a manufacturing process and made into a final product or into a component for incorporation into a product, that delivers consistently reduced impacts and increased benefits for climate, nature, and people."[24]

In line with this, it is important to separate pre-consumer and post-customer waste.

- **Pre-consumer waste** processes such as agricultural waste, cut-offs, unsold stock, scraps and damaged products should be reused, remanufactured or recycled.
- **Post-consumer waste** can be collected from municipal waste streams, owned collection bins or other take-back systems to reuse, remanufacture, or recycle. Mechanical recycling of post-consumer waste is associated with risks of unknown chemical processes in feedstock input. Transparency on material and chemical composition is therefore of great importance.

To support these definitions, Annex I provides information on non-virgin certifications such as Global Recycled Standards (GRS) or the Recycled Claim Standard (RCS) from Textile Exchange.

Circular inflow - Renewable inflow

CTI v4.0 definition: Renewable inflow comprises sustainably managed resources, most often demonstrated by internationally recognized certification schemes, like the Forest Stewardship Council (FSC) and Roundtable on Sustainable Palm Oil (RSPO), that – after extraction – return to their previous stock levels by natural growth or replenishment processes at a rate in line with use cycles.

Alignment with other regulations and standards

- ISO 59020 categorizes inflow and feedstock as sustainably sourced renewable (circular) or non-renewable resources (linear), in line with the CTI methodology.
- CSRD ESRS E5 includes renewable inputs in the definition of circular inflow. Both these definitions align with CTI's definitions and guidelines for reporting.

CTI for fashion aligns with the definition above for renewable inflow. Companies can similarly refer to the definition from the Textile Exchange's Organic Content Standard, which goes even further for the definition of sustainably sourced renewable materials:

"Material that is continually replenished at a rate equal to or greater than the rate of depletion, that delivers consistently reduced impacts and increased benefits for climate, nature, and people."[25]

To align with both definitions, the guidance considers both sustainably sourced and regeneratively sourced biomass as renewable and therefore circular in CTI.

- **Sustainably managed inflow:** Annex II details certifications that companies from the fashion sector can rely on for renewable inflow, including the Responsible Wool Standard, and OEKO-TEX. Renewable certifications are particularly important due to the chemical specifications of textile products and the importance of resource extraction.[26]
- **Regenerative inflow:** In addition to sustainably managed inflow, the fashion sector should aim to have inflows that are certifiable as regenerative. Regenerative practices are agriculture approaches that focus on soil health and aim to restore its well-being and that of surrounding ecosystems.[27] Textile Exchange provides examples of such practices for the fashion sector in its Regenerative Agriculture Outcome Framework. Very few certifications exist for such practices but the Certified Regenerative by A Greener World (AGW) and Regenerative Organic Certified certifications can provide a view on the topic.

In this sense, **companies should categorize bio-based inflows as non-renewable (and therefore linear) when not sustainably or regeneratively sourced or as renewable (and therefore circular) when sustainably or regeneratively sourced**. While both sustainably managed and regeneratively managed inflows are considered renewable and therefore circular in CTI, companies from the sector should prioritize use of regeneratively sourced biomass.

Circular outflow

Circular outflow – Recovery potential

CTI v4.0 definition: Recovery potential reflects the company's ability to design its outflow (e.g. products) to be recoverable through repair, reuse, refurbishment, remanufacturing or recycling through the technical or recirculation through the biological cycle (see section on Technical and Biological recovery, page 16).

Alignment with other regulations and standards

- CSRD ESRS E5 requires the design of products in line with circular principles: durability, reusability, repairability, disassembly, remanufacturing or refurbishment, recycling (technical cycle), recirculation (biological cycle), and other potential product and material use. The standard also requires the recirculation of products after the first use cycle and is in line with the CTI definition of recovery potential.

To enable fashion companies to define the most suitable circular design for their products, we have selected a list of design principles and guidelines for recovery potential in line with the Ellen MacArthur Foundation circular practices design,[28] as well as the Eco-design for Sustainable Products Regulation[29] and Cradle to Cradle Certified design practices.[30]

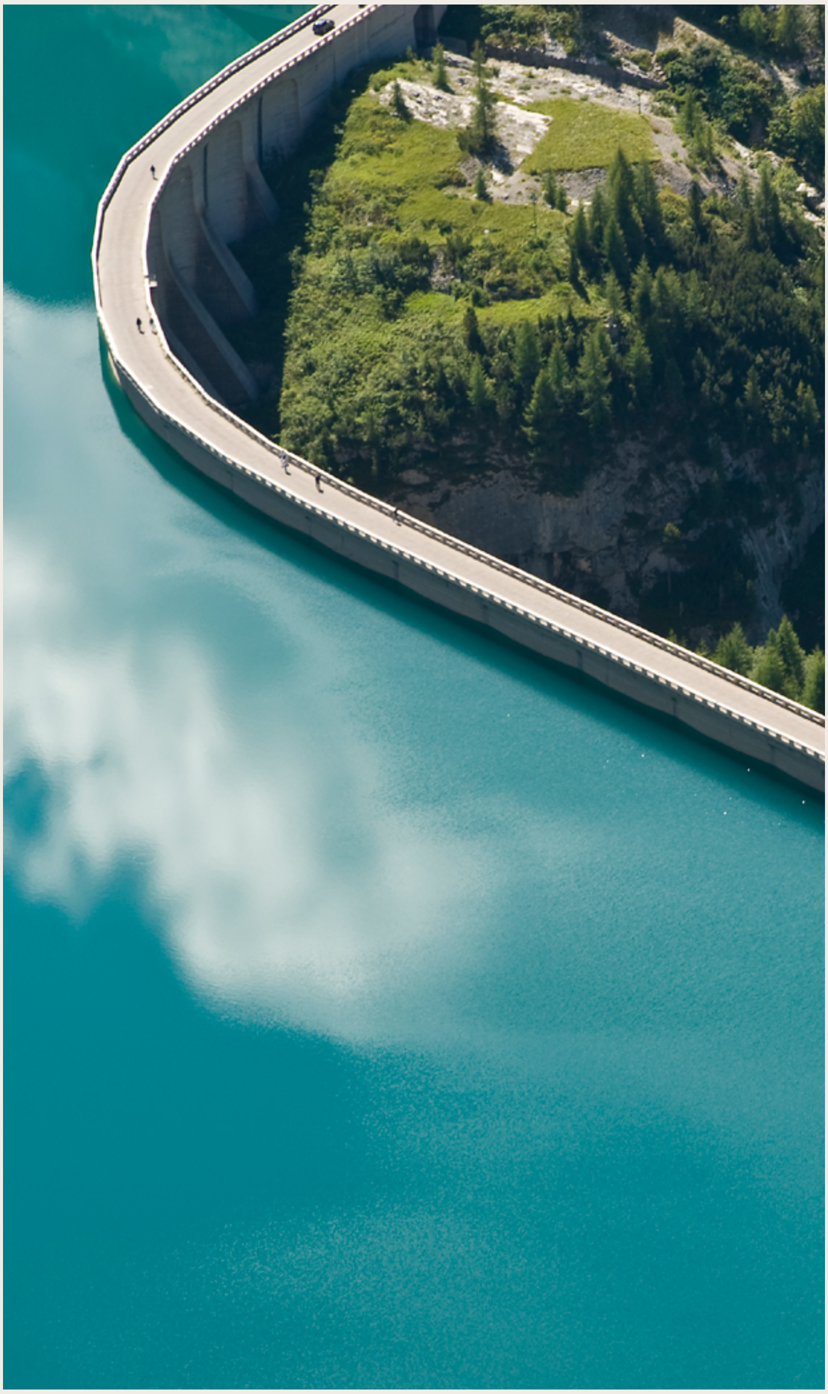
The design principles are applicable at different stages in the value chain although the focus should be on becoming more circular and sustainable in the design and production process to minimize waste and keep products in the loop longer.

Table 1: Design principles and guidelines for recovery potential

Design principle	*Description*
Design for durability	**Physical durability** → Long-lasting, strong and durable materials and fabrication.
	Emotional durability → Product level: Design products for use with care and for the long-term. → Company level: Market the brand to increase loyalty and emotional connections to products.
Circularity design	**Chemicals** → Ban hazardous chemicals (see Zero Discharge of Hazardous Chemicals Manufacturing Restricted Substances List (ZDHC MRSL)) and restrict unnecessary use of all chemicals (see Textile Restricted Substances List and Cradle to Cradle Certified Material Health Assessment for reference).
	Design products for disassembly, reusability, repair, remanufacturing and partial biodegradation → Modular design: Design apparel and footwear for easy disassembly for repair or recycling of components at the end of their useful lives[31]. → Mono-material composition: A product made of a single type of fiber will require less processing for recovery than complex mixtures of fibers, dyes and finishing chemicals, which are difficult to recycle at the end of their useful lives.
	Design products to minimize waste creation in production → Minimize the creation of scraps and leftovers. → Where waste is not reusable in the industry, ensure recyclability for other processes or industries.
Sustainable design	**Minimize resource use** → Reduce the use of chemicals during production and recycling. → Reduce water consumption for raw materials, processing, dyeing and finishing fabrics. → Reduce energy use and emissions and increase the replacement of fossil fuels with renewable energy sources. → Reduce material consumption: Design for the efficient use of materials.
	Production → Avoid overproduction of items through forecast accuracy and making decisions as close to market as possible[32]. → Reduce product variations and encourage timeless pieces[33].
	Traceability → Improve up- and downstream value chain traceability through data (see traceability section).

Perspective on material circularity

The indicators above interact with the material circularity indicator. Both **circular inflow** and **circular outflow** are necessary for a complete material circularity score and often depend on each other. A strong take-back program and the collection of pre-consumer waste create non-virgin feedstock for circular inflow. The next section reviews two additional Close the Loop indicators: renewable energy and % water circularity.



Renewable energy

% renewable energy

CTI v4.0 definition: The circular economy requires the transition to renewable energy. Renewable energy encompasses all renewable resources, including bioenergy, geothermal, hydropower, ocean, solar and wind energy as outlined by the International Renewable Energy Agency (IRENA).[34]

Alignment with other regulations and standards

- The CSRD ESRS will require certifications for renewable energy consumption to assure that there is contractual proof of renewable energy usage. CTI follows the same definition but does not require certification for renewable energy; it is, however, highly recommended.
- Fashion industry actors should also prioritize solutions powered by renewable energy. With this indicator the focus is on the operations of the company. However, we recommend incentivizing the use of renewable energy across the value chain as a truly circular economy runs on renewable energy.
- CTI for fashion recommends companies provide evidence of participation in renewable energy incentives by leveraging renewable energy certificates or power purchase agreements. However, if this type of data point is not accessible, CTI for fashion permits less precise forms or contractual instruments, such as subscription to a green tariff (see glossary for green tariff).

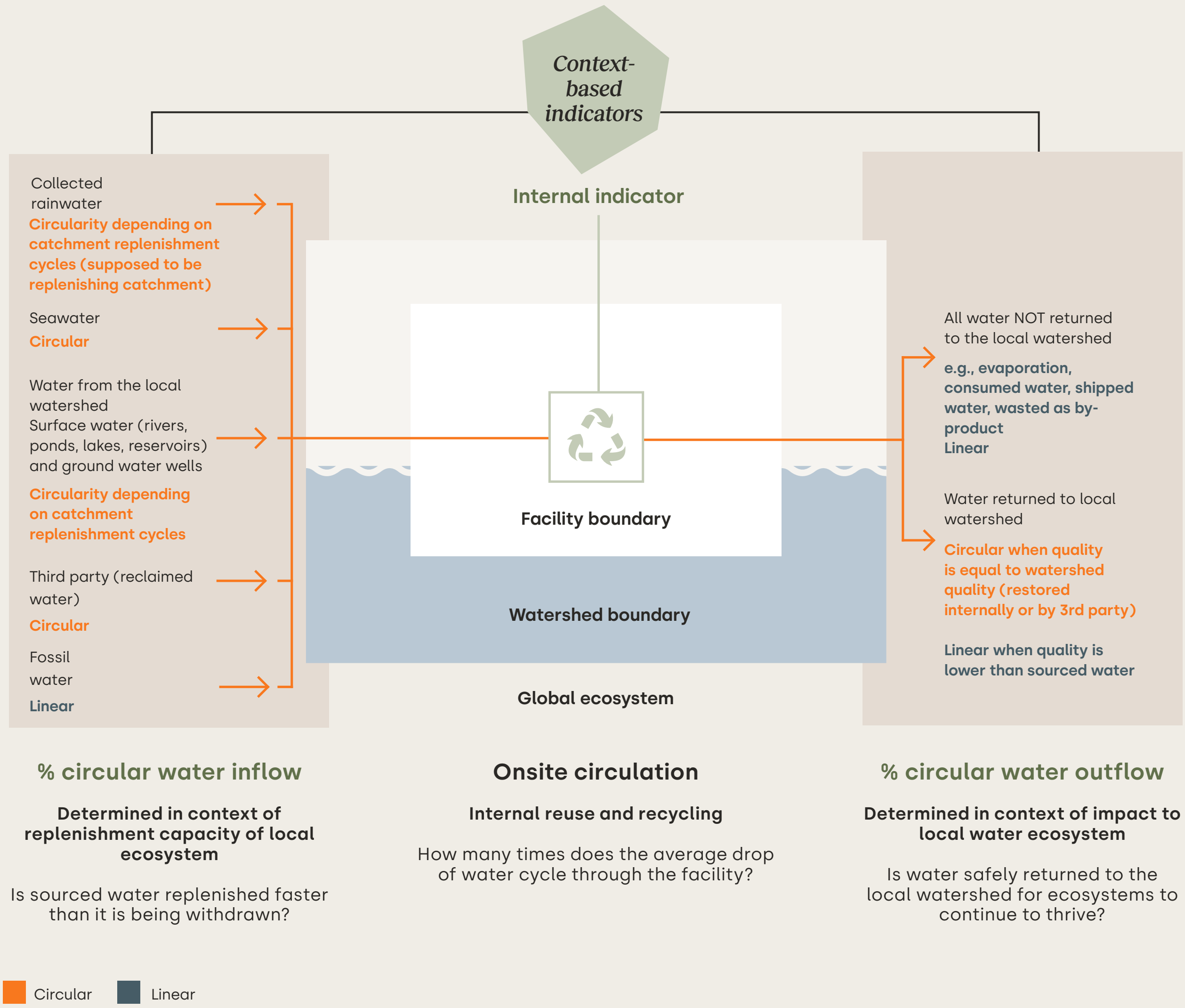
% water circularity

CTI v4.0 definition: In addition to material flows, CTI considers the circularity of freshwater to be an important element of the circular economy. What sets water apart from other materials and resources is the scale of the relevant ecosystem. **Where materials can circulate in a global system, it is necessary to assess water circularity on a local level for a water catchment area or local watershed**. In CTI, the average between % circular water inflow and % circular water outflow (assuming the volume is the same) represents the water circularity of a product or facility.

To support this, CTI v4.0 proposes the following indicators (see also Figure 6):

- → **Circular water inflow** is determined in the context of replenishment capacity of the local ecosystem. Replenishing sourced water faster than it is withdrawn improves its circularity.
- → **Onsite circulation** is determined by internal reuse and recycling strategies for water. This aspect is considered in the % on site water circulation indicator.
- → **Circular water outflow** is determined in the context of impact on the local water ecosystem, focusing on the safety of returned water.

Figure 6: Water circularity of a product or facility



Alignment with other regulations and standards

- CSRD ESRS E3 reflects on water and marine resource management and requires measurable targets for water consumption, including water withdrawals, consumption, discharge and quality of discharge, in line with CTI, for both operations and total levels. Water intensity performance is, however, not part of CTI v4.0 and companies should consider it as an additional assessment.

Freshwater is particularly important for the fashion industry as textile production requires copious quantities of it. **We recommend the fashion industry pay special attention to this indicator and include it in the scope whenever possible.**[35]

2 *Optimize the Loop*

In CTI, this module provides insights on material criticality, resource-use efficiency and higher value recovery strategies. This module and its indicators are optional.

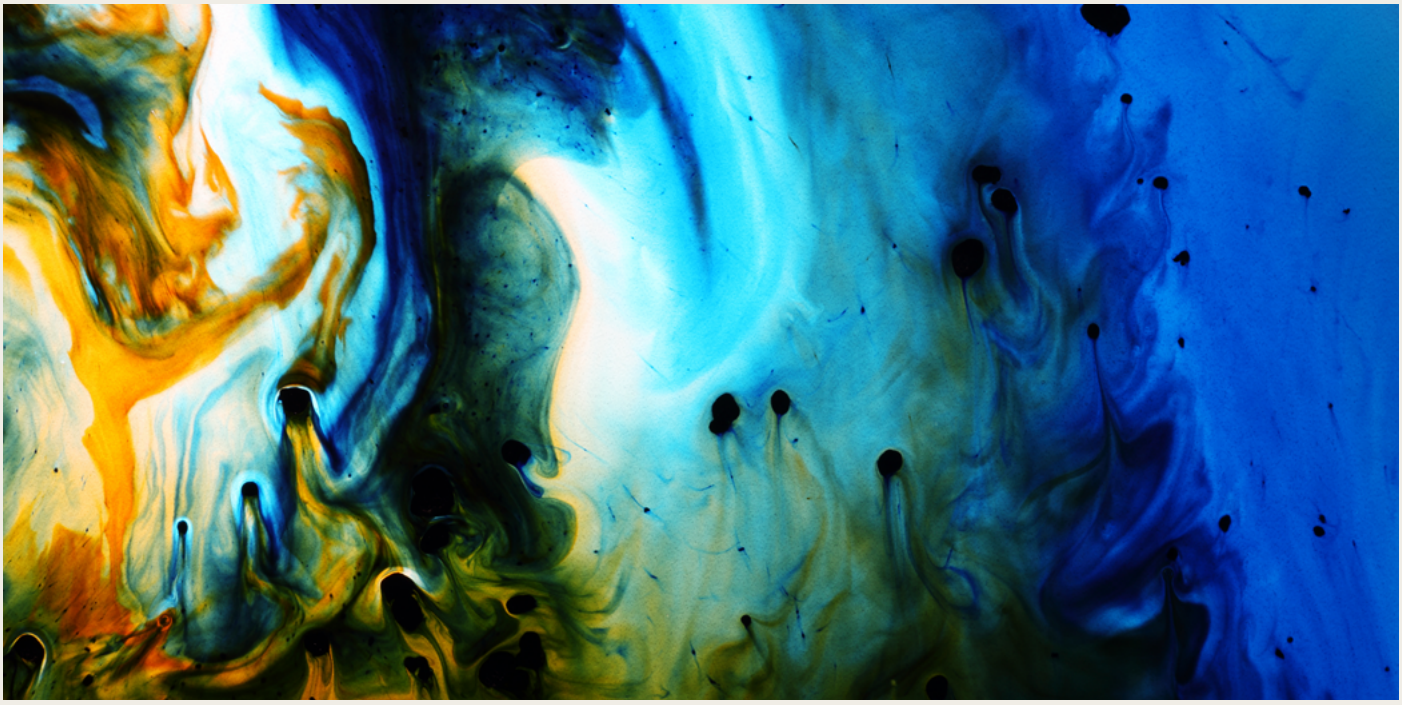
% critical materials

CTI v4.0 definition: The results of this indicator demonstrate the share of inflow considered critical. Companies can refer to internal critical materials lists or existing public lists such as those compiled by the European Commission or the United States Geological Survey. This allows companies to assess the risk level of specific material flows and to prioritize accordingly. Even if the percentage of critical materials is small, it may be relevant to further analyze it to understand:

- The diversity in critical materials;
- The substitutability of critical materials;
- The absolute use of critical materials;
- Revenue dependent on critical materials (revenue at risk).

Various actors in the industry frequently use several substances from the EU critical materials list and US critical minerals list. Companies should consider which alternatives they could use or how they can keep the products that contain them in use as long as possible:[36]

- **Vanadium, chromium, barium, lead, copper, cobalt and/or nickel:** present in dyes
- **Germanium:** a catalyst in the production of polyester and synthetic textile fiber
- **Natural rubber:** material for products
- **Chrome:** used to tan leather
- **Tin:** material for products and packaging
- **Gold:** material for products and jewelries
- **Platinum:** material for products and jewelry
- **Tantalum:** material for products and jewelry
- **Tungsten:** material for products and jewelry
- **Antimony:** used in PET manufacturing and as a flame-retardant



Recovery type

CTI v4.0 definition: % recovery type focuses on how the company recovers outflow and recirculates it into the value chain. Recovery type applies to % actual recovery. The results provide a breakdown of the recovered outflow in shares reused/ repaired, refurbished, remanufactured, recycled or biodegraded.

Depending on the value chain position of the company, the possibilities for optimization in recovery loops may vary. **Lifetime extension strategies such as reuse, refurbish or remanufacture are recovery strategies that retain higher value as they allow companies to preserve the economic value embedded in products and materials, slow down resource flows, and reduce waste and negative environmental impacts.**[37] Such preferred strategies are available in the landscape today:

- **Reuse:** Secondhand and reselling platforms, such as Vinted, are an example of ways to keep items in the loop, incentivizing consumers and building a financially viable business model based on circularity.[38]
- **Refurbish:** Bally is well-known for its high-quality and durable shoes and their dedicated repair and refurbishment service, helping footwear last even longer in their first cycle.[39]
- **Repair:** Patagonia prevents textile waste by offering repair services that allow garments to remain in use longer.[40]

% onsite water circulation

CTI v4.0 definition: The water circularity section offers an internal-facing indicator focusing on internal facility circulation through reuse and recycling.

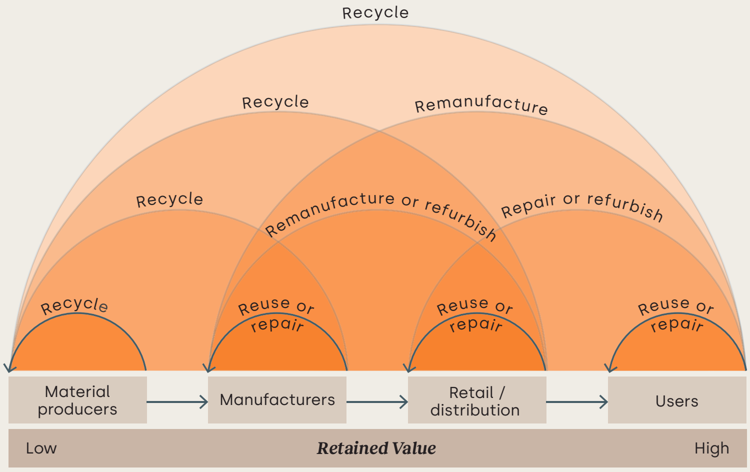
As discussed with the % water circularity indicator, water indicators are key to the fashion sector, which should thus prioritize them accordingly.

Actual lifetime

CTI v4.0 definition: CTI recognizes design for longevity and lifetime extension of products as a circular practice.

This definition is in line with CSRD's reporting requirements for design for durability among other circular principles.[41] Implementing strategies to extend the lifetime of products once they become obsolete leads to higher circularity and value retention. Specifically, extending product lifetime can minimize the need to buy additional products and thus reduce resource use and waste creation.

Figure 7: Recovery types and retained value



- **Emotional durability.** The Ellen MacArthur Foundation has defined emotional durability as a strategy to "increase and maintain a product's relevance and desirability to a user, or multiple users, over time."[42] Understanding and engaging with consumers and creating a sense of product desirability can improve the way the consumer uses the product and for how long. This aspect is particularly relevant for the fashion industry as trends and desirability define many products. Additionally, trends encourage the production and consumption of items that may only be desirable for a single season. Producing classic and timeless products could also increase their emotional durability.
- **Physical durability.** A product's physical durability is a strategy for combining materials and constructing them to create durable products that can resist damage and wear.[43] As mentioned above, designing for durability is a core circular design principle to improve the physical durability of products. The regular use of textiles means the company can shift some attention to the choice of material, composition, and construction of the item to extend its lifetime.

3 *Value the Loop*

This module illustrates the added business value of increasing a company's circular material flows.

The indicators are optional.

Circular material productivity

CTI v4.0 definition: This indicator illustrates the company's effectiveness in decoupling financial performance and linear resource consumption. Companies can calculate circular material productivity by dividing revenues generated by the mass of linear inflow as considered in the Close the Loop module. **The indicator shows a decoupling of the company's financial performance from linear resource consumption. The greater the circular material productivity, the better a company is at decreasing the dependence on the use of virgin resources. Companies can monitor progress on this indicator over time.**

Fashion industry actors, particularly those in fast fashion, often make products at a fast pace and for a low price. This can mean neglecting the quality of fabrics and lifetime of the product. Customers, however, are becoming more aware and slowly changing their consumption habits.[44] This creates an opportunity for companies to drive their circular material productivity and make sure to decouple economic performance from resource consumption.

CTI revenue

CTI v4.0 definition: The CTI revenue indicator creates an objective and quantitative bridge between a company's performance in closing the loop on the resources it uses and how that affects a company's financial performance. The greater the CTI revenue, the better a company can generate revenues from its circular products/business. This metric also reflects decoupling from virgin resource use as revenues increase from circular flows. The methodology is currently based on material circularity and does not provide revenue measurement for services and digital solutions.

Many circular business models have the potential to reduce costs:

- → Circular design principles can reduce the amount of fabric needed and thus the associated costs.
- → Rental, take-back and repair are services that strengthen consumer engagement and relationships with brands, keep products in the loop and increase revenue on a single item.

Companies such as Patagonia and Vinted show the opportunities in being profitable and sustaining economic growth through circular business models.[45, 46] Nike is one of the most financially successful apparel companies, simultaneously investing in circular design, waterless dyeing, using recycled materials and reducing its environmental impact.[47] The misconception that circularity is not profitable is proven wrong in the fact that companies can save money through circular pre- and post-consumer practices. Scalability is, however, required for this to take place.

4 *Impact of the Loop*

This module includes a set of indicators that help companies prioritize circular strategies considering their impact on the company's sustainability targets. It helps calculate GHG savings from circular sourcing and circular end-of-life management (GHG impact) and impacts on land use and land-use change linked to circular sourcing versus linear sourcing (nature impact). WBCSD is developing new indicators to help companies identify those circular strategies and approaches that bring the most social value. Indicators in this module are the only ones looking at the impact of the operations of the company. While the other indicators look at the processes within the walls of the company, GHG impact and nature impact will assess impact in the supply chain and at the end of life of the company's products, in line with the GHG Protocol[48] and the Science Based Targets Network (SBTN) targets for nature.[49] By selecting specific inflow and outflow strategies, the company can observe how this impact their GHG reduction and nature-positive roadmaps.

The indicators in this module are optional.

GHG impact

CTI v4.0 definition: Greenhouse gas (GHG) impact aims to provide companies with a high-level indication of the GHG emissions savings associated with circular strategies compared to using linear ones. **Circular strategies include the use of secondary or renewable materials as inflow and enabling recovery via "higher value retention" recovery. These will usually have a lower carbon impact than non-circular approaches.**

Manufacturing processes, agricultural practices and animal product use, among others, heavily influence the material carbon footprint in fashion.[50] The industry's complex and global value chain means that there are many stages at which switching producers or partners could provide GHG savings.

For instance, the United Nations Framework Convention on Climate Change has published a report on the carbon impact of fibers such as cotton and polyester.[51] In line with the assessment, leveraging the mechanical recycling of PET chips/pellets could reduce GHG emissions up to 66% compared to using virgin ones, showing the importance of switching to a circular paradigm. Also, for cotton, the largest GHG impact happens during the production of the materials.

With this indicator, companies can compare opportunities and assess the GHG impact of switching from a linear to a circular option, considering the whole product cycle.

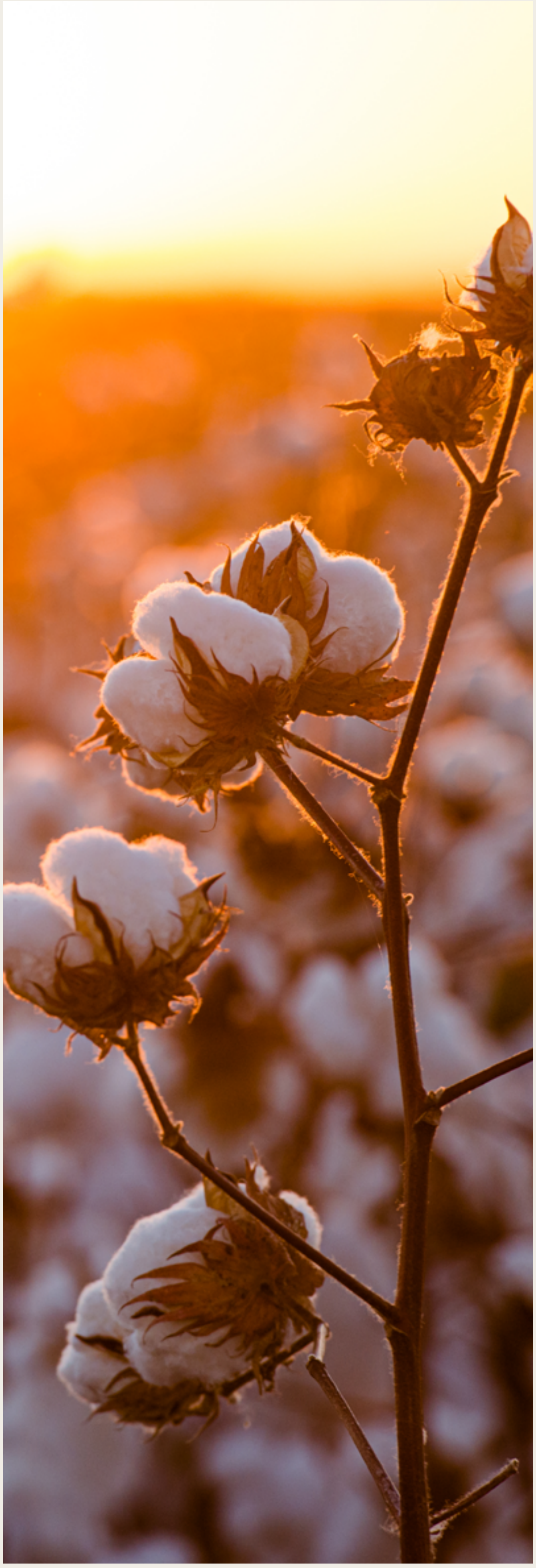
Nature impact

CTI v4.0 definition: This indicator focuses specifically on impact from land use and land-use change as this is the most impactful driver of nature loss. It includes land occupation, land-use change, land degradation and deforestation impacts.[52]

Similarly to GHG impact, circular strategies such as reuse or repair can have positive nature impacts as they tend to require less land than non-linear ones.[53] **This indicator provides an initial screening of land use and land-use change impacts from material extraction and cultivation related to a company's material inflow.** The Nature impact indicator, which focuses specifically on land use and land-use change impacts on biodiversity, helps companies understand how their circular performance impacts this metric. It represents the loss of quality-adjusted km2 that a company is responsible for, focusing specifically on the global extinction threat associated with sourcing locations. It does not include land use and land-use change impacts associated with manufacturing processes as most land use takes place in the material extraction and cultivation phase (but companies can also estimate this using life-cycle analysis (LCA)-based methods). Companies can consider any additional main materials introduced into circular processes (e.g., new elements added in repaired products) in the standard framework.

The industry consumes large amounts of land and raw materials to produce apparel, accessories and footwear products.[54] **With greater awareness, there has been a gradual shift to the adoption of more recycled and sustainably sourced renewable fibers and raw materials used in products.** Textile Exchange defines preferred fibers as having improved environmental and social impacts, considering the particularities of each fiber and certification.[55] In cases where reusing or recycling is too challenging, certified raw materials can help mitigate biodiversity loss, deforestation and land degradation. Textile Exchange's Biodiversity Landscape Analysis outlines the biodiversity crisis and the need to both mitigate risk and collaborate to actively protect and restore land and water.[56]

Additionally, to further support in the identification of material impacts with reduced sustainable impact, companies can leverage the Preferred Fibers and Materials Matrix from Textile Exchange.[57]



The CTI *process cycle*

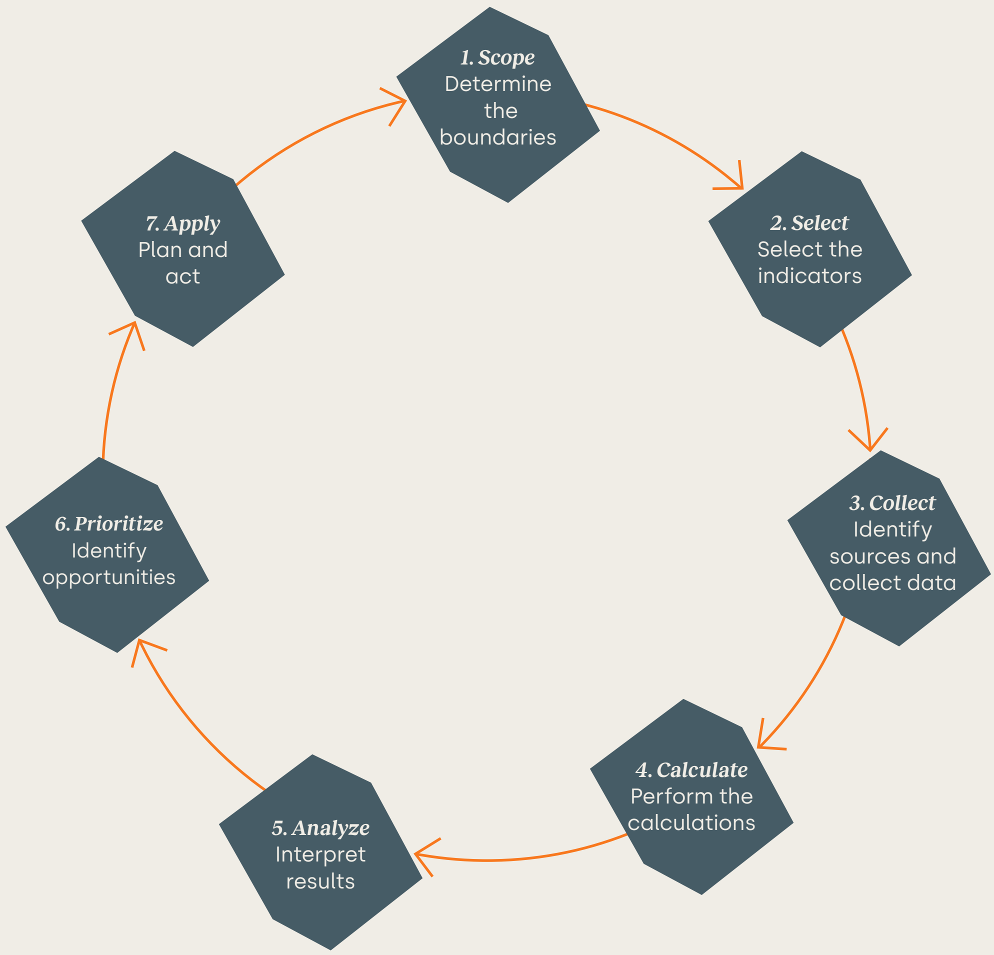
03.

03. The CTI *process cycle*

CTI uses seven steps that support companies in quantifying their circular performance. The process is core to the traditional CTI methodology and CTI for fashion keeps the same process. However, each step includes guidance on how to implement this process for the fashion sector.

Following a cyclic approach is core to the CTI v4.0 methodology. **Building a baseline, setting targets and periodically monitoring progress enables the operationalization of circular approaches across the company.** Having a clear methodology with specific steps that are repeatable enables decision-makers to understand the impact of circular approaches on performance and business models. Once a company has conducted a circular assessment, decision-makers should reflect on the outcome of the assessment and define next steps to continuously monitor progress, improve decision-making and prepare for the next assessment. In line with this cyclical approach, the first step of an assessment should be the scoping, presented below.

Figure 8: The seven steps in the CTI framework



Step 1 – Scope:

Determine boundaries

Scoping the assessment adequately is a critical step in ensuring that:

1. the assessment is fit for purpose,
2. the assessment is aligned with strategic objectives and
3. the view of the impacts is holistic and properly informs decision-making.

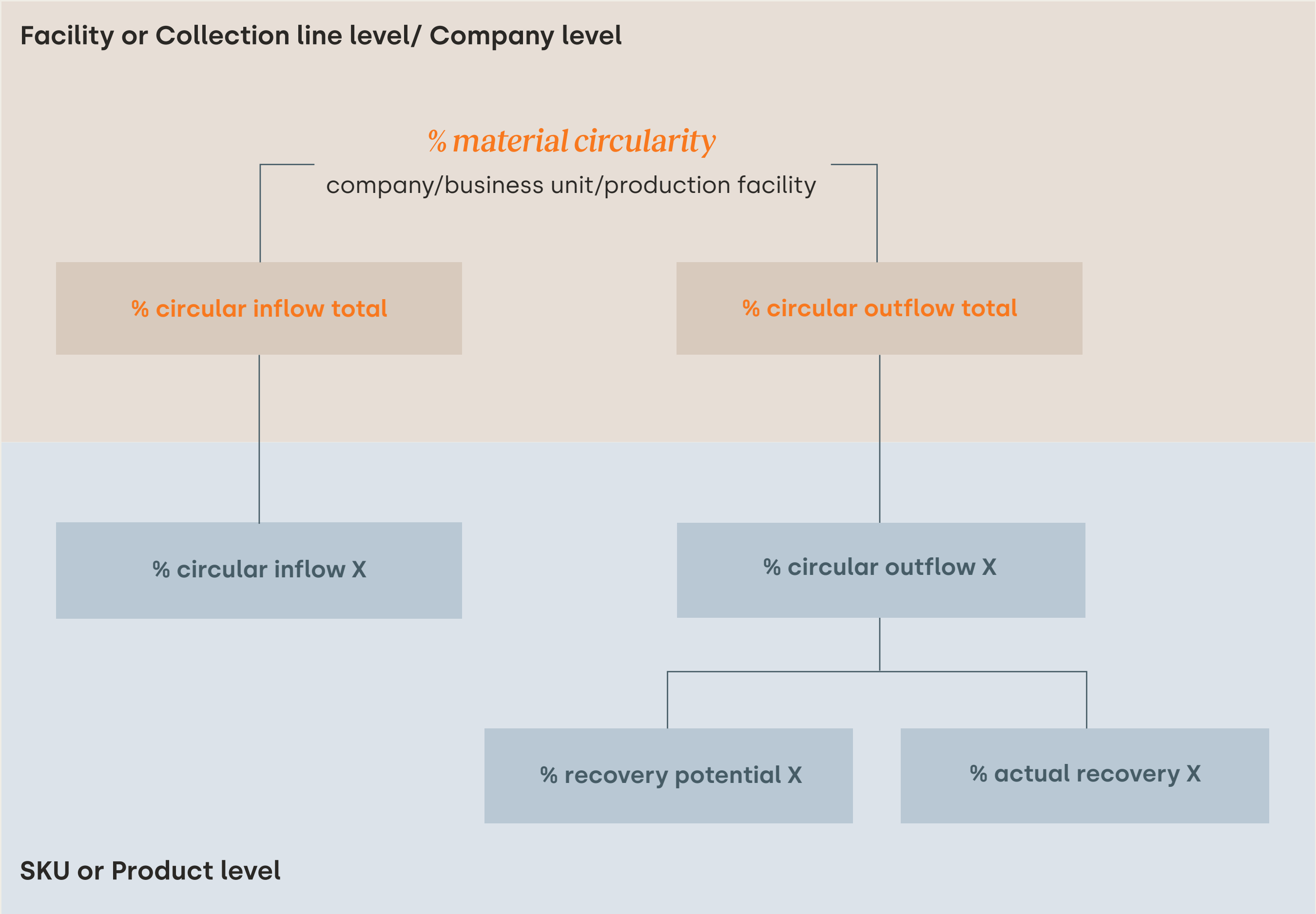
Hence, taking enough time on scoping the assessment is important.

Before choosing indicators from the indicator menu, we recommend planning the circularity assessment carefully to ensure the company:

- Determines upfront what insights it wants to obtain from carrying out the CTI assessment;
- Dedicates time to finding the most credible and granular data sets;
- Devises a plan for how it can take the results from the CTI assessment forward.

This is particularly important as the CTI methodology is flexible and can be implemented at product, facility and company levers – product, facility and company levels – and allowing companies to measure circularity at each of these distinct levels. This level of flexibility means that all the following steps of the CTI framework will depend on the completion of **Step 1: Scope**. We encourage companies to define which level of assessment to focus on. In line with this exercise, the company can then leverage the levels needed for scoping (Figure 9).

Figure 9: Flexible system boundaries: CTI allows for circularity assessment at different levels



Companies may start by answering the following question: ***What is the intent of the assessment?*** Consider the following questions in setting the objectives:

Why is circularity important for the company?

For example:

- Reduce our environmental impacts on climate and nature (e.g., by reducing waste);
- Create value through alternative business models (e.g., product-as-a-service);
- Decouple financial growth from virgin resource use (e.g., increasing financial returns without increasing resource extraction);
- Improve supply chain resilience (e.g., by reusing existing stock of products and materials);
- Reduce social risks along the value chain;
- Achieve public-facing climate and natural targets.

Which questions does the company want to answer by doing this assessment?

For example:

- What are the best initiatives to drive our circular agenda and achieve our public-facing agenda?
- How are we complying with non-financial reporting and disclosure requirements, both voluntary, such as the Global Reporting Initiative (GRI) or mandatory, such as the Corporate Sustainability Reporting Directive (CSRD)?

Who is the audience for the assessment's outcomes and insights? What do we want this audience to do with these insights and information? What other questions are they likely to ask after seeing the results?

For example:

- Internal stakeholders: product design team, procurement team, marketing team, communication team, company executives and boards
- External stakeholders: regulators, clients, NGOs, investors, business partners, suppliers Initiative (GRI) or mandatory, such as the Corporate Sustainability Reporting Directive (CSRD)?

What business unit, product group or even specific materials should we focus on to start with? Where could impact drive optimal value for all stakeholders?

For example:

- Stock keeping unit (SKU) or product level
- Collection or facility level
- Company level

How does this assessment interact with other analysis within the company?

For example:

- Is the assessment complementing existing product-level life cycle assessments and would leverage the same scope?

Once the company has conducted the exercise above, the next stage can start with the review of the three main questions from **Step 1**. To support fashion companies in successfully scoping their assessments, we provide further recommendations for **Step 1** (CTI v4.0 provides further details):

- ***What level of the business do we assess?***
- ***What is the timeframe?***
- ***What do we include and exclude?***

What level of the business do we assess?

For the fashion sector, we suggest three levels of circularity measurement: SKU or product level, facility level and company level. For each level, it is important to clarify what this level entails for the business and what are the associated objectives.

SKU or product level
Definition

Product refers to an apparel or footwear product that meets a consumer's specific needs. We include the sub-categories below, in line with the draft from the EU Product Environmental Footprint Category Rules (PEFCR):

- T-shirts
- Shirts and blouses
- Sweaters and mid-layers
- Jackets and coats
- Pants and shorts
- Dresses, skirts and jumpsuits
- Leggings, stockings, tights and socks
- Underwear
- Swimwear
- Apparel accessories
- Open-toed shoes
- Closed-toed shoes
- Boots

Example: *If a company wants to measure the circularity of a product, such as a shoe, the focus should be on the mass of the components of the shoe.*

Examples of objectives for the assessment

- **Objective 1**: Design products to drive material circularity (durability, sustainably -sourced renewable inflow, non-virgin inflow and end-of-life strategies)
- **Objective 2**: Design services to drive circular solutions and to enable ecosystem thinking for enhanced circular opportunities
- **Objective 3**: Drive decision-making in procurement towards sustainably sourced renewable or recycled fibers and raw materials
- **Objective 4**: Create the conditions to report in a transparent manner for certification

Collection or facility level
Definition

A subset of a company sharing the same function/scope/location/products the company provides.

Example: *If a company only has a production unit and an administration unit, then it makes sense to assess at the business unit level only instead of company level. The focus can be on the mass of materials relevant for a jacket collection.*

Examples of objectives for the assessment

- **Objective 1**: Comply with reporting requirements
- **Objective 2**: Minimize overproduction and waste creation
- **Objective 3**: Reduce environmental impacts of operations and processes

Company level
Definition

Company or organization, according to ISO 9000:2015,[58] refers to a person or group of people that has its own functions, with responsibilities, authorities and relationships to achieve its objectives.

Example: *If a company wants to measure its overall circularity and aggregate the overall data on circularity.*

Examples of objectives for the assessment

- **Objective 1**: Comply with reporting requirements such as CSRD
- **Objective 2**: Reduce environmental impacts of operations and processes
- **Objective 3**: Define a circular roadmap for the company
- **Objective 4**: Identify partners to drive circularity in company and industry

What is the timeframe?

Timeframe for SKU or product level

- → Recommended is the lifespan of the product
- → Snapshot between product at time A vs time B
- → Fiscal years are also possible for reporting needs

Timeframe for collection or facility level

- → We recommend following a fiscal year reporting timeframe (to support company-level reporting) or the production cycle

Timeframe for company level

- → We recommend following a fiscal year reporting timeframe

What do we include and exclude?

Most companies will find it challenging to obtain data for 100% of material flows. This means that they might not include some flows in the assessment or that they may have to use proxies and assumptions. The company is free to set these proxies, assumptions and excluded streams but must carefully document and fully disclose them if it intends to share the results. We recommend inclusions and exclusions to help CTI users scope the assessment in a credible and comparable manner.

SKU or product level — examples
Inclusion

- → Number of products this assessment is relevant for
- → Weight of materials used for the creation of final product (main materials and components)

Exclusion

- → Waste generated during the process and over-production
- → Water and energy data
- → Packaging

Collection or facility level — examples
Inclusion

- → All material inflows needed for a facility
- → Include processing aids and waste streams
- → Include water circularity indicators

Exclusion

- → Material flows and items from other facilities
- → Machinery used in process

Company level — examples
Inclusion

- → All material inflows needed for a company

Exclusion

- → N/A

CTI use case — VF

Founded in 1899, VF Corporation is one of the world's largest active-lifestyle companies, connecting people to the activities and experiences they cherish most through a portfolio of outdoor, active, workwear and streetwear brands including Vans, The North Face, Timberland, Napapijri and Dickies. The company's purpose is to power movements of sustainable and active lifestyles for the betterment of people and the planet. They connect this purpose with a relentless drive to succeed to create value for all stakeholders and use the company as a force for good.

The Napapijri Rainforest jacket is Napapijri's most beloved icon, so much so that many simply call it "the Napapijri jacket". VF measured the circularity of the Napapijri jacket at an **SKU or product level.**

Objectives

- Improve selection of fabrics and materials used
- Determine the importance of the design phase for a product
- Overview of GHG impact of the product
- Prioritize circular agenda at SKU or product level

Timeframe

- Comparison between an item in time A vs time B (snapshot time)

Inclusion/exclusion

- **Inclusion:** Material circularity mass of each (components of the jacket: Lining/padding/etc.) and material carbon footprint
- **Exclusion:** Packaging and scraps generated during production, as well as additional environmental indicators (water, energy, etc.).

Figure 10: Circular Transition Indicators (CTI) use case: Napapijri Rainforest Jacket

Step 2 – Select:

Select the indicators

Once the company has defined the objectives of the CTI assessment, it can proceed to the selection of indicators in line with the material topics for the fashion industry. We encourage the selection of specific indicators for the subsequent steps. Based on discussions with stakeholders from different positions in the value chain, we have determined that, due to their importance, some indicators for the sector should be mandatory. However, as data availability can be an issue for some indicators, specifically for the ones where most of the information lies outside of the company, CTI users can consider important indicators with low data availability as recommended.

For each step, the sector guidance provides recommendations on which indicators to select for each level of the assessment. The guidance defines which indicator is mandatory, recommended or optional for each level of the assessment. In line with this, "mandatory" refers to indicators that are mandatory for compliance with the CTI framework but not necessarily mandatory for reporting standards, such as the CSRD. Hence, for assessments focusing on other purposes, fashion companies have the liberty to select their relevant indicators.

1 ***Close the Loop***

A company's ability to close material loops sits at the heart of the CTI framework.

Figure 11: Closing resource loops

	Product	*Facilities*	*Corporate*
% material circularity	Mandatory	Mandatory	Mandatory
% water circularity	Recommended	Mandatory	Mandatory
% renewable energy	Optional	Recommended	Recommended

2 *Optimize the Loop*

These indicators illustrate how companies perform in lowering risks and maximizing high-value recovery beyond closing material loops.

Figure 12: Optimizing loops

	Product	*Facilities*	*Corporate*
% critical materials	Optional	Optional	Optional
% recovery type	Mandatory	Optional	Optional
Onsite water circulation	Optional	Recommended	Recommended
Actual lifetime	Recommended	Recommended	Optional

3 *Value the Loop*

This module links circular performance with financial performance. It helps with portfolio steering towards more circular products and services and to show decoupling of economic growth from linear resource use.

Figure 13: Valuing loops

	Product	*Facilities*	*Corporate*
Circular material productivity	Optional	Optional	Optional
CTI revenue	Optional	Optional	Optional

4 *Impact of the Loop*

This module helps companies prioritize circular strategies considering their impact on the company's sustainability targets.

CTI use case — VF

VF measured the material circularity of the Napapijri jacket at a SKU or product level as well as the **GHG impact of the raw materials used for production**.

Selected indicators

- → % material circularity
- → GHG impact

Excluded indicators

- → The company excluded all other indicators to keep the initial assessment accessible and easily manageable.

Figure 14: Impacting loops

	Product	*Facilities*	*Corporate*
GHG impact	Recommended	Recommended	Recommended
Nature impact	Recommended	Recommended	Recommended

Step 3 – Collect:

Identify sources and collect data

Data collection is likely to be the most labor-intensive part of the process. Some data points might be easy to obtain, while others will require collaboration with other departments internally or with external partners to gather the relevant data, particularly on inflow and actual recovery of outflow.

There are good practices that can support companies in this endeavor, which we include in this section, along with data to collect for each indicator.

Good practices for data collection

Identify the data source

For each data set, define the sources of the data needed for the CTI assessment and who is responsible for providing and maintaining it.

- → Who owns this data? Differentiate between internal sources (e.g., another department) and external sources (such as suppliers).
- → What level of confidence do we have in the data provided?
- → How was the data collected? For this it is important to differentiate between primary and secondary data.

Identify the data source

For each data set, assess the quality of the data by understanding the data collection process.

- → How accurate and how representative is the data provided?
- → What assumptions did the company make during the data gathering process? How do these affect the usability and applicability of the data?

Structure of the data

For each data set, clarify the structure needed and how to aggregate the different data, with the aim of making data management as efficient as possible, which will also make any necessary data corrections and further updates easier. Therefore, the company needs to structure the data using the relevant categories for inputs and outputs and the correct units for easy inclusion in the calculations.

Table 2: Structuring the data

Input	*Definition*	*Example*
Flow name	Name of the flow	Padding
Flow type	→ Material (e.g. fabric for fashion) → Component part → Product part → Component → Product → Packaging	Material
Critical material	If it is a critical material	0 (No)
Mass (kg)	Overall mass	10 kg
Non-virgin – renewable (circular) %	% of mass that is renewable and non-virgin	0%
Non-virgin – renewable (circular) %	% of mass that is not renewable and non-virgin	0%
Virgin – renewable (circular) %	% of mass that is renewable and virgin	50%
Virgin – non-renewable (linear) %	% of mass that is not renewable and virgin	50%
GHG material	If it is part of the GHG list from EcoInvent	N/A

Source: CircularIQ[59]

1 *Close the Loop*

→ **% material circularity**

→ **% water circularity**

→ **% renewable energy**

Circular inflow

% circular inflow (per material flow) - renewable

For product, facility and company level

- To be considered as renewable, the company should certify inflow according to established labels or standards. **Appendix I – Renewable certifications** provides a list of relevant sustainably sourced renewable certifications to consider if the inflow is sustainably sourced renewable or not.

  Example: *for a cotton T-shirt, if the cotton is certified according to Better Cotton standards then the company can consider the inflow as renewable.*

- If some inflows are issued from regenerative agricultural or farming practices, the company should include the relevant certification and should prioritize shifting to this type of inflow over sustainably managed ones.

  Example: *the company should indicate a Regenerative Organic Certified certification for the same cotton T-shirt.*

- The company should collect the mass of each inflow. At facility or business unit and company level, it is important to also include the mass of inflows that do not end up in the product, such as scraps, leftovers from production or chemicals.

  Example: *for the same T-shirt, at the SKU or product level, the mass of cotton inflow would be the amount needed to produce the T-shirt. At the product line, collection or facility level, where the T-shirt is produced, the company should consider the overall mass coming into the facility for the T-shirt (including scraps).*

- The company should prioritize more detailed and granular data when available, by the following order of preference (high to low) material > component part > product part > component > product.

  Example: *information on the fabric comprising the T-shirt is more valuable than the aggregated information at the SKU or product level.*

CTI use case — Bally

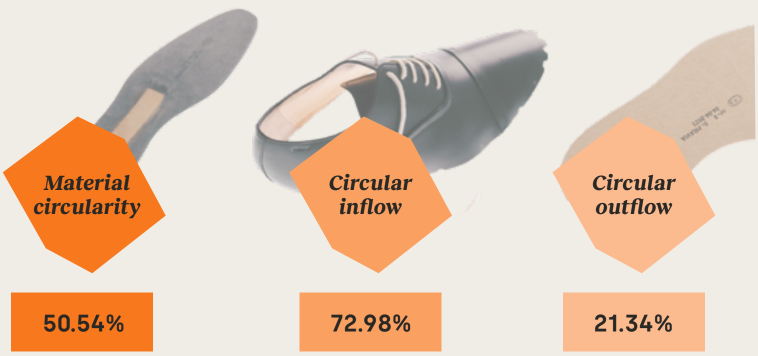
Bally is a Swiss luxury brand established in 1851, with a rich heritage in shoemaking. The company defines itself as "modern-day artisans, combining heritage with innovation to bring Swiss luxury and uncompromised beauty to the world."

In line with this statement, the company is working actively on improving its sustainability impact, starting by classifying its materials based on their level of sustainability. 95% of materials used by Bally are classified according to 10 macro categories that drive their transition towards the most sustainable materials.

As stated in its *Sustainability Report* 2022, the company has committed to continuing to enhance "our systems to be increasingly precise in detailing the components of our products and their weight. In addition, we are committed to improving our material sourcing."[60] In 2022, Bally defined its Preferred Material List to set up a scientific approach for designing sustainable products. It has identified seven evaluation levels – renewable, recycled, organic, regenerative, bio-based, low impact and conventional – and defined four levels of reference – preferred, good, discouraged and banned.

Since the beginning of 2023, Bally measures its capability to select materials according to the above and is making consistent progresses on reaching the target of having 90% of its materials classified as "preferred" or "good" by 2028.

Figure 15: **Circular Transition Indicators (CTI) use case: Scribe shoe**



% circular inflow (per material flow) - non-virgin

For product, facility and company level

- Companies should collect the mass of each inflow. At facility and company level, it is important to also include all the mass of inflows that do not go into products, such as scraps, leftovers from production or chemicals.

  Example: *for a jacket made of recycled polyester, the company should collect the mass of recycled polyester based on the amount needed to produce the jacket. For the facility where it produces the jacket, the company should consider the overall mass coming in the facility for the T-shirt.*

- As shown in the section on the technical and biological recovery cycles for fashion, the various recovery rates are considered circular, with the prioritization as follows: reduce > reuse > refurbish > recycle.

  Example: *reselling a bag is more valuable than recycling it. The Recovery type - % recovery by lifetime extension indicator in CTI tracks performance in higher value recovery strategies. (*CTI v4.0, page 59*).*

- Fashion companies should also differentiate between pre-consumer vs post-consumer inflows.

  Example: *in case of pre-consumer waste, third-party processed unavoidable waste and any unsold items that are returned from stores / warehouses / etc. can be considered circular inflow. Internal looping of scraps within one facility would not be considered as circular inflow as overproduction should rather be avoided and optimized from an efficiency and cost perspective.*

- If primary data from suppliers on recovery rate is not available (for example, data from a third party that cannot be shared or data that are not granular enough), the company can leverage secondary data. We include a recommendation for such data on the right per fabric or per country to support companies in this data process:

Table 3: Recommended secondary data, by material[61]

Material	*Example*
Polyester	~15% recycled worldwide
Wool	~6% recycled worldwide
Elastane	~3% recycled worldwide
Polyamide	~2% recycled worldwide
Cotton	~1% recycled worldwide
Down	~1% recycled worldwide
MMCF (synthetic cellulose fibers)	~0.5% recycled worldwide
Polypropylene	~0.2% recycled worldwide

Table 4: Recommended secondary data, by country

Country	*Recycling rate*
Global[62]	8.45%
Czech Republic[63]	24%
Germany[64]	26%
Denmark[65]	12%
France[66]	33.5%
Italy[67]	29%
Netherlands[68]	32%
Sweden[69]	12%
USA[70]	13%
China[71]	20%
India[72]	59%

Circular outflow

% circular outflow (per material flow) - potential recovery

For product, facility and company level

- The company should collect the mass of the part that can be potentially recovered compared to the overall mass of the product of each outflow. At facility and company level, it is important to also include all the mass of outflow that does not go into the product, such as scraps.

  Example: *for a pair of shoes where it is possible to remove and recycle the outside part, CTI requires comparing the mass of the outside part with respect to the mass of the overall shoe.*

Focus on technical cycle

As discussed in the section on circular indicators: potential recovery, we have identified selected design practices that companies can use to define the technical cycle. As a suggestion, we provide assessment and testing methods for each principle. We list the design principles by frequency of use within the industry:

Table 5: Design principles and testing methods

Design principles	*Description*	*Testing methods*
Design for durability	**Physical durability** → Long-lasting, strong and durable materials and fabrication.	Durability test (see indicators "actual lifetime")
	Emotional durability → Product level: Design products for use with care and for the long-term. → Company level: Market the brand to increase loyalty and emotional connections to products.	Durability test (see indicator "actual lifetime")
Circular design	**Chemicals** → Ban hazardous chemicals (see ZDHC) and restrict unnecessary use of all chemicals (see Textile Restricted Substances List and Cradle to Cradle Restricted Substances List for reference)	Chemical certification (see enabler "safe chemicals")
	Design products for disassembly, reusability, repair, remanufacturing and partial biodegradation → Modular design: Design apparel and footwears for easy disassembly for repair or recycling of components at end of their useful lives. → Mono-material composition: A product made up of a single type of fiber will require less processing for recovery than complex mixtures of fibers, dyes and finishing chemicals that are difficult to recycle at the end of their useful lives.	Mass components that are retrievable
	Design products to minimize waste creation in production → Minimize creation of scraps and leftovers. → Where waste is not reusable in the industry, ensure recyclability for other processes or industries.	Mass of waste created during production
Sustainable design	**Minimize use of resources** → Reduce use of chemicals during production and recycling. → Reduce water consumption needed for raw materials, processing, dyeing and finishing fabrics. → Reduce energy use and emissions and increase replacement of fossil fuels with renewable energy sources. → Reduce material consumption: design for efficient use of materials.	Volume of resource used compared to benchmark
	Production → Avoid overproduction of items through forecast accuracy and making decision as close to market as possible. → Reduce product variations and encourage timeless pieces.	Mass of items not sold through traditional channels
	Traceability → Improve up- and downstream value chain traceability through data (see traceability section).	Product data completeness and consumer access

Focus on biological cycle

As mentioned in the section on technical and biological cycles, the safe return of nutrients into the biological cycles through biodegradation or composting is not yet feasible at scale for the fashion sector, except for packaging. Companies in the fashion and textile value chain should refrain from communicating or reporting on the "biodegradability or compostability" of fashion products as this is challenging in practice and may mislead consumers. In the case of biodegradable or compostable packaging, we encourage companies to provide consumers with all necessary instructions to ensure they realize biodegradability/compostability in practice as per design.

% circular outflow (per material flow) - actual recovery

For SKU or product level

Companies can leverage the actual recovery rates from a selected list of countries if applicable (see **Step 3** – % circular inflow – recycling rate).

Example: *if the cotton recycling rate in France is 13%, then the company should consider 13% actual recovery for a T-shirt made of cotton and produced in France.*

For facility and company level

Companies can leverage the actual recovery from the above countries, unless there is overproduction or there are take-back systems in place:

- → **Prevent and reduce overproduction.** Companies can consider this in cases where they have important product amounts that they do not sell through traditional channels. For those cases, the company should still apply the actual recovery rate per country and flag any overproduction.
- → **Waste creation.** In cases where products end up as waste and the company has visibility over the end-of-life of those items. This can include, for example, filling for furniture, filling for cars, thermic isolates for houses, new fashion products, etc.
- → **Take-back system.** In cases where more than 5% of the production can return to the company and it can recover those products via the technical cycle.

Table 6: **Type of distribution channels in fashion**

Traditional	*Non-traditional*
→ Own retail stores → Outlets owned by brand → Online markets → Malls/warehouses → Resale of returned items in-store or online	→ Discount outlets → Clothing donations

% water circularity

For facility and company level

- **Water inflow:** collect the volume of water withdrawal (circular vs non-circular), the quality and the source of water and its vulnerability.
- **Water outflow:** collect the volume of water discharged (circular vs non-circular), the quality and the vulnerability of the recipient system where it is discharged.

In line with the above data points, gathering information on the quantity of water inflow and water discharge is usually within the scope of most information. Gathering data on the quality of the water source and water discharge is not always possible. In line with this, we suggest the following guidelines:

- **Best practice:** the most transparent way to gather data would be for companies to set up their own water treatment systems to assure complete transparency. As this is not always possible, the company can also consider the following elements.
  - **Industrial and municipal water:** in cases where companies are leveraging third-party sources for water consumption, we recommend contacting the water provider to ask for the overall water quality and risks.
  - **Secondary data:** when it is impossible to gather data from providers directly, the company can leverage the risks from the overall geography to provide some direction. They can use databases such as the World Bank Water Data.

% renewable energy

For facility and company level

- Renewable energy used (annual consumption) with respect to total energy used (annual consumption).
- We recommend certifications for renewable use. For example, companies can leverage I-REC certified renewable energy.

CTI use case — Sun Tekstil

Founded in 1987 in Türkiye, Sun Tekstil Sanayi ve Ticaret Anonim Sirketi manufactures, exports and trades weaving, knitwear, textile and apparel products. The company carries out 10% of its production operations in its facilities in the Torbali district of Izmir province and Manisa province and 90% with its suppliers. The company designs, manufactures and sells women's clothing collections for brands operating in the global ready-made clothing retail sector.

Water inflow

Sun Tekstil obtains 90% of its production from its stakeholders in the supply chain and can request the water quality data from their suppliers directly. Its headquarters, where the company carries out 4% of total production, is a shared building with its subsidiary Ekoten. To decrease the local water stress risks and to increase the water circularity rates Ekoten has implemented an advanced waste water treatment facility that can provide 95% water recovery.

Water outflow

Accessing data for Sun Tekstil on the water outflow proved to be challenging as the company provides the water back to the local watershed after the Ekoten's water treatment plant and it cannot always trace data back to the company's consumption. To increase traceability and to guarantee water quality upon discharge, Sun Tekstil and Ekoten implemented a new waste water treatment facility that can provide 95% water recovery.

Renewable energy

Sun Tekstil uses biomass for all its steam production for iron operations and purchases I-REC certificates for all its grid electricity consumption. This reduces approximately 30% of Scope 1 emissions and Market-based Scope 2 emissions to "0" tCO_2.

2 *Optimize the Loop*

→ % critical material

→ % recovery type

→ actual lifetime

→ onsite water circulation

% critical materials

For product, facility and company level

- → Select critical materials from existing public lists, such as those compiled by the **European Commission** or the **United States Geological Survey**.
- → Check specifically for vanadium, chromium, barium, lead, copper, cobalt, nickel, germanium, natural rubber, chrome, tin, gold, platinum, tantalum, tungsten and antimony.

Recovery type

For product, facility and company level

Within the Close the Loop module and the % material circularity indicator, the scoring for the recovery types for flows moving in the technical cycle is not different when excluding downcycling and energy recovery. This position is necessary as each strategy may need to take place at some time at some place in the value chain.

As explained in the section on the Circular Transition Indicators – Recovery type, companies should prioritize recovery strategies that maximize the value of the products. The aim is to identify from the strategies discussed those applied to the outflows:

- → Reuse
- → Refurbish
- → Repair
- → Recycle

As explored in the section on the technical and biological cycles in this report, biodegradability through composting in the biological cycle is not yet widely feasible for the vast majority of products in the fashion industry. Therefore, this guidance does not suggest reporting by using this recovery type for the fashion sector.

% onsite water circularity

For facility and company level

This indicator offers an internal-facing view focusing on internal facility circulation through water reuse and recycling.

- Required water volumes per process in the facility
- Required water quality level per process in the facility

Actual lifetime

For product

Actual lifetime will compare the lifetime of a product to the average lifetime of a product from the same category. Hence, companies should measure the lifetime of their products and determine a reference lifetime value of an "industry average" product, calculated using a methodology consistent with best practices. In line with this, the focus for fashion should include emotional durability, as well as physical durability.

- For **emotional durability**, we suggest looking at the time of requests for return or repair. For instance, if customers are still sending back their products after 10 years, it means that the product has high emotional durability. Further, customer loyalty (as a leading indicator that is measurable now) and satisfaction can be good indicators to identify emotional durability.
- For **physical durability**, we suggest following the Product Environmental Footprint Category Rules (PEFCR) testing methodology (still in draft) specifically for fashion products or to consider warranty duration. Tests could include: intrinsic quality, number of uses, repairability potential of products, warranty duration.

Reference literature can also provide the industry average, taking care to use the most up-to-date data to reflect the current state of the industry. For instance, in line with the product categories, PEFCR provides duration of services based on the number of uses. Those numbers can serve as an industry average.

To compare the two dimensions, it is important to respect consistency and thus to leverage similar testing methods.

CTI use case — Bally

In its *Sustainability Report 2022,*[73] Bally states:

"We usually repair Scribe shoes that are, on average, five to eight years old. The age of the shoes we receive varies significantly according to the client's use and care, as well as to the material of the sole, with leather soles tending to have longer lifecycles than rubber. However, we are proud to share that in 2022, 28% of Scribe renewals were made on shoes produced at least 10 years ago, of which 6% were on shoes produced as long as 14 years ago."

Bally gathers data on its shoes to build a quantitative, fact-based understanding of their durability. Through repair services, Bally can gather data on the quality of the shoes and their average duration. In repairing the shoe, the company usually replaces the sole, the footbed and some other minor portions. It refurbishes and treats the rest of the components to increase their durability so as to ensure and to reinforce their aesthetic features (polishing and surface treatments for instance are completely remade).

3 *Value the Loop*

→ **circular material productivity**

→ **CTI revenue**

Circular material productivity

For product, facility and company level

- Revenue of assessed part of the business

CTI revenue

For product, facility and company level

- Revenue per product (group)
- Level of circularity per product or product group (based on the Close the Loop indicators)

4 *Impact of the Loop*

→ GHG impact

→ nature impact

GHG impact

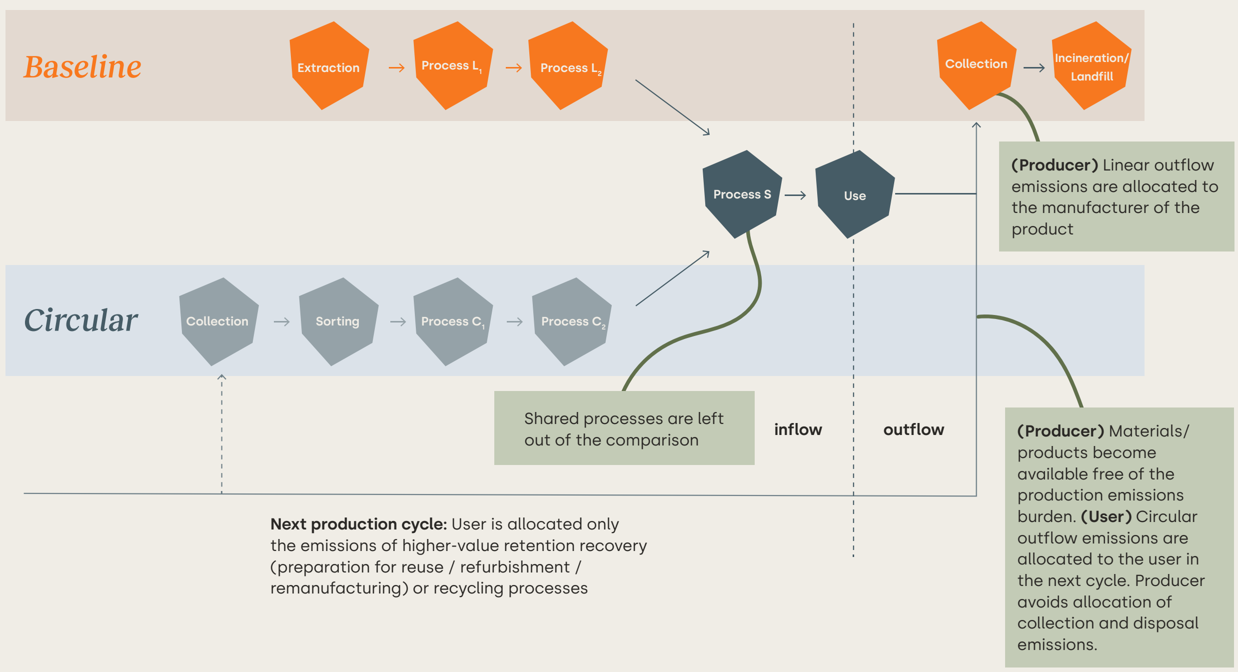
For product, facility and company level

GHG impact will offer visibility over the change in GHG emissions from applying a circular model compared to a linear model. Figure 13, from CTI v4.0, can support in visualizing this relationship.

The aim of the GHG impact indicator is to quantify the change in GHG emissions by shifting from a linear model to a circular one. This considers the inflow by leveraging materials that are circular compared to linear ones. For example, using recycled instead of virgin polyester. Regarding the outflow, the aim is to understand the GHG emissions avoided by transforming the end of life of a product from linear practices such as landfilling to circular practices such as reusing garments.

In line with Figure 16, the company should collect data at both the inflow level and the outflow level. Hence, for the two dimensions, the company should consider the following data points.

Figure 16: Setting the system boundaries of baseline and circular material flows



Inflow

- All data points for the % circular inflow indicator
- CO_2-eq/kg sourced virgin materials
- CO_2-eq/kg recycled content or reused product/material

By gathering the data points above, allows to compare the amount of GHG emissions avoided between using virgin materials compared to using recycled or reused material.

Outflow

- All data points for the % circular outflow indicator
- CO_2-eq/kg preparation for reuse
- CO_2-eq/kg recycling process
- CO_2-eq/kg incineration (with/without energy recovery)
- CO_2-eq/kg landfill

By gathering the data points above, allows to compare the amount of GHG emissions avoided between landfilling or burning fashion products compared to reusing or recycling them, while considering all the processes required for this to happen.

To support the collection of this data, companies can leverage emissions factors.

CTI use case — VF

For the Napapijri use case, the aim was to quantify the GHG emissions avoided by using recycled compared to virgin polyester. The focus was thus on quantifying the GHG impact of the inflow as this was where the change in design was taking place.

To support this exercise, VF leveraged emissions factors from third-party sources to quantify, for the weight of the polyester provided, how much more climate-friendly polyester it recycled.

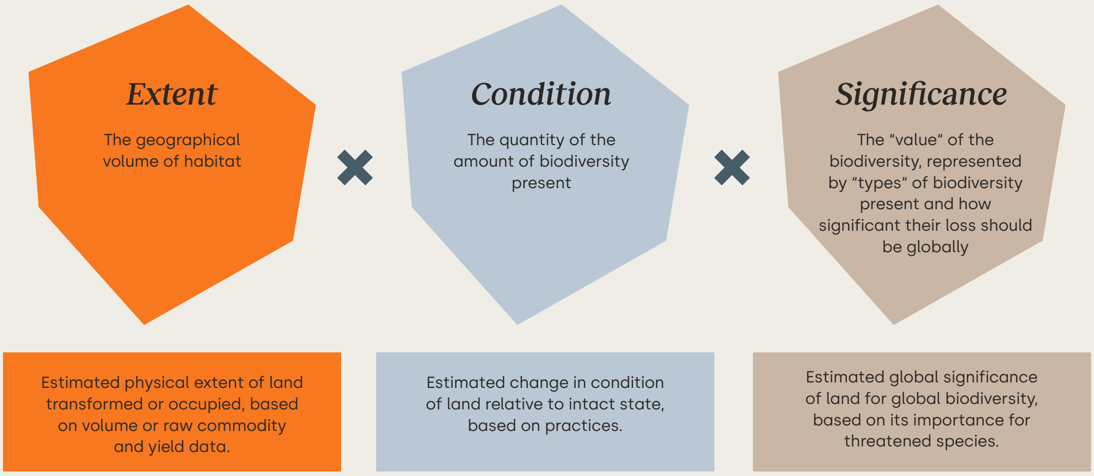
Nature impact

For product, facility and company level

The nature impact indicator requires an overview of incoming materials and products, a necessary step to calculate % circular inflow, measured in the Close the Loop module. It also requires additional data on land-use type, land-use intensity, and sourcing location. This allows for the estimation of the extent, condition and significance associated with a company's inflow. Scores can be summed across materials for a constituent product or entire value chain.

In general, each dimension requires the primary data shown in Figure 17.

Figure 17: Key components of land-use impacts to calculate impact on nature



CTI use case — VF

VF performed a nature impact – land-use analysis of its brands' various t-shirts to identify materials with the most productive land use and the least impact on biodiversity. The scope of the assessment considered several types of cotton and wool used to produce T-shirts with different farming practices: conventional (or linear), regenerative, sustainably managed and organic.

To start the assessment, it collected primary data on the materials and land management practices used for each T-shirt, and the region or country of sourcing (e.g., a T-shirt made of 100% regenerative wool from New Zealand, and a T-shirt made from 100% regenerative cotton from the USA).

- **Extent:** VF conducted research to determine the productivity of farming practices (or the extent of land transformed or occupied) for the various materials used. This data, when calculated, falls into one of 8 buckets defining the extent of land use from negligible to extremely large. It made an important assumption to keep the number of T-shirts produced for all exercise comparable to ensure an accurate comparison between materials.
- **Condition:** The Mean Species Abundance (MSA), a secondary source, indicates the amount of biodiversity present in the geographic area of farming. This score will also fall into one of 6 buckets varying between very small and very large biodiversity.
- **Significance:** This score represents the "value" of the biodiversity and how significant their loss would be globally (e.g., if biodiversity levels are low, the significance of biodiversity loss would be lower than that in a high biodiverse region). This score is also based on secondary data, namely the STAR threat-abatement score (STAR-t).

Overall, primary data is easily accessible within most companies and completed with reliable sources and scoring frameworks.

Estimated extent (km2)	~0	0-<0.1	0.1-<1	1-<10	10<100	100<1,000	1,000<10,000	>10,000
Category description	Negligible	Very small	Small	Small-medium	Medium-large	Large	Very large	Extremely large
Score for extent dimension (E)	0.01	0.1	1	10	100	1000	10000	Use actual area estimate

Estimated condition change (on 0-1 scale, based on MSA)	0-<0.01	0.01-<0.1	1-<0.3	0.3-<0.5	0.5<0.7	>0.7-1
Category description	Very small	Small	Small-medium	Medium-large	Large	Very large
Score for condition dimension (C)	0.01	0.1	0.3	0.5	0.7	1

Estimated significance (80th percentile STAR-t score)	0-<10	10<100	100<1,000	1,000<10,000	10,000<1000,000
Category description	Low	Moderate	High	Very high	Highest
Score for condition dimension (C)	1	2	3	4	5

Step 4 – Calculate:

Perform the calculations

This section presents the different formulas used to calculate indicators. Regarding some data, the outcome is already part of the framework and companies can perform the calculations solely based on the secondary data selected. Therefore, we differentiate in this section between primary and secondary data:

- **Primary.** Primary data are data that the company can input directly, either from its own operations or from its suppliers and ecosystem. Those have a higher level of quality as they reflect real operations and the company should prioritize them over the use of secondary data.
- **Secondary.** In case primary data is not accessible, we provide data sets for some indicators, such as recovery rates.

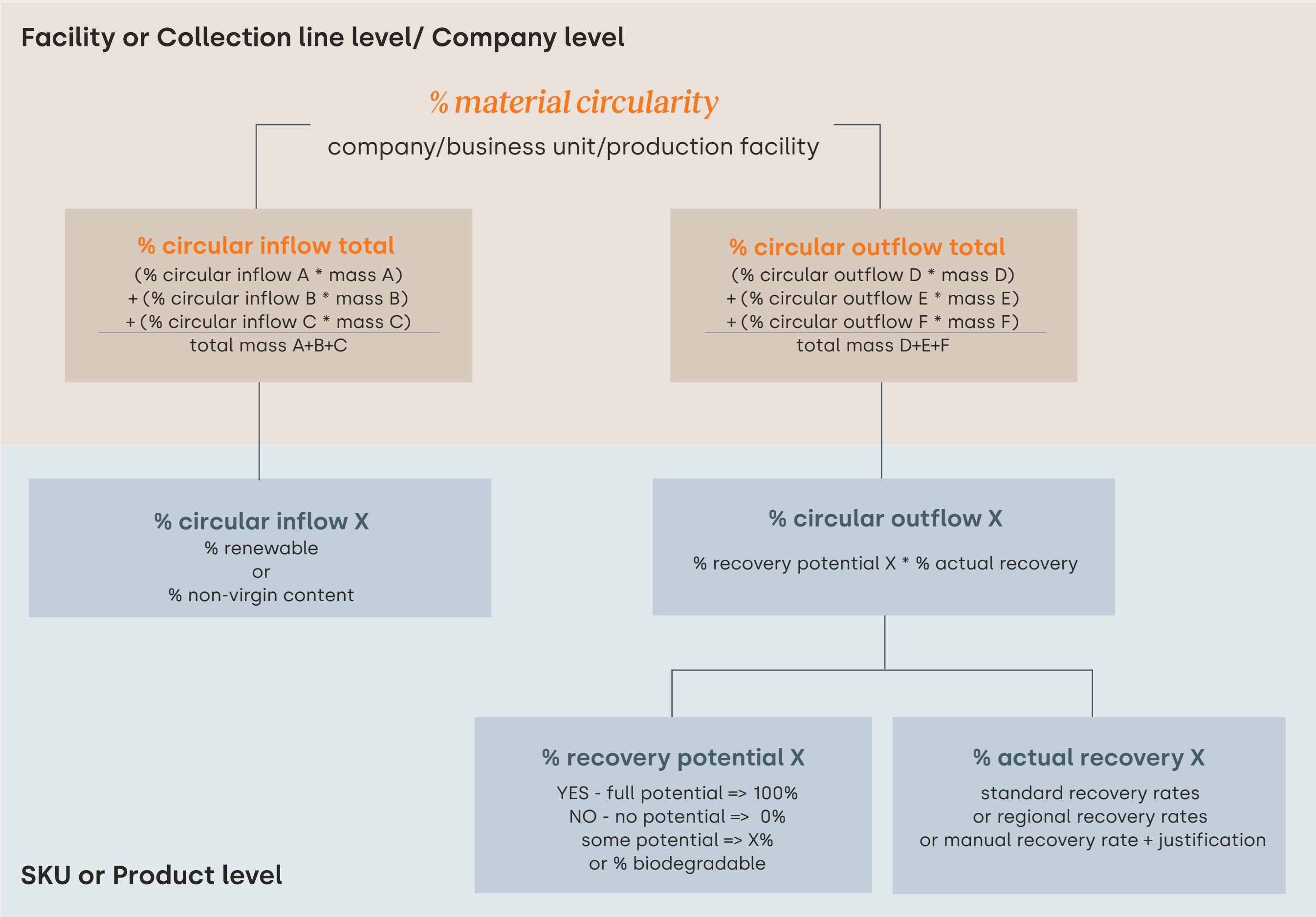
1 *Close the Loop*

- → **% material circularity**
- → **% water circularity**
- → **% renewable energy**

CTI is a methodology based on flexible system boundaries, meaning that the methodology is applicable at the product, facility and company level. In line with this, it is important to understand how to move from one level to another. Figure 18 illustrates these variations in levels.

For each of the four material circularity indicators, the next steps will clarify how to calculate them at the various levels or how to connect them to the needs of the fashion sector.

Figure 18: Flexible system boundaries CTI



Circular inflow

% circular inflow (per material flow) - renewable

For SKU or product level

This measurement requires primary data on renewable or regenerative inflows. Hence, the company needs to measure the following aspects:

Renewable inflow – circular

For all inflows certified renewable, the following formula applies:

→ % circular inflow R = % Renewable content

Regenerative inflow – circular

For all inflows certified regenerative, the following formula applies:

→ % circular inflow R = % Regenerative content

Non-renewable – linear

For all inflows not certified renewable, the following formula applies:

→ % circular inflow NR = 0%

% circular inflow (per material flow) - non-virgin

For SKU or product level

The company should use primary data on non-virgin (recycled or reused) flows for the measurement. Hence, the company needs to measure the following aspects:

Virgin/primary flow – linear

For all inflows where the material has not been used before, the following formula applies:

→ % circular inflow V = 0%

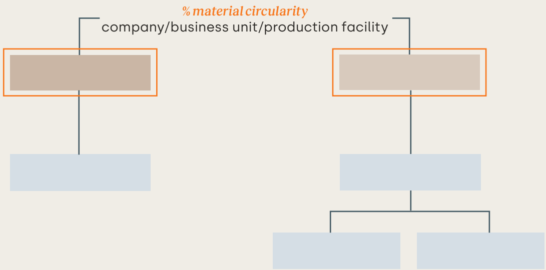
Non-virgin flow – circular

For all inflows where the material has been (partially) used before, for example via reuse or refurbish, the following formula applies:

→ % circular inflow NV = % Recovered content

In cases where primary data are not available for measurement, companies can leverage secondary data for the calculations as shown in **Step 3**.

Once the company has calculated both inflows levels at the SKU or product level, it is possible to aggregate them to have a view at the facility/ collection unit or company level. In line with this, the company can apply the following formula:

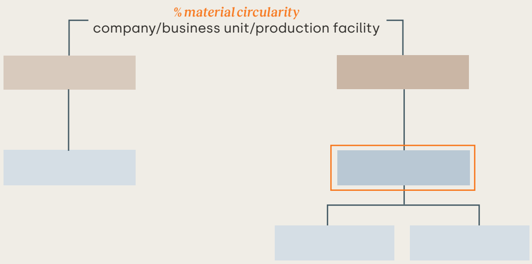


% circular inflow total

$$\frac{[(\text{% circular inflow A} * \text{mass A}) + (\text{% circular inflow B} * \text{mass B}) + (\text{% circular inflow C} * \text{mass C})]}{\text{total mass of all inflows (A + B + C)}}$$

Circular outflow

% circular outflow reflects the combined effectiveness of the company to increase potential recovery and to maximize actual recovery of its products. The company can apply the following formula to reflect this combined perspective:



% circular outflow X

% recovery potential X * % actual recovery X

It is important to understand how both indicators are calculated, which we present in the next section:

% circular outflow (per material flow) - potential recovery

For SKU or product level

The measurement requires primary data on potential recovery rate. Hence, the company needs to measure the following aspects:

No recovery possible – linear

For all outflows, where the design does not enable any recovery potential, the following formula applies:

→ % circular outflow NR = 0%

Partial recovery possible – partially circular

For all outflows, where the design enables some recovery potential, the following formula applies:

→ % circular outflow NR = % Recovery potential

Full recovery possible – circular

For all outflows, where the design enables full recovery potential, the following formula applies:

→ % circular outflow R = 100%

To support the selection of the right recovery potential, we reviewed the following design principles. The aim is to provide some guidance to indicate a possible recovery rate in line with each design principle. The potential recovery rates are guidelines to better understand the weight of each design practice. They can be added together.

Table 7: Review of design principles

Design principles	*Description*	*Testing methods*	*Potential recovery*
Design for durability	**Physical durability** → Long-lasting, strong and durable materials and fabrication.	Durability test (see indicators "actual lifetime")	% increase in durability
	Emotional durability → Product level: Design products for use with care and for the long-term. → Company level: Market the brand to increase loyalty and emotional connections to products.	Durability test (see indicator "actual lifetime")	% increase in durability
Circular design	**Chemicals** → Ban hazardous chemicals (see ZDHC) and restrict unnecessary use of all chemicals (see Textile Restricted Substances List and Cradle to Cradle Restricted Substances List for reference)	Chemical certification (see enabler "safe chemicals")	10%
	Design products for disassembly, reusability, repair, remanufacturing and partial biodegradation → Modular design: Design apparel and footwears for easy disassembly for repair or recycling of components at end of their useful lives. → Mono-material composition: A product made up of a single type of fiber will require less processing for recovery than complex mixtures of fibers, dyes and finishing chemicals that are difficult to recycle at the end of their useful lives.	Mass components that are retrievable	50%
	Design products to minimize waste creation in production → Minimize creation of scraps and leftovers. → Where waste is not reusable in the industry, ensure recyclability for other processes or industries.	Mass of waste created during production	10%
Sustainable design	**Minimize use of resources** → Reduce use of chemicals during production and recycling. → Reduce water consumption needed for raw materials, processing, dyeing and finishing fabrics. → Reduce energy use and emissions and increase replacement of fossil fuels with renewable energy sources. → Reduce material consumption: design for efficient use of materials.	Volume of resource used compared to benchmark	10%
	Production → Avoid overproduction of items through forecast accuracy and making decision as close to market as possible. → Reduce product variations and encourage timeless pieces.	Mass of items not sold through traditional channels	50%
	Traceability → Improve up- and downstream value chain traceability through data (see traceability section).	Product data completeness and consumer access	10%

CTI use case — Sun Tekstil

To enable circular design, Sun Tekstil focused on understanding the product-as-a-service strategy and developed processes from the design of products to the end of their life. The aim was to design high-quality, recyclable, traceable, durable products within the scope of eco-design criteria. As a result, in 2022 Sun Tekstil produced 64% of its products from sustainable raw materials. Furthermore, the company also minimized the production of physical samples by using 3D software.

After leveraging the CTI framework, which demonstrated the recovery potential, the company collaborated with a start-up called Fazla to support industrial symbiosis. Fazla ensures the traceability of the waste streams after onsite sorting with the online system created, allowing for the continuous monitoring of the waste created, the sector and the processes applied to the waste. This has supported Sun Tekstil in developing an advanced matrix to identify development routes that will add more value to the waste and ensure it is ready for processing by other industries.

% circular outflow (per material flow) - actual recovery

For SKU or product level

We recommend using primary data on actual recovery for the measurement. Since many outflows are possible for a company, for each outflow we present possible ways to measure it.

Waste creation

For all outflows that can be considered as waste or as left over from the production, where the company has control, the company should add waste to the measurement and apply the following formula:

- → % circular outflow A = % Recovery from new stream

Example: *the company could fully discard the leftovers from shoe production and would thus have an actual recovery of 0%. If it uses the same leftovers to create a product, such as key chain holders, then the actual recovery used is the recycling rate of fashion products in the country.*

Prevent and reduce overproduction

For all outflows that can be considered as overproduction, items and products that are sold via non-traditional channels, where the company has control, the company should add the flow to the measurement and apply the following formula:

- → % circular outflow A = % Recovery from new stream

Example: *if a company produces too many T-shirts for a season and it needs to sell the leftovers to an outlet in bulk, this would be considered as overproduction. In this case, the company should flag the overproduction and apply the recycling rate of the location of the outlet. In cases where there is no available recycling rate for the country, actual recovery should be 0%.*

Take-back system

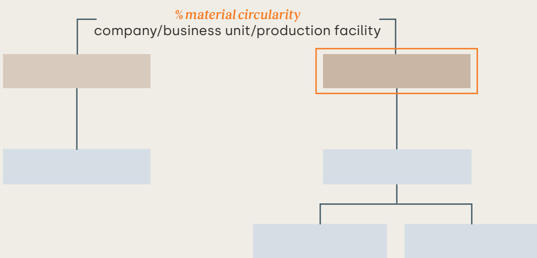
For all outflows that can be considered as part of a take-back scheme, where the company has control, the company should add the flow to the measurement and apply the following formula, with the condition that it is above 5%:

- → % circular outflow A = % recovery from new stream

Example: *if a company establishes a take-back system where consumers bring back 3% of its products, this is not material enough to be considered and the company should apply the recycling rate of the country to externally report actual recovery performance. In cases where it is above 5%, the company can use the outcomes of its recovery rate. So, if a company receives 25% back and reuses 50% of those for other products while burning the rest, then it should use the actual recovery rate of 12.5%.*

In cases where primary data are not available for measurement, companies can leverage secondary data for the calculations, as shown in **Step 3**.

Once the company has calculated both outflow levels at the SKU or product level, it is possible to aggregate them to have a view at the facility/collection or company level. The company can apply the following formula to reflect this aggregated level:



% circular ouflow total

$$\frac{[(\%\ \text{circular outflow A} * \text{mass A}) + (\%\ \text{circular outflow B} * \text{mass B}) + (\%\ \text{circular outlow C} * \text{mass C})]}{\text{total mass of all outflows } (A + B + C)}$$

% water circularity

For facility and company level

The measurement requires primary data on water circularity rate. Hence, the company needs to measure the following aspects:

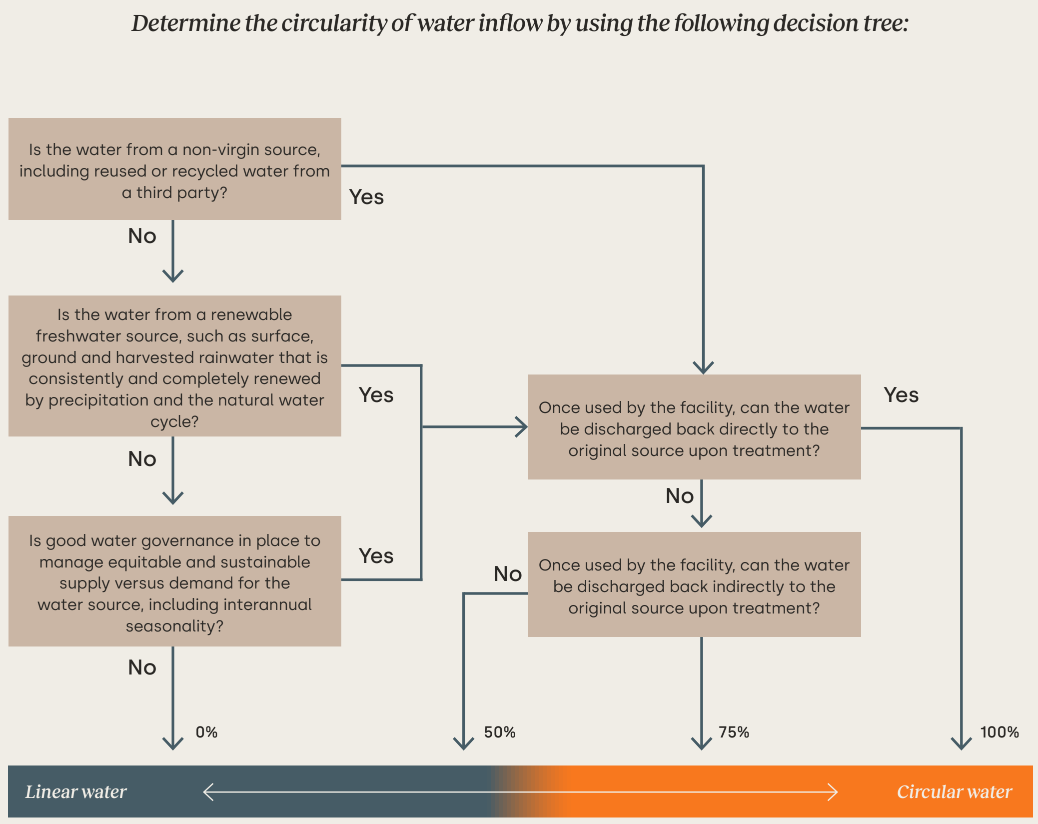
Water inflow

For all water inflows, the following formula applies to define the level of water circularity:

$$\frac{\text{(Q total circular water withdrawal}}{\text{Q total water withdrawal)}} \times 100$$

To support companies in defining the level of water circularity for inflow, CTI proposes the following schemas:

Figure 19: Decision tree to determine the circularity of water inflow



Water outflow

For all water inflows, the following formula applies to define the level of water circularity:

$$\frac{\text{(Q total circular water discharge}}{\text{Q total water withdrawal)}} \times 100$$

Following the basic principle for water circularity, circular outflow has **three criteria:**

- Water outflow is circular if other sites (offsite) recycle it; this includes drinking water supply to communities in the basin.
- Discharged water is circular if it returns to the local watershed at a quality that makes it readily available for environmental, social, agricultural or industrial purposes.
- Product water is circular if returned to the local watershed at a quality that makes it readily available for environmental, social, agricultural or industrial purposes.

CTI use case — Sun Tekstil

Water inflow

Sun Tekstil obtains 90% of its production from its stakeholders in the supply chain and can request the water quality data from its suppliers. Sun Tekstil carries out 4% of total production activities at its headquarters in a shared building with its subsidiary Ekoten. To decrease the local water stress risks and to increase the water circularity rates, Ekoten has implemented an advanced waste water treatment facility that can provide 95% water recovery.

Water outflow

To increase traceability and to guarantee water quality upon discharge, Sun Tekstil and Ekoten have invested in a new waste water treatment facility that can provide 95% water recovery.

% renewable energy

For facility and company level

The measurement requires primary data on renewable energy. Hence, the company needs to measure the following aspects:

Renewable energy

For all energy flows, the following formula applies to define the level of renewable energy:

$$\frac{\text{[Renewable energy (annual consumption)}}{\text{total energy (annual consumption)]}} \times 100$$

2 *Optimize the Loop*

- → **% critical material**
- → **% recovery type**
- → **actual lifetime**
- → **onsite water circulation**

% critical material

For product, facility and company level

The measurement requires primary data on critical material. Hence, the company needs to measure the following aspects:

% critical materials

For all critical materials, the following formula applies to define the percentage of critical material:

$$\frac{\text{(Mass of inflow defined as critical}}{\text{total mass of linear inflow)}} \times 100$$

% recovery type

For product, facility and company level

The measurement requires primary data on % recovery type. Hence, the company needs to identify what happens to its outflow in line with actual recovery.

% recovery type

For this indicator, it is thus important to understand for the various outflows provided (repair, reuse, refurbish, recycle) and what happens to the outflow.

% on-site water circularity

For facility and company level

The measurement requires primary data for on-site water circularity. Hence, the company needs to measure the following aspects:

Onsite water circularity

For all onsite water flows, the following formula applies to define the percentage of onsite water circularity:

$$\frac{\text{[(Q water use - Q total water withdrawal)}}{\text{Q total water withdrawal]}} + 1$$

Actual lifetime

For product, facility and company level

The measurement requires primary data on actual lifetime. Companies can complete these with secondary data for the average product's actual lifetime. Hence, the company needs to measure the following aspects:

Product actual lifetime

- For this indicator, companies need to understand the actual lifetime of their product. In line with the considerations outlined in **Step 3**, it is important to separate emotional durability and physical durability and select the appropriate test based on the category.

Average product actual lifetime

- For this indicator, companies need to understand the average lifetime of a product in a similar product category in the PEFCR as the product tested.

Actual Lifetime Indicator

For actual life, the following formula applies to define it:

$$\frac{\text{Product actual lifetime}}{\text{Average product actual lifetime}}$$

CTI use case — Bally

As stated above, Bally receives shoes for repairs around 5 to 10 years later and sometimes up to 14 years. Based on data gathered through its repair services, Bally can access data points indicating that clients can use some of its products for up to 14 years when provided with the right level of care and maintenance.

Those data points show that Bally has designed its shoes with durability at its core. Furthermore, establishing repair services enables the fixing and maintaining of the shoes for an even longer period of use. Finally, by establishing a strong emotionally durability case for its shoes, Bally has managed to encourage its customers to send back their shoes for repair.

Those circular practices indicate that Bally has produced shoes that are more durable than those traditionally found on the market. There are currently few scientific sources that help understand the actual life span of leather shoes. However, according to leather manufacturers, the answer should be a couple of years, depending mostly on the care and quality of leather.[74, 75] These estimates show that the company produces shoes that can last longer than others commonly found on the market.

3 *Value the Loop*

→ **circular material productivity**

→ **CTI revenue**

Circular material productivity

For product, facility and company level

The measurement requires primary data on circular material productivity. Hence, the company needs to measure the following aspects:

Circular material productivity

For this indicator, the following formula applies to define it:

$$\frac{\text{Revenue}}{\text{total mass of linear inflow}}$$

CTI revenue

For SKU or product level

The measurement requires primary data on CTI revenue. Hence, the company needs to measure the following aspects:

CTI revenue

For this indicator, the following formula applies to define it:

$$\frac{(\text{\% circular inflow} + \text{\% circular outflow})}{2} \times \text{revenue}$$

For facility and company level

CTI revenue

For this indicator, the following formula applies to define it:

CTI Revenue Product A
+ CTI Revenue Product B
+ ....

4 *Impact of the Loop*

- → GHG impact
- → nature impact

GHG impact

For product, facility and company level

Inflow

We recommend using primary data for the measurement whenever possible. Companies should analyze the information derived from the Impact of the Loop module considering the % material circularity indicator.

The result of the calculation is the amount of GHG emissions the company can save if the materials go from the current % recycled content to increased % recycled content. **The following formula should be applied:**

$$(M_t \text{ x } GHG_r) - (M_t \text{ x } GHG_r) - (M_t \text{ x } GHG_r)$$

Or the formula for the percentual savings:

$$\frac{(M_t \text{ x } GHG_r) - [(M_t \text{ x } GHG_r) + (M_v \text{ x } GHG_v)]}{(M_t \text{ x } GHG_r) - (M_t \text{ x } GHG_v)} \text{ x100}$$

- → **Mt =** total mass material
- → **GHG_r =** emission factor of the recovery methods ($kgCO_2$ / kg)
- → **M_r =** mass recovered material used (either via preparation for reuse or recycling)
- → **GHG_v =** emission factor of the virgin material ($kgCO_2$ / kg)
- → **M_v =** mass virgin material used

Outflow

We recommend the use of primary data for the measurement. Companies should analyze the information derived from the Impact of the Loop module considering the % material circularity.

For the outflow, the results of the calculation are the amount of GHG emissions the company can save if the materials go from the current % of recovery to 100% recovery via recycling, remanufacturing or reuse. **The following formula should be applied:**

$$(M_t \text{ x } GHG_{xl}) - (M_t \text{ x } GHG_{xl})$$

Or the formula for the relative savings:

$$\frac{(M_{xr} \text{ x } GHG_{xl}) - (M_t \text{ x } GHG_r)}{(M_t \text{ x } GHG_{xl}) \ GHG_r)} \text{ x100}$$

- → **M_t =** total mass material
- → **GHG_{xl} =** emission factor of the linear recovery method: incineration, landfill
- → **Mxr =** mass to be recovered outflow
- → **GHG_{xr} =** emission factor of the mass to be recovered = 0 kg CO/kg
- → **M_{xl} =** mass linear outflow

CTI use case — VF

For the Napapijri use case, the aim was to quantify the GHG emissions avoided by using recycled compared to virgin polyester.

Compared to a baseline with 0% recycling polyester, using recycled polyester would enable VF to reduce GHG emissions by 21% when using 50% recycled polyester and to reduce them by 86% when using 100% recycled polyester.

Scenario modeling is hence possible with this indicator to support decision-making in line with decarbonization of the operations.

Figure 20: Circular Transition Indicators (CTI) use case: Napapijri Rainforest Jacket

Nature impact

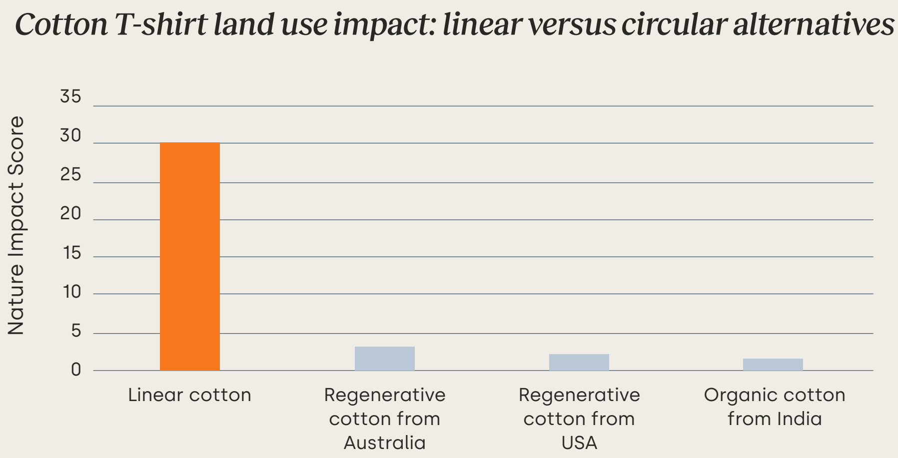
CTI use case — VF

Cotton

Multiplying the three dimensions above for each type of cotton reveals impact on land use and land-use change for linear cotton from India, regenerative cotton from Australia, regenerative cotton from the USA and organic cotton from India. The results show that circular alternatives allowed for a reduction between 91% and 95% compared to linear cotton. Several circular strategies can be applied to reduce land use impacts of T-shirts. Organic and regenerative practices have the potential to achieve higher productivity and therefore reducing the amount of land needed to produce the same amount of cotton. In addition, the land is used in a more sustainable way, maintaining a higher degree of endemic species on the land by reducing or eliminating the use of chemical fertilizers and pesticides. Finally, circular alternatives may consciously source cotton from areas that are less significant to global biodiversity.

It is essential to acknowledge potential limitations in the accuracy of these results as secondary data sources have been used.

Figure 21: Cotton T-shirt land use impact: linear versus circular alternatives



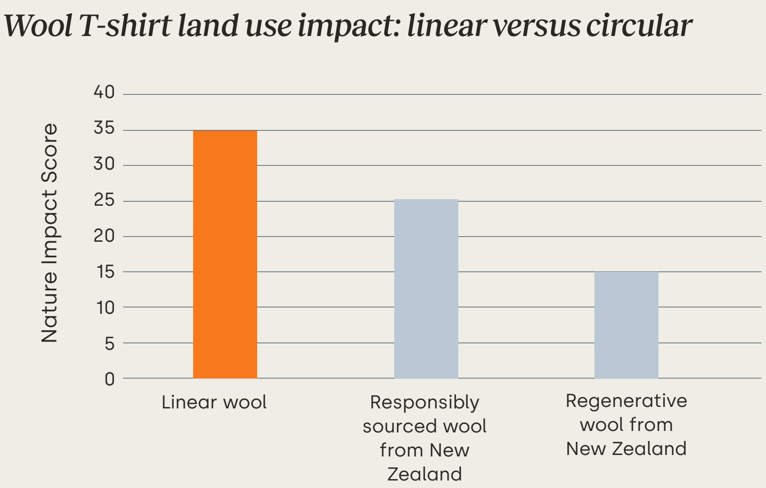
CTI use case — VF

Wool

VF also made the calculation for wool T-shirts, comparing conventional wool from Australia, responsibly sourced wool from New Zealand and regenerative wool from New Zealand. The regenerative wool scored 57% better than conventional wool, followed by the sustainably managed wool T-shirt with a 28% reduction in impact. These score differences are largely due to conventional wool's intensive pasture need and high stock density compared to sustainably managed and regenerative wool that consider native species and lower stock density for land.

It is essential to acknowledge potential limitations in the accuracy of these results as secondary data sources have been used.

Figure 22: Wool T-shirt land use impact: linear versus circular alternatives



Step 5 – Analyze:

Interpret results

This section focuses on interpreting the results for decision-making. Companies should involve the relevant decision-makers in this part of the process. The results from the CTI calculation provide the quantitative foundation for identifying, prioritizing and implementing circular initiatives.

Current performance and performance over time

Current performance

We developed the CTI fashion sector guidance for wide applicability across companies, industries and value chains. As performance is likely to vary substantially depending on the company's characteristics, CTI does not subjectively judge what "bad" and "good" performance is. **CTI empowers companies to study their own potential for improvement by examining the percentage of their business still considered linear.** Analyzing the underlying indicators is relevant to understanding what is necessary to increase the level of circularity.

Performance over time

The most valuable insights might come from tracking performance over time. **A company can compare progress to any time-bound goals, objectives or targets that it has formulated.** If performance does not meet expectations, the company may further analyze the underlying indicators and parameters that influence the outcomes.

To help companies understand possible circular pathways to help them contextualize their results, we provide examples of circular strategies for each indicator.

1 *Close the Loop*

- → **% material circularity**
- → **% water circularity**
- → **% renewable energy**

Material circularity

Non-virgin inflow

Possible strategy: Companies can increase non-virgin (recycled or reused) inflow by sourcing reused items, textile waste, scraps, cut-offs and damaged products. These strategies will help in reducing the overall waste and resources needed to manufacture new products.

Examples:

- → The North Face from VF has launched the Renewed Collection made from returned, damaged or defective items.[76]
- → Another example is Vinted, a platform for the resale of fashion items that enables reuse inflows to take place.[77]

Renewable inflow

Possible strategy: Companies can increase circular inflow by replacing virgin fossil fuel-based synthetic materials and processing input with renewable input (sustainably and regeneratively managed resources) inflows. It would be preferable that those materials should be from sustainably sourced renewable inputs, rather than virgin fossil fuels or natural materials from extractive agriculture systems.

Examples:

- → Pangaia uses food waste to dye its clothes. This strategy looks beyond waste created post-manufacturing of textiles and includes the whole value chain.[78]
- → Patagonia aims to only use renewable or recycled inflow by 2025, knowing most of its emissions come from virgin materials, thereby improving several indicators simultaneously.[79]

Recovery potential

Possible strategy: Design products and components for simplified disassembly, repair, reuse and remanufacturing by using mono-material composition and modular design. Additionally, data transparency on product composition simplifies remanufacturing and recycling by communicating the best strategy for remanufacturing and recycling.

Examples:

- → Helly Hansen has launched the Mono Material Line, allowing garment-to-garment recycling.[80]
- → Everlane describes the exact material composition of all aspects of items in addition to the certifications of each material and the location of manufacturing. Having this information online increases the chances of recovery if the customer removes the informative label from the item (which is often the case).[81]

Actual recovery - Business model

Possible strategy: Increasing the recovery of products can become a financially viable business model if the company deploys a renting or take-back business model in addition to the existing core business model to increase the number of uses per item. Renting can open possibilities to new customer segments and ensure the maintenance and care of products according to specifications.

Examples:

- → REI has expanded its offering with a renting business model for outdoor and sporting gear, which means more potential customers are engaged.[82]
- → Patagonia offers repairs services to ensure that clients can maintain clothes in a usable state as long as possible.[83]

Actual recovery – Collaboration

Possible strategy: Recovery requires a great deal of collaboration among retailers, collection partners, sorters and recyclers. The current network and infrastructure for textile collectors comprises goodwill companies and others. These companies struggle to find sorters, recyclers and retailers to resell or donate. Through collaboration, the industry can take advantage of existing textile collectors and recyclers to scale up and improve existing infrastructure to effectively reuse or recycle products.

Example:

→ Helpsy, the largest clothing collector in the Northeast US, with over 2,200 collection containers, has partnered with companies such as Levi's, Patagonia and Reformation, as well as municipalities, to collect and recycle clothing for resale.[84]

Water circularity

Possible strategy: The sector can improve water circularity by managing demand, reducing overall water use, with a focus on reduction of linear water in- and outflows, designing with materials with lower water demand (from crop to production), and substituting linear water in- and outflows with circular water in- and outflows.

Examples:

→ Sun Tekstil has invested in an advanced water treatment plant that will provide 95% water recovery.[85] For more information, refer to the use case from Sun Tekstil in Step 3.

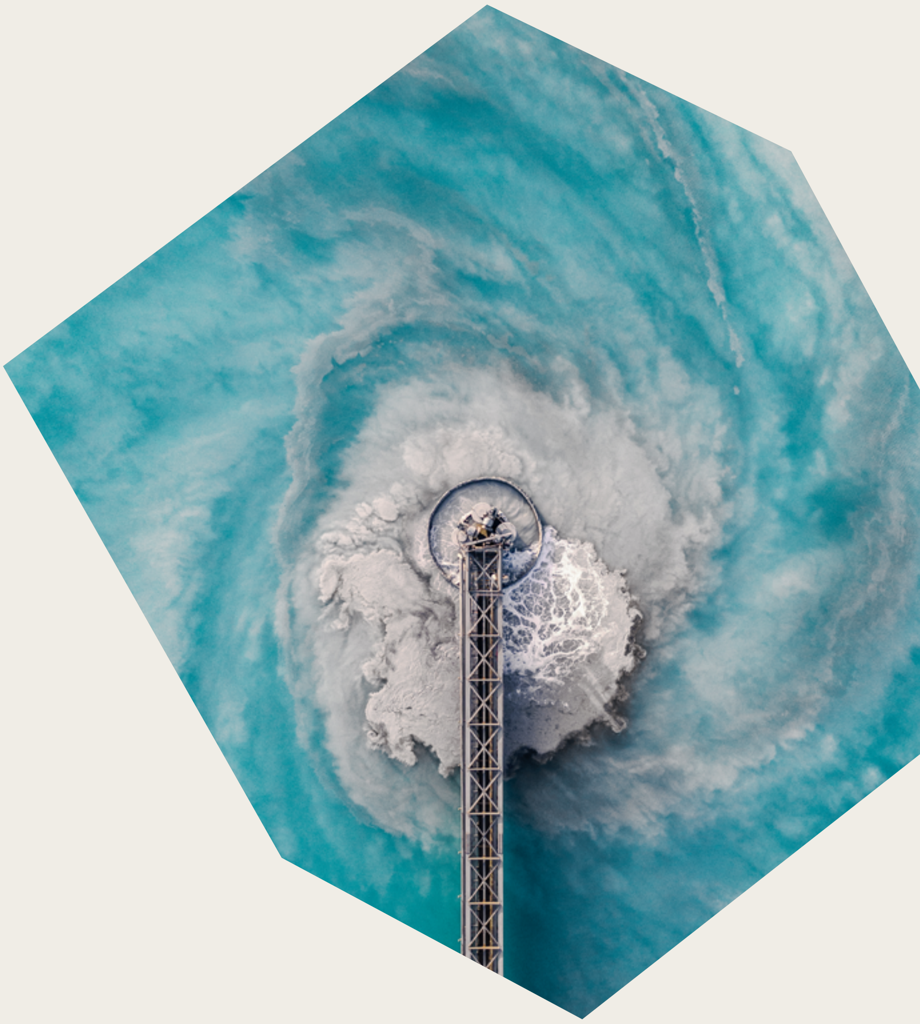
→ American Eagle, an American clothing company, has introduced its Real Good products, which use sustainably produced and sourced materials, and is working with factories that meet its Water Leadership Program requirements.[86]

Renewable energy

Possible strategy: Decreasing overall energy consumption, for example through energy efficiency measures, is a critical strategy in today's industry, where fossil fuels still largely power electricity grids. Additionally, substituting fossil fuels with renewable alternatives and prioritizing reuse, reselling and remanufacturing over energy-demanding recycling can help reduce overall energy consumption and ensure the energy used comes from renewable sources.

Example:

→ Patagonia runs on 100% renewable electricity in the USA and 76% globally. The company aims to become 100% renewable by 2025.[87]



2 Optimize the Loop

- → **% critical material**
- → **% recovery type**
- → **actual lifetime**
- → **onsite water circulation**

Critical materials

Possible strategy: Where possible, substitute critical materials with materials with fewer health and scarcity risks attached.

Example:

- ATP Atelier tans its leather products using vegetable tanning methods instead of the common chrome tanning methods. It has replaced this critical material, upholding the quality and lifetime of products. In addition, it has developed a new tanning process using organic compounds requiring less time and 20% less water compared to chrome-tanning.[88]

Actual lifetime

Possible strategy: Maximize a product's performance and lifetime by designing for durability and circularity. Longer lifetimes are also achievable by enabling circular services and raising customer awareness of product maintenance.

Example:

- Bally has designed and produced shoes with a lifetime that can last decades and offers repair services as shown in the actual recovery indicator. Designing products to last longer can minimize the need to buy new products.[89]

For the onsite water circularity indicators, please refer to the water circularity indicator.

3 Value the Loop

- → **circular material productivity**
- → **CTI revenue**

Circular material productivity

Possible strategy: Use the metric to compare performance over time. If the industry is increasing the decoupling of financial growth from material consumption at a faster rate than the company, it should identify and unlock new opportunities.

Example:

- Nike is one of the most financially successful apparel companies, simultaneously investing in circular design, waterless dyeing, using recycled materials and reducing its environmental impact. Its circular strategy encompasses providing take-back schemes, refurbishing products and providing services to make products last longer.[90]

CTI revenue

Possible strategy: Increase investments in new circular products, increase the circularity of existing products and drive sales of more circular alternatives over less circular alternatives.

Example:

- Reformation, a fashion brand focusing on sustainable fashion, has grown from a start-up into a company increasing its revenue from clothing made from deadstock fabrics, mostly natural fibers, and refurbishing returned or damaged items. The platform is growing and in 2022, resale, vintage and rental represented 16% of business volume.[91]

4 *Impact of the Loop*

→ GHG impact
→ Nature impact

GHG impact

Possible strategy: Use the GHG impact indicator with the % material circularity indicator to decide on the option with the lowest environmental impact. Switching from recycling to repair can have a large impact on GHG emissions reductions post-use.

Example:

- Levi's has introduced the Tailor Shop, which provides repair and upcycling services instead of recycling products.[92] It has also partnered with Renewcell to use Circulose (a new fiber made from recycled cotton) in denim products to achieve 80% water savings and reduce CO_2 emissions by 65% compared to conventional cotton.

Nature impact

Possible strategy: Use the nature impact module to identify the most effective sourcing strategy for reducing land-use impact and pressure on nature. Indeed, this indicator focuses specifically on impact from land use as this is the most impactful driver of nature loss. It includes land occupation, land-use change, land degradation and deforestation impacts.

Example:

- Following VF's use case on cotton and wool t-shirts, the company can analyze which opportunities it is missing and how to reduce its nature impact based on material selection. The results should be considered together with an analysis of material circularity and GHG impact to allow a wider view of impact. Therefore, a larger assessment should inform conclusions and goals and not just the nature impact indicator. The indicator is valuable in showing the physical impact on land of sourcing conventional, regenerative, or sustainably managed materials and can inspire many opportunities for transitioning to more circular operations.

Step 6 – Prioritize:

Identify opportunities

The insights gathered on circular performance indicate which flows have the greatest potential for improvement. However, to use this information to make decisions and prioritize, the company might want to understand how circular performance relates to linear risks. By assessing company exposure to risks and subsequently evaluating opportunities via a business case, companies can start prioritizing actions. For this section, we refer to WBCSD's 2018 Linear Risks report, which explains circular risk and opportunities.

Identify linear risks and circular opportunities

As it is possible to link the indicators used in the assessment to linear risks and circular opportunities, these connections can give the company an initial picture of what kind of risk and opportunities are relevant.

Table 8: Linear risks and circular opportunities

Type of risk		*Market*	*Operational*	*Business*	*Legal*
Definition		**Involve market- and trade-related factors that impact business assets and liabilities**	**Involve factors that impact a firm's internal operations**	**Are a result of emerging societal, economic and political trends that impact the firm's strategic business objectives**	**Arise from current and future regulations, standards and protocols**
% circular inflow	Opportunity	Charge premium for non-virgin, bio-based products; in fashion, clients are increasingly interested in sustainable products and are willing to pay a higher price for them[93]	Set up take-back and collection schemes in value chains as they provide an opportunity to connect again with customers	Increased technology for supply chain transparency	Subsidies for renewable (certified) resources
	Risk	Scarcity of renewable and regenerative resources for fashion products	Supply chain failures, mostly relevant due to the globalized nature of the industry	Shifting consumers demand towards second-hand, local products	More stringent requirements for consumer claims and labels, like the EU Green Claims Directive and US FTC Green Guides[94]
% circular outflow	Opportunity	Valorizing waste as a secondary resource (high volume of materials collected through municipalities and only 13% recycled in US for textile)[95]	Attracting and retaining talent	New business models such as product as a service (for example, renting model) or take-back systems	Subsidies and incentives for business model innovation and valorization of biodegradable flows Investors increasingly looking into GHG and biodiversity impact[96]
	Risk	Trade bans on waste – bans on transporting textile waste across borders for recovery	Internal process failures Managing recovery of products made from blended materials where the textiles have undergone various (and sometimes unknown) treatments[97]	Right to repair movement (French AGEC law – anti-gaspillage pour une économie circulaire – against waste and for circular economy[98])	Mandatory reporting to open-loop collection and recycling schemes as mentioned in CSRD – ESRS E5[99]

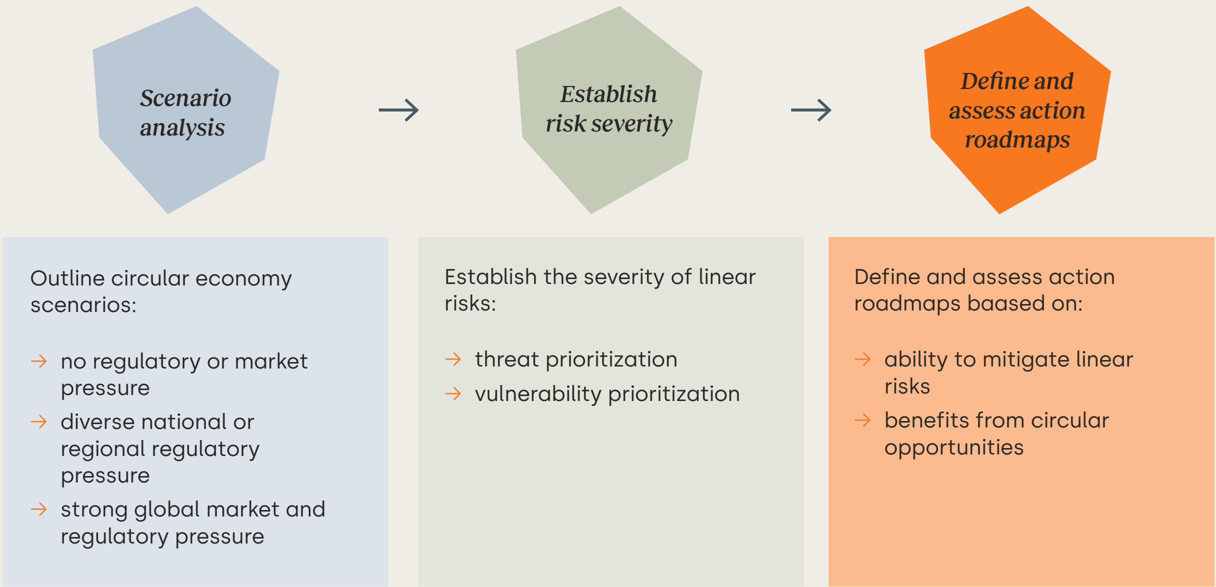
Type of risk		*Market*	*Operational*	*Business*	*Legal*
Definition		**Involve market- and trade-related factors that impact business assets and liabilities**	**Involve factors that impact a firm's internal operations**	**Are a result of emerging societal, economic and political trends that impact the firm's strategic business objectives**	**Arise from current and future regulations, standards and protocols**
% water circularity	Opportunity	Attract interest with new materials and processes reducing water consumption	Awareness of manufacturing methods and processes with reduced water demand	New innovative technologies for water	Potential for more secure water rights due to demonstrable sustainable management
	Risk	Industry's high dependency on water suffers impacts when scarcity increases[100]	Water shortages disrupting operations and unforeseen mitigation cost	Local reputation and loss of social license to operate	Upcoming tightening of regulations with rising water scarcity
% renewable energy	Opportunity	Dedicated financing and cost reductions	New partnerships	Decreasing cost of renewables	Greater access to renewable resources as a result of tightening renewable portfolio standards across jurisdictions
	Risk	Resource scarcity	Worker safety issues	Increasing fossil energy prices	More prescriptive procurement and disclosure rules for companies, whether imposed by investors or regulators
% critical materials	Opportunity	Lower costs if abundant materials can replace scarce ones	Avoided upstream risks with substitution of critical materials	Disruptive new technologies, such as new chemical techniques (vegan tanning, etc.)	(New) government policies on chemicals (REACH for chemicals[101])
	Risk	Higher costs or longer manufacturing time with substituted materials (tanning leather without chrome could take longer)	Unwanted job loss in developing markets	Changing consumer demand	Sourcing rules and regulations
CTI revenue	Opportunity	More resilient and steady cash flows from portfolio	Drive internal competition across business	Brand equity and reputation benefits Consolidation of the brands and the creation of a real secondhand market	Preparedness for reporting and disclosure Regulations can level the playing field for all brands to ensure all are part of the circular solution
	Risk	Circularity's higher costs require more customer engagement to retain revenue Lack of insights responding to investor inquiries	Avoidable layoffs due to failure to improve portfolio	Competitive disadvantage due to inaction	Upcoming regulations on more linear products

Type of risk		*Market*	*Operational*	*Business*	*Legal*
Definition		**Involve market- and trade-related factors that impact business assets and liabilities**	**Involve factors that impact a firm's internal operations**	**Are a result of emerging societal, economic and political trends that impact the firm's strategic business objectives**	**Arise from current and future regulations, standards and protocols**
Actual lifetime	Opportunity	Market expansion opportunities Increase of product portfolio Reduction of manufacturing and sourcing costs	Identification of design improvements for future products Work with higher added value materials Reduction of waste generation	Customer fidelity (e.g., product as a service) Supply chain security	Digital product passport Repairability index/scoring system (e.g. Ifixit) Green procurement to require min. 25% refurbished and secondhand products
	Risk	Ensure availability of technical service and supply/spare parts after warranty expires	Lack of take-back and repair infrastructure	Consumer concern for prioritizing products from companies that address key value chain issues	Legislation against premature or planned obsolescence Legislation to promote minimum durability criteria, extended product responsibility Right to repair
GHG impact	Opportunity	Better positioning by using less carbon-intensive materials (recycled polyester vs virgin)[102]	Better positioning by using less carbon-intensive materials	Providing alternatives with a lower carbon footprint, for example, recycled vs virgin polyester	Benefits for products offerings with lower carbon footprint More favorable performance under potential mandatory product labeling and scoring schemes
	Risk	Increased demand for circular recovery of materials due to end-of-life GHG scope 3 savings commitments	Factoring of carbon price into procurement of virgin materials	Ability to meet consumer demand for lower impact products	Ability to meet waste GHG reporting requirements
Nature impact	Opportunity	Access to consumer premiums and impact investment for reduced nature-related damage	Reduce or substitute dependencies with highest nature-related risks Contribute to sector-level conservation and restoration practices in sourcing landscapes	Provide alternatives with a lower impact textile on biodiversity to (new) clients (see Textile Exchange's Preferred Fiber and Materials)[103]	Advance preparation for compliance with new regulatory frameworks for biodiversity, such as the EU's Corporate Sustainability Reporting Directive
	Risk	Failure to meet increased demand for sustainably sourced materials, in particular for materials that are deforestation- & conversion-free	Nature-related risks could threaten the production of key commodities across a supply chain	Inability to meet consumer demand for sustainably sourced products Reputational risk/opposition from local communities, Indigenous groups and environmental companies	Failure to anticipate or comply with existing regulations could limit access to certain markets or financing, create financial and legal liabilities

Linear risk assessment and prioritization

We recommend that companies formulate and prioritize actions considering their impact on identified linear risks in different scenarios. This process can be as simple (half-day workshop with experts in the company to go through the steps) or as elaborate (days to weeks with detailed data for thorough analysis) as desired, depending on the needs and resources of the company. Either way, we recommend the following steps:

Figure 23: Risk assessment and prioritization steps



1. Scenario analysis

At this stage, a company should investigate possible future scenarios and develop an understanding of how these may affect the business. Companies may apply a time-bound approach to understand developments in each possible scenario (e.g., today, in 5 years, in 10 years). In this exercise, companies should include:

- **No regulatory or market pressure:** How will a lack of change in the playing field affect the company?
- **Diverse national or regional regulatory pressure:** How will national or regional targets affect the business of a company in the future?
- **Strong global market and regulatory pressure:** How will robust combined global trends (technology, markets, regulation) affect the business of the company?

In each of these scenarios, companies can decide which factors to use to assess the impact on the business.

2. Establish risk severity: Threat and vulnerability assessment

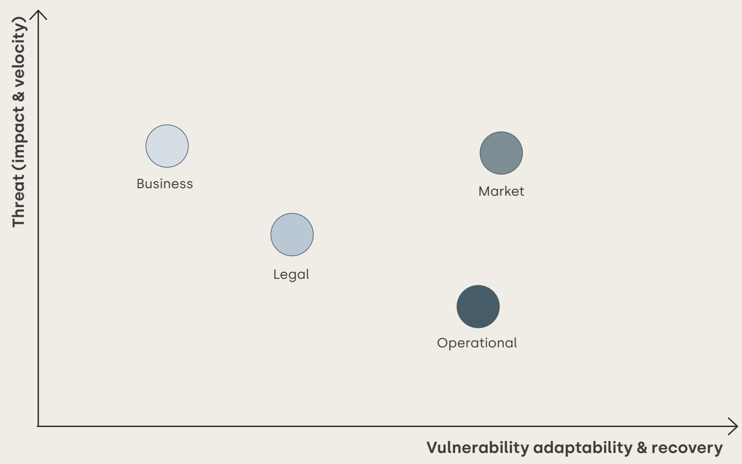
In this step, companies use the information gathered from the scenario analysis to rank and prioritize linear risks. Common criteria for risk prioritization are severity of adverse impact and likelihood; however, relying on these factors alone might limit the accuracy of the prioritization. Therefore, we suggest using two more-elaborate criteria defined by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) Enterprise Risk Management (ERM) framework:

- **Threat** (inherent risk), where the impact (the consequences) and the velocity or speed of onset (the speed at which risk impacts an entity) determine the magnitude of the threat.
- **Vulnerability** (residual risk), defined in terms of adaptability and recovery. The magnitude of the vulnerability depends on adaptability (the capacity of an entity to adapt and respond to risks) and recovery (the capacity of an entity to return to tolerance).

Companies can visualize the above-mentioned risk factors in one overview to enable the formulation of potential actions and final prioritization. This illustrates the threat of a hypothetical company's linear risk (y-axis) versus vulnerability (x-axis).

The graph only shows the main risk categories for demonstration purposes. However, it can be more specific and include all linear risk subcategories, including resource scarcity and changing consumer demands.

Figure 24: Plotting the risks



This visualization can help prioritize which risk to address first. Based on this prioritization, and in combination with the insights obtained during the analysis phase, companies can plan the roll out and next steps.

3. Define potential action roadmaps

In this step, companies define and assess potential action roadmaps. The purpose of this step is to use the insights gathered on circular economy scenarios outlined in **Step 1** and relevant linear risks explored in **Step 2** to describe how the business of the company may develop in the future.

We recommend starting by evaluating a business as usual (BAU) situation that describes how the company's business will develop without taking additional action for circularity.

Afterward, companies can use the BAU situation as a baseline and to outline potential action roadmaps in which it takes different actions to:

- Mitigate the identified linear risks;
- Unlock potential benefits from circular opportunities.

Companies can carry out the description of how each action roadmap changes the future of the company using a text-based system, such as by writing a story, or can visualize it graphically, for example as a timeline with different future events. We recommend using the quantitative and qualitative factors defined in **Step 1** to highlight the effects achieved in each action roadmap.

Step 7 – Apply:

Plan and act

After analyzing the results, prioritizing the risks and opportunities, assessing the circular solutions and defining the business case, the next step is to formulate targets for improvement and execute related actions.

Formulate targets

Based on the analysis, the potential opportunity for improvement has become apparent. In addition, the prioritize phase has identified the risk and opportunities to address. When combined, this information provides relevant evidence to formulate SMART (specific, measurable, ambitions, relevant, time-bound) targets.

Roll out actions

It is necessary to create actions to achieve the targets. Although it is up to the company to further define the specific actions per target, the following is guidance on elements to consider.

- **Define what needs to happen:** the target gives direction on what needs to happen. As described in the analysis section and the industry targets below, there are high-level examples of possible directions to take. It is up to the company to further formulate specific actions based on the nature of the company and the outcomes of the analysis.
- **Define when it needs to happen:** companies should set up an action plan through back casting. With the time-bound target in mind, companies can roll out intermediate targets and actions based on a roadmap. It is important to define the timelines in the roadmap to ensure the alignment of assessment cycles with the intermediate targets.
- **Define who needs to take action:** to ensure action, it is necessary to identify an owner to drive action. Table 11 in the CTI v4.0 report lists the possible actions from the analyze phase, with the relevant departments internally, the external parties to consider and considerations to consider when executing the action.

Assess the actions and progress on formulated targets

It is important to recognize that this phase is not the final phase of the Circular Transition Indicators framework. The process steps follow each other in a cycle and this phase will feed into the scoping phase to start the next assessment and monitor improvement on the targets resulting from the actions executed in the apply phase.

In line with this aim, the next section presents industry-specific goals that can inspire companies when developing their own circular roadmap, starting with the United Nations Environment Programme (UNEP) Collection of Industry Goals, followed by the Sustainable Development Goals (SDGs).

Industry-specific goals

UNEP's Collection of Industry Goals[104]

- By 2050, reach **net-zero emissions** in the textile value chain. By 2030, reach a 45-50% reduction in supply chain emissions.
- By 2050, adopt **100% renewable energy** and by 2030, reach 50%.
- Zero Discharge of Hazardous Chemicals (ZDHC): **Chemicals of concern** according to the ZDHC Manufacturing Restricted Substances List (MRSL) to eliminate by implementing the ZDHC Roadmap to Zero Programme.
- Ensure a **just transition to environmental sustainability**, the application of decent work principles across the textile value chain, and company support of the delivery of SDG 8 (Decent work and economic growth).
- Publicly **disclose Tier 1 facilities.**
- By 2050, achieve **60% of textile market revenue comprised by circular consumer offers**. By 2030, reach 30%.
- By 2050, **double textile utility**.
- By 2030, **source 100%** of priority materials that are both **preferred and low climate impact**. By 2025, source 25% sustainably.
- By 2025, **recycle 45% of polyester**, with a goal of 90% recycled volume by 2030.
- By 2025, **source 100% sustainable cotton**.
- Each year, invest **USD $30 billion in the transition to circular** and sustainable textile.

Sustainable Development Goals

The United Nations Sustainable Development Goals (SDGs) and relevant targets may be used as guidelines in forming meaningful and time-bound targets. All SDGs are applicable to the fashion industry in some way.[105]

Below is a collection of SDGs that are particularly important for the sector and that circularity could impact positively or negatively.

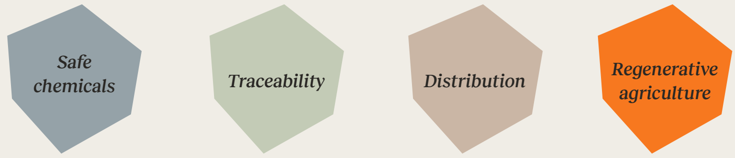
SDGs applicable to the industry:

- *Target 3.9:* By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination. This target is particularly important as the production of textiles, from growing the crops to dyeing and finishing processes, requires more than 1,900 chemicals, almost 8% of which the EU has labeled as hazardous to health and the environmental.[106] A focus on chemicals considered circular could improve this target; this should also hold true for chemical recycling.
- *Target 5.5:* Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, and public life. Currently, young women between the ages of 18 and 24 make 80% of apparel.[107] By shifting work focus from one country to another due to circular practices that are more local, it is important to make sure that it does not negatively impact women.
- *Target 6.4:* By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity. The fashion industry is water-intensive: the production of a single cotton T-shirt consumes 2,700 liters of water, enough to meet one person's drinking needs for 2.5 years.[108] Minimizing water use and improving water circularity is core to the CTI framework.
- *Target 7.2:* By 2030, increase substantially the share of renewable energy in the global energy mix. Various circular processes require important energy consumption, such as sorting and recycling. However, normal recycling should require less energy and would thus make shifting to renewable energy easier.[109]
- *Target 8.5:* By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value. While circularity has the potential to create new jobs, fairness and decent work must remain an important consideration as there is a risk this target could impact working conditions.[110]
- *Target 8.4:* Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation.
- *Target 9.4:* By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes.
- *Target 12.5:* By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse. These are very important targets representing the need to minimize resource use and minimize waste creation. They are core to the CTI framework and, as explained by Circle Economy,[111] a circular economy would enable the world to stay within planet boundaries and thus to respect those targets.
- *Target 13.2:* Integrate climate change measures into national policies, strategies and planning. The clothing and footwear industry is responsible for 10% of global GHG emissions, more than shipping and international flights combined.[112] Leveraging circular materials such as non-virgin inflows are a pathway to reduce this environmental impact.[113]
- *Target 14.1:* By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution. Water pollution via chemical use or micro-plastic release are important problems for the fashion industry.[114] This sector guidance promotes circular design principles that reduce microplastic creation and minimize unsustainable chemical use.
- *Target 15.2:* Promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally. For example, fashion is a significant contributor to global deforestation, with around 150 million trees logged every year to become cellulosic fabrics, such as viscose.[115]

Key enabling factors of the transition to circularity for the fashion industry and textile value chain

Several industry-relevant topics have emerged in sector guidance discussions as enabling factors to drive circularity in the fashion sector. To support companies as they establish best practices in measuring circularity, we consider the following enablers crucial to this process:

Figure 25: **Enabling factors for a circular fashion and textile value chain**



Safe chemicals

According to the Sustainability Accounting and Standards Board (SASB), the use of highly polluting chemicals is one of the biggest challenges the industry faces, negatively impacting the environment and the people producing and using items.[116] The production of clothing uses more than 1,900 chemicals, 165 of which the EU has classified as hazardous to health or the environment.[117] Washing cycles and microfibers continuously release these chemicals into the environment. For recycling, it is necessary to separate chemicals from the textiles, forming boundaries for textile-recovery.

There are three tiers of maturity of a company's or product's chemical profile, rewarding those that are certified and reducing their unsustainable chemical use and recommending to others the best practices that could improve their score:

- → ***Tier 2 - chemical certification.*** Bluesign, the Global Organic Textile Standard (GOTS) and the Cradle to Cradle Certified Products Program are certifications that can help define best practices for chemicals and remain compliant with global standards. Tier 2 companies or facilities hold these certifications, align with their best practices and comply with local and international regulations.
- → ***Tier 1 - compliance with local and international regulations.*** We encourage these companies and facilities to align with best practices and become certified for their circular chemical use.
- → ***Tier 0 - no compliance with regulations.*** We recommend these companies and facilities become compliant with regulations before using the CTI framework to measure their circularity.

Depending on their compliance with avoiding restricted chemicals and their association with certifications, they can gain insights into best practices and using chemicals as an enabler for their circular transition.

Traceability

Traceability gives an indication of the information and transparency of a product's value chain that the company can share, starting from upstream with its material inputs, all the way to the end-recyclers. As an enabler, it clarifies how well-documented and clear the overall value chain is and how much information it can share with the latter stream.

The fashion industry has a complex, global value chain as represented in Figure 26 taken from the VF 2022 Impact Report.[119] The goal of each stakeholder should be to receive transparent communication from suppliers and offer the same to their customers. The Corporate Sustainability Reporting Directive (CSRD) will require companies to report on their impact on society and the environment from 2024.[120] This mandate relies on the traceability and transparency of product information, from the harvesting of natural resources to recovery of used items.

Without awareness of the impact of a product's manufacturing process on society and the environment, a company cannot implement the necessary improvements to progressively reduce these impacts. CSRD will be an incentive for companies to use traceability as an enabler to improve their value chain and demand transparency from their suppliers. Data received from these inquiries will additionally improve the input into the CTI framework to gain insights into their true circular performance.

Good practices to implement strong traceability systems[121,122]

- Map the numbers of (1) tier 1 suppliers and (2) suppliers beyond tier 1.
- Manage product certifications and labeling. An example is Made in Green from OEKO-TEX.
- Calculate a product's carbon/water/waste footprint.
- Accurately communicate a product's story to customers.

Figure 26: Circular strategies and traceability across the fashion value chain

Source: VF 2022 Impact Report[118]

Distribution

Understanding the impact of distribution methods and scale of environmental pressures is crucial in enabling the circular transition. The global reach of the value chain demands frequent transport. Distribution also covers after-sale distribution, covering mode of transport, distance and packaging. At the same time, the fashion industry is known for offshoring its manufacturing and global distribution.

Good practices for a sustainable distribution system[123]

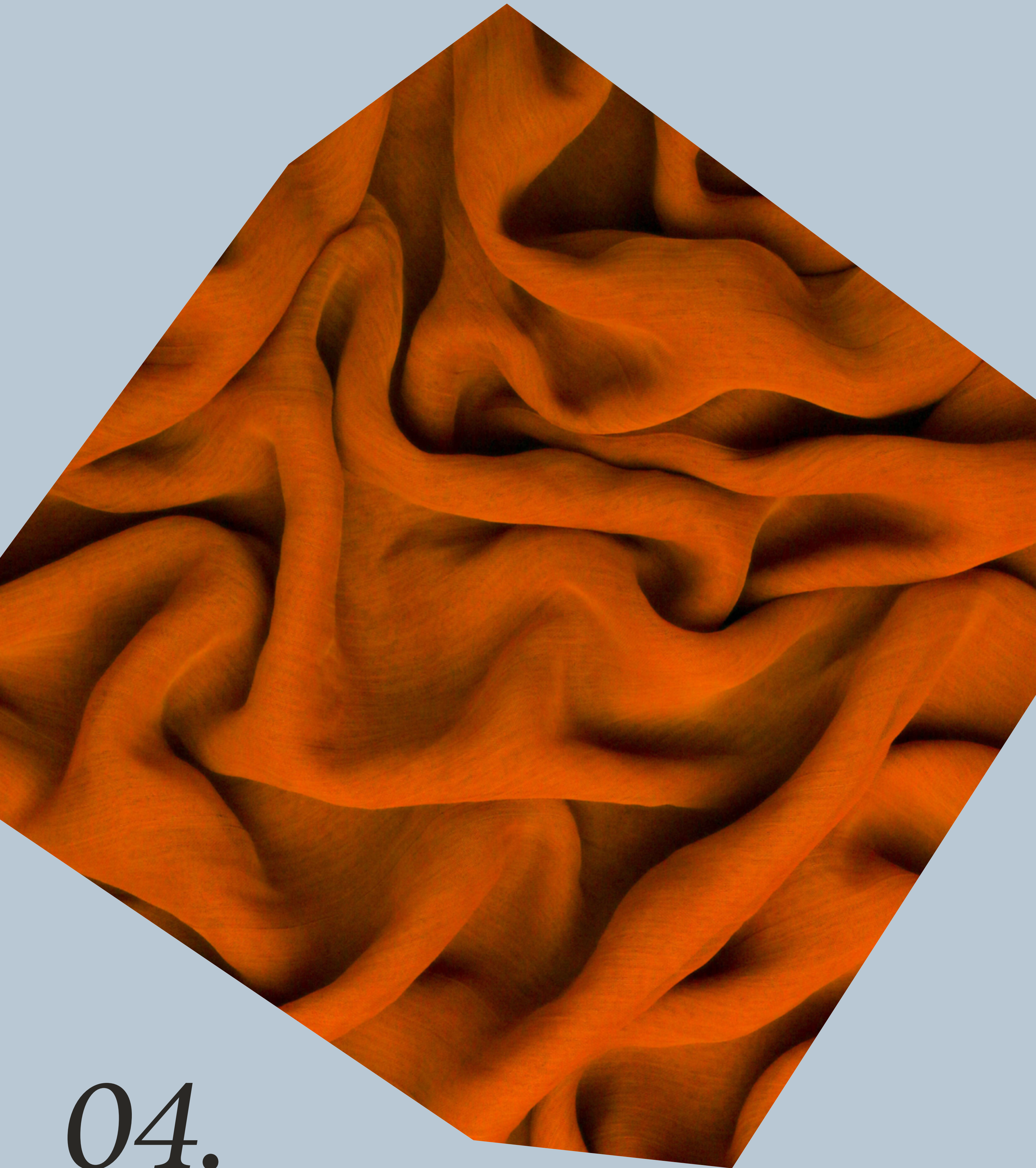
- Conduct a circularity and GHG assessment of warehouses: heating and cooling processes, energy sources, insulation, lighting, equipment, location.
- Switch to sustainable packaging: air pillows instead of polystyrene foam, biodegradable packaging, waste minimization, flexible packaging instead of rigid, made with renewable energy.
- Minimize the carbon footprint of transportation: consider fleets that are electric or run on alternative fuels, and railways; consolidate goods to reduce shipping loads.
- Enable online consumers to select (and potentially pay a premium or accept a minor inconvenience for) less carbon-intensive delivery options, such as delivery by electric vehicles, non-express options or to centralized pick-up/drop-off points.

Regenerative agriculture

Regenerative agriculture puts ecological, social, economic and animal well-being at its core and balances the four to create a sustainable way of farming. While soil health is incredibly important to the overall quality of raw materials and the environment, regenerative agriculture goes beyond this to ensure indigenous roots remain, animals maintain their habitat, water is available and biodiversity is enhanced.

Textile Exchange's Regenerative Agriculture Landscape Analysis outlined that a transition to regenerative agriculture will be fundamental to the long-term health of the fashion and textile industry.[124] Regenerative agriculture can address many of the industry's current social and environmental challenges, making it an important enabler of the transition to a circular economy. Regenerative Organic Certified and Certified Regenerative by A Greener World (AGW) are two of the few focused certifications that certify companies, farms and products on their alignment with the fundamentals of regenerative farming.[125]

Conclusion



04.

04. Conclusion

The fashion industry's linear "take-make-waste" model is not sustainable, leading to wasteful practices and detrimental environmental impacts. By embracing circular approaches, we can significantly reduce negative impacts on both people and planet while unlocking economic opportunities.

Several fashion companies are at the forefront of the transition to a circular economy. However, scaling circularity across an entire company and the full value chain is proving challenging. Well-defined and recognized corporate performance and accountability systems for circularity, built on robust metrics and targets, are crucial to addressing this challenge. Such systems can support the integration of circular strategies, products and business models into a company's corporate strategy and progressively transition to higher levels of circularity in the materials used, the design of its products and business models.

The CTI Fashion Initiative supports companies in the fashion industry and textile value chain through the integration of consistent metrics for circularity that unlock novel avenues for value creation through new offerings that retain and attract customers, provide access to additional markets, mitigate operational, market and legal risks and attract new capital.

From a value chain perspective, a standardized approach to measuring circularity can help rally companies in the industry around common targets and measures of success. Working with WBCSD's Circular Transition Indicators (CTI), companies from all positions in the value chain can confidently build baselines and set targets across portfolios of products, facilities and at the corporate level.

Circular strategies will be necessary to meet any fashion and textile company's sustainability roadmap because increasing the use of circular feedstock, extending the useful lives of products and facilitating the end-of-life recovery of materials can significantly reduce a company's material carbon footprint.

Sourcing circular materials can also lower a company's overall impact on nature. By using regenerative or certified organic raw materials, companies can significantly reduce their impact on land-use change and the resulting biodiversity loss compared to using conventionally sourced cotton or wool.

There is much to gain from the adoption of circular practices. We encourage companies to adopt CTI to measure improvements and communicate transparently with stakeholders and regulators. This can enable businesses to align their valuation and capital allocation models with scaling the solutions that work.

The CTI Fashion Initiative stands ready to help with dedicated implementation support, data for circularity and guidance. Join our community of circular fashion and textile leaders!

CTI glossary

05.

05. CTI: *glossary*

% material circularity

The massed average of the % circular inflow and % circular outflow for a given product (group or portfolio), business unit or company.

Advanced/chemical recycling

Process applicable to most synthetic textile fibers that can bring back the materials to a quality and purity comparable to the virgin material.

Circular economy principles

- → Design out waste and pollution
- → Keep products and materials in use
- → Regenerate natural systems.

Circular inflow

Inflow that is:

- → Renewable inflow (see definition) and used at a rate in line with natural cycles of renewability

OR

- → Non-virgin (recycled, reused or remanufactured materials)

Circular outflow

Outflow that is:

- → Designed and treated in a manner that ensures products and materials have a full recovery potential and extend their economic lifetime after their technical lifetime

AND

- → Demonstrably recovered

Circular performance

The multidimensional results of a product (group), business unit, including % circularity (% circular inflow and % circular outflow) and at least one other CTI indicator. This indicator may be from any of the three modules.

CTI revenue

The revenue generated by a product (group or portfolio), business unit or company multiplied by its % circularity.

Company boundary

Physical or administrative perimeter of the company, consistent in scope with financial and sustainable reporting.

Downcycling

Recycling "something in such a way that the resulting product is of lower (economic) value than the original item".[126] It indicates a loss of the material's/product's original characteristics that precludes use in a similar function to its previous cycle (functional equivalence). Downcycling usually describes a product's material properties, level of degradation or, in the case of metals, degree of impurity, which leads to a loss of economic value.[127]

Durability

The ability of a product to function as required, under specified conditions of use, maintenance and repair, until a limiting event prevents it functioning.

Emotional durability: Applying strategies that increase and maintain a product's relevance and desirability to a user, or multiple users, over time.[128]

Physical durability: Combining material choices and garment construction, including component reinforcement, to create highly durable products that can resist damage and wear over long periods of time.[129]

Fashion industry

Apparel, accessories & footwear refers to entities involved in the design, manufacturing, wholesaling and retailing of various products, including adult and children's clothing, handbags, jewelry, watches and footwear.

Functional equivalence

"The state or property of being equivalent" (or equal) in function.[130]

In the context of CTI, this defines an outflow (a product, product part, waste stream, etc.) designed so that it is technically feasible and economically viable to bring it back to inflow (as material, product part, etc.), preserving a similar function to its previous cycle. For example, it is possible to recycle the plastics used in mobile phones for kitchen appliances because properties like strength and aesthetics are equivalent.

Green tariff

"A renewable energy solution in regulated electricity markets that allows customers to more easily access clean power. A green tariff is a price structure, or an electricity rate, offered by a local utility and approved by the state's Public Utility Commission that allows eligible customers to source up to 100% of their electricity from renewable resources."[131]

Inflow

Resources that enter the company, including materials, parts or products (depending on a company's position in the supply chain). Not included are water and energy, which are part of the specific water and energy indicators.

Land-use change

The conversion of natural areas into human-dominated landscapes, caused by activities such as urbanization, deforestation, agriculture and infrastructure development. This process is a key driver of biodiversity loss. Addressing land-use change is vital to preserving biodiversity and ensuring sustainable development.

Linear inflow

Inflow that is from virgin, non-renewable resources.

Linear outflow

Outflow that is not classifiable as circular. This means that the outflow:

- Is not circular in design/consists of materials treated in a manner that leaves no recovery potential

OR

- Not demonstrably recovered nor flowing back into the economy.

Linear risk

Exposure to linear business practices: use scarce and non-renewable resources, prioritize sales of new products, fail to collaborate and fail to innovate or adapt. This will negatively impact a company's license to operate.[132]

Mechanical recycling

The processing of fibers by sorting, grinding and compounding the fibers for reuse.

Non-virgin inflow

Inflow previously used (secondary), e.g., recycled materials, secondhand products or refurbished parts.

Outflow

Material flows that leave the company, including materials, parts, products, by-products and waste streams (depending on a company's position within the supply chain).

Product lifetime

The duration of the product that starts at the moment a product is released for use after manufacturing or recovery and ends the moment a product becomes obsolete. Its durability, intended as the ability to "function as required, under specified conditions of use, maintenance and repair, until a limiting event prevents its functioning" drives the longer product lifetime.

Recovery

The technically feasible and economically viable recovery of compounds, materials, parts, components or even products (depending on the company) at the same level of functional equivalence through reuse, repair, refurbishment, repurposing, remanufacturing, recycling or biodegrading. This excludes energy recovery from waste and any biological cycle waste that does not satisfy all criteria outlined in the biological cycle.

Recovery types

The different forms of material recovery, such as (in order of the recirculation loops in the Ellen MacArthur Foundation's Circular Economy System or Butterfly diagram[133]):

- **Reuse:** To extend a product's lifetime beyond its intended designed life span, without changes made to the product or its functionality.
- **Repair:** To extend a product's lifetime by restoring it after breakage or tearing, without changes made to the product or its functionality.
- **Refurbish:** To extend a product's lifetime by large repair, potentially with replacement of parts, without changes made to the product's functionality.
- **Remanufacture:** To disassemble a product to the component level and reassemble (replacing components where necessary) to as-new condition with possible changes made to the functionality of the product.
- **Recycle:** To reduce a product back to its material level, thereby allowing the use of those materials in new products. For the fashion industry, recycling should be separated between chemical and mechanical recycling.

Regenerative – Sustainably sourced renewable material

Material that is continually replenished at a rate equal to or greater than the rate of depletion, that delivers consistently reduced impacts and increased benefits for climate, nature, and people.

"Sustainably sourced" is adapted from the United Nations Development Programme (UNDP) and SDG 12 and aligns with the concept of "preferred", "recycled material" is adapted from ISO 14009:2020, and "renewable material" is adapted from Ellen MacArthur Foundation.[134]

Renewable inflow

Sustainably managed resources, most often demonstrated by internationally recognized certification schemes like the Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFCRC) and Roundtable on Sustainable Palm Oil (RSPO)[135] that, after extraction, return to their previous stock levels by natural growth or replenishment processes at a rate in line with use cycles. Therefore, they are replenished/regrown at a faster rate than harvested/extracted.[136]

Virgin inflow

Inflow not previously used or consumed (primary).

Annexes

Annex I – Non-virgin certifications

Name	*Focus*	*Description*
Recycled Claim Standard	**Recycled fibers**	The Recycled Claim Standard (RCS) is an international, voluntary standard that sets requirements for third-party certification of recycled input and chain of custody. The goal of the RCS is to increase the use of recycled materials.
Global Recycled Standard	**Recycled fibers and processes**	The Global Recycled Standard (GRS) is an international, voluntary, full product standard that sets requirements for third-party certification of recycled content, chain of custody, social and environmental practices, and chemical restrictions. The goal of the GRS is to increase use of recycled materials in products and reduce/eliminate the harm caused by its production.

Annex II – Renewable certifications

Name	*Focus*	*Description*
Better Cotton Initiative (BCI)	**Cotton**	BCI promotes sustainable practices in cotton cultivation by providing guidelines for reducing environmental impact and improving working conditions in the cotton supply chain.
Bluesign System	**Chemicals**	The Bluesign System focuses on sustainable textile production by assessing the environmental impact of materials, processes and products. It promotes the efficient **use of resources, minimization of chemical usage** and safe working conditions.
Cradle to Cradle Certified	**Circularity**	While not exclusive to textiles, Cradle to Cradle certification evaluates products based on factors such as **material health, product circularity, clean air and climate protection, water and soil stewardship, and social fairness.**
EU Ecolabel	**Environment**	The EU Ecolabel is a voluntary certification scheme that covers various products and services, including textiles and clothing. It sets criteria for **multiple environmental aspects**, such as materials used, water and energy consumption, emissions and more.
Forest Stewardship Council (FSC)	**Fibers**	All materials used come from responsibly managed, FSC-certified forests. Products with the FSC 100% label contribute most directly to the mission to ensure thriving forests for all, forever.
Floriculture Sustainability Initiative (FSI) 2025	**Flowers & plants**	The FSI Basket of Standards includes a set of benchmarked social and agricultural sustainability compliance standards. It is an instrument to identify, measure and promote responsible sources of flowers and plants.
Global Organic Textile Standard (GOTS)	**Fibers**	GOTS is a globally recognized certification for **textiles made from organic fibers.** It covers both ecological and social criteria, ensuring that the entire textile supply chain adheres to strict standards for organic farming and ethical practices.
Nordic Swan Ecolabel	**Environment**	The Nordic Swan Ecolabel is a certification used in the Nordic countries. It evaluates the **environmental impact of products** throughout their life cycle and encourages sustainable practices.
OEKO-TEX Standard 100	**Toxicity**	OEKO-TEX certification focuses on the **safety of textile products** and their potential impact on human health. It ensures that textiles are free from harmful substances, such as toxic dyes and chemicals.
OEKO-TEX Organic Cotton	**Cotton**	OEKO-TEX Organic Cotton is an approach to care for the environment and health. Organic cotton certification offers verification from farm to product. Companies have manufactured products bearing this label without using genetically modified organisms (GMOs) and have had them evaluated for pesticides and other harmful substances.
OEKO-TEX Leather Standard	**Leather**	The Leather Standard label indicates that the labelled article has successfully passed a test for chemicals that are harmful to health.
OK Biobased Certification	**Fibers**	OK certifies products as one-star, two-star, three-star or four-star bio-based using a determined **percentage of renewable raw materials** (% bio-based).
Responsible Down Standard (RDS)	**Feather**	(RDS incentivizes **the down and feather industry based on the humane treatment of ducks and geese** and rewards companies leading the way. The standard also gives companies and consumers a way to know what is in the products they buy.
Responsible Wool Standard (RWS)	**Wool**	RWS requires the certification of all sites, **from wool farmers to the seller in the final business-to-business transaction.** RWS farmers and ranchers must meet animal welfare, land management and social requirements.
Organic Content Standard	**Organic**	The Organic Content Standard certification enables the traceability of the organic textiles worldwide.
Leather Working Group (LWG)	**Leather**	LWG standards certify all actors in the supply chain, from rawhide to finished leather, covering microenterprises to large tanneries. In fact, most of the certified suppliers are small leather manufacturers.

Endnotes

1 Ellen MacArthur Foundation (2020). Vision of a circular economy for fashion. Retrieved from https://www.ellenmacarthurfoundation.org/our-vision-of-a-circular-economy-for-fashion.

2 Sustainability Accounting and Standards Board (SASB) (2023). SASB Standards. Retrieved from: https://sasb.org/standards/download/.

3 United Nations (2023). The UN Alliance for Sustainable Fashion. Retrieved from: https://unfashionalliance.org/.

4 European Parliamentary Research Service (2022). Textiles and the environment. Retrieved from: https://epthinktank.eu/2022/05/04/textiles-and-the-environment/.

5 Dragomir, V. & Dumitru, M. (2022). Practical solutions for circular business models in the fashion industry. Cleaner Logistics and Supply Chain. Volume 4, July 2022, 100040. Retrieved from: https://www.sciencedirect.com/science/article/pii/S2772390922000130.

6 Arribas-Ibar, M., Nylund, P. & Brem, A. (2022). Circular business models in the luxury fashion industry: Toward an ecosystemic dominant design. Current Opinion in Green and Sustainable Chemistry. Volume 37, October 2022, 100673. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S2452223622000852.

7 Pucker, K. (2023). A circle that isn't easily squared. Stanford Social Innovation Review. Retrieved from: https://ssir.org/articles/entry/a_circle_that_isnt_easily_squared.

8 United States Department of Transportation - Federal Highway Administration (2023). Why Measure Sustainability? Invest. Retrieved from: https://www.sustainablehighways.org/98/why-measure-sustainability.html.

9 World Business Council for Sustainable Development (2023). Circular transition indicators v4.0 – Metrics for business, by business. Retrieved from: https://www.wbcsd.org/Programs/Circular-Economy/Metrics-Measurement/Resources/Circular-Transition-Indicators-v4.0-Metrics-for-business-by-business.

10 Jensen, H.H. (2022). 5 circular economy business models that offer a competitive advantage. World Economic Forum Agenda [Blog]. Retrieved from: https://www.weforum.org/agenda/2022/01/5-circular-economy-business-models-competitive-advantage/.

11 Ellen MacArthur Foundation (n.d.). The butterfly diagram: visualising the circular economy. Retrieved from: https://ellenmacarthurfoundation.org/circular-economy-diagram.

12 European Environment Agency (2023). Plastic in textiles: towards a circular economy for synthetic textiles in Europe. Retrieved from: https://www.eea.europa.eu/themes/waste/resource-efficiency/plastic-in-textiles-towards-a.

13 European Parliament (2019). Environmental impact of the textile and clothing industry. Retrieved from: https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI(2019)633143_EN.pdf.

14 Rankin, J. (2022). EU wants to force fashion firms to make clothes more durable and recyclable. Retrieved from: https://www.theguardian.com/environment/2022/mar/30/eu-wants-to-force-fashion-firms-to-make-clothes-more-durable-and-recyclable.

15 McKinsey (2022). Circular fashion in Europe: Turning waste into value. Retrieved from: https://www.mckinsey.com/industries/retail/our-insights/scaling-textile-recycling-in-europe-turning-waste-into-value.

16 Holland Circular Hotspot (2023). Chemical Recycling in a circular perspective. Retrieved from: https://hollandcircularhotspot.nl/wp-content/uploads/2023/11/online-version_Chemical-Recycling-in-Circular-Perspective-Aug23.pdf.

17 VF (2022). Three Things You Didn't Know About Regenerative Agriculture. Retrieved from: https://www.vfc.com/news/featured-story/98803/three-things-you-didnt-know-about-regenerative-agriculture.

18 Tonti, L. (2023). Fashion greenwashing glossary part two: what do 'biodegradable', 'closed loop' and 'degrowth' really mean? The Guardian. 24 April 2023. Retrieved from: https://www.theguardian.com/fashion/2023/apr/24/fashion-greenwashing-glossary-part-two-what-do-biodegradable-closed-loop-and-degrowth-really-mean.

19 Egan, J. & Salmon, S. (2021). Strategies and progress in synthetic textile fiber biodegradability. Retrieved from: https://link.springer.com/article/10.1007/s42452-021-04851-7.

20 TÜV Rheinland (n.d.). Biodegradability Testing. Retrieved from: https://www.tuv.com/world/en/biodegradability-testing.html.

21 European Parliament (2023). Parliament backs new rules for sustainable, durable products and no greenwashing. Retrieved from: https://www.europarl.europa.eu/news/en/press-room/20230505IPR85011/parliament-backs-new-rules-for-sustainable-durable-products-and-no-greenwashing.

Endnotes

22 Fraser, K. (2021). Composting is the future of fashion packaging. Fashion United. Retrieved from: https://fashionunited.com/news/fashion/composting-is-the-future-of-fashion-packaging/2022063048378.

23 TIPA (2023). Compostable Garment Bag. Retrieved from: https://tipa-corp.com/application/garment-bag/.

24 Textile Exchange (2020). Recycled Claim Standard (RCS). Retrieved from: https://textileexchange.org/recycled-claim-global-recycled-standard/.

25 Textile Exchange (2020). Organic Content Standard. Retrieved from: https://textileexchange.org/organic-content-standard/.

26 European Parliament (2019). Environmental impact of the textile and clothing industry. Retrieved from: https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI(2019)633143_EN.pdf.

27 World Economic Forum (2022). What is regenerative agriculture? Retrieved from: https://www.weforum.org/agenda/2022/10/what-is-regenerative-agriculture/.

28 Ellen MacArthur Foundation (n.d.). Introduction to circular design. Retrieved from: https://www.ellenmacarthurfoundation.org/introduction-to-circular-design/we-need-to-radically-rethink-how-we-design.

29 European Commission (n.d.). Ecodesign for sustainable products regulations. Retrieved from: https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products-regulation_en.

30 Cradle to Cradle (2021). Cradle to Cradle Certified version 4.0 Product standard user guidance. Retrieved form: https://cms.new.c2ccertified.org/assets/v4.0-user-guidance-101921-cradle-to-cradle-products-innovation-institute.pdf.

31 European Commission (n.d.). Waste framework directive. Retrieved from: https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en.

32 Reuters (2023). EU countries back ban on destruction of unsold textiles. Retrieved from: https://www.reuters.com/world/europe/eu-countries-back-ban-destruction-unsold-textiles-2023-05-22/.

33 European Commission (2023). Textile Recycling Excellence. Retrieved from: https://circular-cities-and-regions.ec.europa.eu/support-materials/projects/textile-recycling-excellence.

34 International Renewable Energy Agency (IRENA), IRENA Coalition for Action (2020). Towards 100% renewable energy: Utilities in transition. Retrieved from: https://coalition.irena.org/-/media/Files/IRENA/Coalition-for-Action/IRENA_Coalition_utilities_2020_v1.pdf?la=en&hash=9DFD13841A884113A1B4B28A69C6E00E4FA12637.

35 European Parliament (2020). The impact of textile production and waste on the environment (infographics). Retrieved from: https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic.

36 Rujido-Santos, I. et al. (2022). Metal content in textile and (nano)textile products. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8775849/.

37 European Commission (n.d.). Waste framework directive. Retrieved from: https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en.

38 Vinted (2023). Vinted, How it works, retrieved from: https://www.vinted.com/how_it_works.

39 Bally (2023). Sustainability Report Bally. Retrieved from: https://www.ballyofswitzerland.com/on/demandware.static/-/Library-Sites-bally-shared-row/en/v1700218593547/images/2020/new/sustainability/bally-sustainability-report-2022.pdf#zoom=75.

40 Patagonia (2023). Exchanges, Returns and Repairs. Retrieved from: https://www.patagonia.com/returns.html.

41 European Financial Reporting Advisory Group (EFRAG) (2022). Draft European Sustainability Reporting Standards. Retrieved from: https://www.efrag.org/Assets/Download?assetUrl=%2Fsites%2Fwebpublishing%2FSiteAssets%2F12%2520Draft%2520ESRS%2520E5%2520Resource%2520use%2520and%2520circular%2520economy.pdf.

42 Ellen MacArthur Foundation (2021). Design products to be used more and for longer. Retrieved from: https://ellenmacarthurfoundation.org/articles/designing-products-to-be-used-more-and-for-longer.

43 Ellen MacArthur Foundation (2021). Design products to be used more and for longer. Retrieved from: https://ellenmacarthurfoundation.org/articles/designing-products-to-be-used-more-and-for-longer.

Endnotes

44 Centobelli, P. et al. (2022). Slowing the fast fashion industry: an all-round perspective. Current Opinion in Green and Sustainable Chemistry. Volume 38, December 2022, 100684. Retrieved from: https://www.sciencedirect.com/science/article/pii/S2452223622000967.

45 Ram, A. (2021). Our quest for circularity. Patagonia. Retrieved from: https://www.patagonia.com/stories/our-quest-for-circularity/story-96496.html.

46 Vinted (n.d.). Second-hand: better for you and the climate. Retrieved from: https://company.vinted.com/sustainability.

47 Nike (n.d.). Sustainability. Move to Zero. Retrieved from: https://www.nike.com/sustainability.

48 Greenhouse Gas Protocol (2011). Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Retrieved from: https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf.

49 Science Based Targets Network. Homepage. Retrieved from: https://sciencebasedtargets.org/about-us/sbtn.

50 European Parliament (2020). The impact of textile production and waste on the environment (infographics). Retrieved from: https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic.

51 United Nations Framework Convention on Climate Change (2021). Identifying Low Carbon Sources of Cotton and Polyester Fibers. Retrieved from: https://unfccc.int/documents/273670.

52 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2019). Global Assessment Report on Biodiversity and Ecosystem Services. Retrieved from: https://www.ipbes.net/global-assessment.

53 United Nations Framework Convention on Climate Change (2021). Identifying Low Carbon Sources of Cotton and Polyester Fibers. Retrieved from: https://unfccc.int/documents/273670.

54 European Parliament (2020). The impact of textile production and waste on the environment (infographics). Retrieved from: https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic.

55 Textile Exchange (2022). Materials Impact Dashboard. Retrieved from: https://textileexchange.org/materials-dashboard/.

56 Textile Exchange (2023). Biodiversity Landscape Analysis. Retrieved from: https://textile-exchange.org/app/uploads/2023/09/Biodiversity-Landscape-Analysis.pdf.

57 Textile Exchange (2022). Preferred Fiber And Materials Market Report. Retrieved from: https://textileexchange.org/knowledge-center/reports/preferred-fiber-and-materials/.

58 International Organization for Standardization (ISO) (2015). ISO 9000:2015 Quality Management Systems: fundamentals and vocabulary. Retrieved from: https://www.iso.org/standard/45481.html.

59 CircularIQ. Retrieved from: https://circular-iq.com/.

60 Bally (2022). Bally Sustainability Report 2022. Retrieved from: https://www.ballyofswitzerland.com/on/demandware.static/-/Library-Sites-bally-shared-row/en/v1700218593547/images/2020/new/sustainability/bally-sustainability-report-2022.pdf#zoom=75.

61 Textile Exchange (2022). Preferred fiber and materials market report. Retrieved from: https://textileexchange.org/app/uploads/2022/10/Textile-Exchange_PFMR_2022.pdf.

62 Textile Exchange (2022). Preferred fiber and materials market report. Retrieved from: https://textileexchange.org/app/uploads/2022/10/Textile-Exchange_PFMR_2022.pdf.

63 European Commission Joint Research Centre (2021). Circular Economy Perspectives in the EU textile sector. Retrieved from: https://publications.jrc.ec.europa.eu/repository/handle/JRC125110.

64 European Commission Joint Research Centre (2021). Circular Economy Perspectives in the EU textile sector. Retrieved from: https://publications.jrc.ec.europa.eu/repository/handle/JRC125110.

65 European Commission Joint Research Centre (2021). Circular Economy Perspectives in the EU textile sector. Retrieved from: https://publications.jrc.ec.europa.eu/repository/handle/JRC125110.

66 European Commission Joint Research Centre (2021). Circular Economy Perspectives in the EU textile sector. Retrieved from: https://publications.jrc.ec.europa.eu/repository/handle/JRC125110.

67 European Commission Joint Research Centre (2021). Circular Economy Perspectives in the EU textile sector. Retrieved from: https://publications.jrc.ec.europa.eu/repository/handle/JRC125110.

Endnotes

68 European Commission Joint Research Centre (2021). Circular Economy Perspectives in the EU textile sector. Retrieved from: https://publications.jrc.ec.europa.eu/repository/handle/JRC125110.

69 European Commission Joint Research Centre (2021). Circular Economy Perspectives in the EU textile sector. Retrieved from: https://publications.jrc.ec.europa.eu/repository/handle/JRC125110.

70 United States Environmental Protection Agency (2022). Textiles: Material-specific data. Retrieved from: https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/textiles-material-specific-data.

71 Textile Technology (2022). China: Recycling of 25% of all textile waste by 2025. Retrieved from: https://www.textiletechnology.net/technology/news/china-recycling-of-25--of-all-textile-waste-by-2025-32004#:~:text=In%202020%2C%20China%20produced%20around%2022%20million%20tons,fiber%20was%20produced%20from%20textile%20waste%20in%202020.

72 Fashion for Good (2022). Wealth in waste: India's potential to lead circular textile sourcing, Retrieved from: https://fashionforgood.com/our_news/wealth-in-waste-indias-potential-to-lead-circular-textile-sourcing/.

73 Bally (2022). Bally Sustainability Report 2022. Retrieved from: https://www.ballyofswitzerland.com/on/demandware.static/-/Library-Sites-bally-shared-row/en/v1700218593547/images/2020/new/sustainability/bally-sustainability-report-2022.pdf#zoom=75.

74 Duvall (2023). How Long Can You Expect Leather Boots To Last? Retrieved from: https://www.duvallleatherwork.com/how-long-can-you-expect-leather-boots-to-last/.

75 Elejalde-Ruiz, A. (2011). How to tell it's time to throw out your shoes. The Seattle Times. Retrieved from: https://www.seattletimes.com/life/outdoors/how-to-tell-its-time-to-throw-out-your-shoes/.

76 North Face (2023). Renewed. Retrieved from: https://www.thenorthfacerenewed.com/about.

77 Vinted (2023). How it works. Retrieved from: https://www.vinted.com/how_it_works.

78 Pangaia (2023). Natural & Food Dye. Retrieved from: https://pangaia.com/pages/natural-and-food-dye.

79 Patagonia (2019). How we're reducing our carbon footprint. Retrieved from: https://www.patagonia.com/stories/how-were-reducing-our-carbon-footprint/story-74099.html.

80 Helly Hansen (2023). Mono Material. Retrieved from: https://www.hellyhansen.com/journal/mono-material-singular-and-circular-design.

81 Everlane (2023). About. Retrieved from: https://www.everlane.com/about.

82 REI (2023). Rentals. Retrieved from: https://www.rei.com/stores/rentals.

83 Patagonia (2019). How we're reducing our carbon footprint. Retrieved from: https://www.patagonia.com/stories/how-were-reducing-our-carbon-footprint/story-74099.html.

84 Helpsy (2023). Our partners. Retrieved from: https://www.helpsy.co/our-partners.

85 Sun Tekstil (2022). Sun Tekstil Sustainability Report 2022. Retrieved from: https://www.suntekstil.com.tr/wp-content/uploads/2023/08/Sustainability-Report-2022-230616.pdf.

86 American Eagle (2023). Real Good. Retrieved from: https://www.ae.com/us/en/x/real-good.

87 Patagonia (2019). How we're reducing our carbon footprint. Retrieved from: https://www.patagonia.com/stories/how-were-reducing-our-carbon-footprint/story-74099.html.

88 ATP (2023). Our Store. Retrieved from: https://atpatelier.com/en-eu.

89 Bally. Homepage. Retrieved from: https://www.bally.ch/en/.

90 Nike (2023). Circular Solutions. Retrieved from: https://www.nike.com/sustainability/services.

91 Reformation (2022). The Sustainability Report. Retrieved from: https://media.thereformation.com/image/upload/v1683921070/pdfs/Reformation-Annual-Report-2022.pdf.

92 Levi's (2023). Tailor Shop. Retrieved from: https://www.levi.com/CH/en/features/tailor-shop.

93 Fibre2Fashion (2023). 69% US consumers willing to pay more for sustainable products. Retrieved from: https://ww.fashionnetwork.com/news/69-us-consumers-willing-to-pay-more-for-sustainable-products,1502237.html.

94 European Commission (n.d.). Environment – Green claims. Retrieved from: https://environment.ec.europa.eu/topics/circular-economy/green-claims_en.

95 United States Environmental Protection Agency (2022). Textiles: Material-specific data. Retrieved from: https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/textiles-material-specific-data.

96 MSCI (2023). Biodiversity: The New Frontier of Sustainable Finance. Retrieved from: https://www.msci.com/our-solutions/climate-investing/biodiversity-sustainable-finance.

Endnotes

97 Loo, S.L., Yu, E. & Hu, X. (2023). Tackling critical challenges in textile circularity: A review on strategies for recycling cellulose and polyester from blended fabrics. Journal of Environmental Chemical Engineering. Volume 11, Issue 5, October 2023, 110482. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S2213343723012216.

98 Ministry for the Ecological Transition and Solidarity of France (2020). The anti-waste law in the daily lives of the French people, what does that mean in practice? Retrieved from: https://circulareconomy.europa.eu/platform/sites/default/files/anti-waste_law_in_the_daily_lives_of_french_people.pdf.

99 European Financial Reporting Advisory Group (EFRAG). Draft European Sustainability Reporting Standards. Retrieved from: https://www.efrag.org/lab6.

100 Ravasio, P. (2012). How can we stop water from becoming a fashion victim? The Guardian. 7 March 2012. Retrieved from: https://www.theguardian.com/sustainable-business/water-scarcity-fashion-industry.

101 European Chemicals Agency. REACH Legislation. Retrieved from: https://echa.europa.eu/regulations/reach/legislation.

102 United Nations Framework Convention on Climate Change (2021). Identifying Low Carbon Sources of Cotton and Polyester Fibers. Retrieved from: https://unfccc.int/documents/273670.

103 Textile Exchange. The Preferred Fiber and Material Matrix. Retrieved from: https://textileexchange.org/about-materials-matrix/.

104 United Nations Environment Programme (UNEP) (2023). Sustainability and circularity in the textile value chain. Retrieved from: https://www.unep.org/resources/publication/sustainability-and-circularity-textile-value-chain-global-roadmap.

105 United Nations (2015). Sustainable Development Goals. https://sdgs.un.org/goals.

106 European Parliament (2019). Environmental impact of the textile and clothing industry. Retrieved from: https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI(2019)633143_EN.pdf.

107 Drew, D. (2019). These are the economic, social and environmental impacts of fast fashion. World Economic Forum Agenda [Blog]. Retrieved from: https://www.weforum.org/agenda/2019/01/by-the-numbers-the-economic-social-and-environmental-impacts-of-fast-fashion/.

108 European Parliament (2020). The impact of textile production and waste on the environment (infographics). Retrieved from: https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic.

109 U.S. Energy Information Agency (EIA) (2023). Energy and the environment explained. Retrieved from: https://www.eia.gov/energyexplained/energy-and-the-environment/recycling-and-energy.php.

110 Old, R. et al. (2022). Discussing The Social Impacts Of Circularity. Collaborating Centre on Sustainable Consumption and Production (CSCP). Retrieved from: https://circulareconomy.europa.eu/platform/sites/default/files/ciap_social-impact_report.pdf.

111 Circle Economy (2023). What are the circular economy benefits? Retrieved from https://www.circle-economy.com/circular-economy/what-is-the-circular-economy.

112 European Parliament (2020). The impact of textile production and waste on the environment (infographics). Retrieved from: https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic.

113 Circle Economy (2022). Circularity Gap Report 2022. Retrieved from: https://www.circularity-gap.world/2022.

114 European Environment Agency (2022). Microplastics from textiles: towards a circular economy for textiles in Europe. Retrieved from: https://www.eea.europa.eu/publications/microplastics-from-textiles-towards-a.

115 Somers, S. (2020). Nature in Freefall: How Fashion Contributes to Biodiversity Loss. Fashion Revolution Retrieved from: https://www.fashionrevolution.org/nature-in-freefall/.

116 Sustainability Accounting and Standards Board (SASB) (2023). SASB Standards. Retrieved from: https://sasb.org/standards/download/.

117 European Parliament (2019). Environmental impact of the textile and clothing industry. Retrieved from: https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI(2019)633143_EN.pdf.

118 VF Corporation (2022). Seizing the momentum sustainability & responsibility report. Retrieved from: https://d1io3yog0oux5.cloudfront.net/vfc/files/documents/Sustainability/Resources/VF_FY2022_Made_for_Change_Report_FINAL.pdf.

Endnotes

119 VF Corporation (2022). Seizing the momentum sustainability & responsibility report. Retrieved from: https://d1io3yog0oux5.cloudfront.net/vfc/files/documents/Sustainability/Resources/VF_FY2022_Made_for_Change_Report_FINAL.pdf.

120 European Commission (2023). Corporate Sustainability Reporting. Retrieved from: https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en.

121 Fashion for Good (2023). What is traceability? Retrieved from: https://fashionforgood.com/our_news/what-is-traceability/.

122 Sustainability Accounting and Standards Board (SASB) (2023). SASB Standards. Retrieved from: https://sasb.org/standards/download/.

123 Agility (2021). What is green distribution and sustainable logistics. Retrieved from: https://www.agility.com/en/blog/what-is-green-distribution-and-sustainable-logistics/.

124 Textile Exchange (2022). Regenerative agriculture landscape analysis. Retrieved from: https://textileexchange.org/app/uploads/2022/09/Regenerative-Agriculture-Landscape-Analysis.pdf.

125 A Greener World (n.d.). Certified Regenerative by AGW. Retrieved from: https://agreenerworld.org/certifications/certified-regenerative/.

126 Merriam-Webster (n.d.). Downcycle definition. Retrieved from: https://www.merriam-webster.com/dictionary/downcycle.

127 Campbell-Johnston, K. et al. (2020). The Circular Economy and Cascading: Towards a Framework. Resources, Conservation & Recycling: X. Volume 7, September 2020, 100038. Retrieved from: https://www.sciencedirect.com/science/article/pii/S2590289X20300098.

128 Ellen MacArthur Foundation (2021). Design products to be used more and for longer. Retrieved from: https://ellenmacarthurfoundation.org/articles/designing-products-to-be-used-more-and-for-longer.

129 Ellen MacArthur Foundation (2021). Design products to be used more and for longer. Retrieved from: https://ellenmacarthurfoundation.org/articles/designing-products-to-be-used-more-and-for-longer.

130 Merriam-Webster (n.d.). Equivalence definition. Retrieved from: https://www.merriam-webster.com/dictionary/equivalence.

131 World Resources Institute (WRI) (2019). Utility Green Tariffs. Retrieved from: https://www.wri.org/initiatives/utility-green-tariffs.

132 Circle Economy, PGGM, KPMG, European Bank for Reconstruction and Development (EBRD) & WBCSD. (2018). Linear Risks. Retrieved from: https://docs.wbcsd.org/2018/06/linear_risk_report.pdf.

133 Ellen MacArthur Foundation (n.d.). The butterfly diagram: visualising the circular economy. Retrieved from: https://ellenmacarthurfoundation.org/circular-economy-diagram.

134 Textile Exchange (2023). Preferred Fibers and Materials: Definitions. Retrieved from: https://textileexchange.org/app/uploads/2023/02/Preferred-Fibers-and-Materials-Definitions-Guidance-Jan-2023.pdf.

135 For example, Forest Stewardship Council (FSC) and Roundtable on Sustainable Palm Oil (RSPO) certifications.

136 Organisation for Economic Co-operation and Development (OECD) (n.d.). OECD Statistics. Retrieved from: https://stats.oecd.org/.

Acknowledgements

Disclaimer

This publication is released in the name of WBCSD. Like other WBCSD publications, it is the result of collaborative efforts by representatives from member companies and external experts. This does not mean, however, that every member company or stakeholder agrees with every word. The report has been prepared for general informational purposes only and is not intended to be relied upon as accounting, tax, legal or other professional advice.

Attribution

Contributors

WBCSD – Irene Martinetti, Manager, Circular Economy; Elisabeth Wilson, Senior Manager, Key Account, Quentin Drewell, Director, Circular Products and Materials

Deloitte – Carlo Giardinetti, Sustainability Lead Consulting Switzerland, Deborah de Wolff, Sustainability Consultant, Merel ten Hoedt, Sustainability Consultant

VF Corporation - David Quass, Sustainability Director, Niccolò Gervasoni, Sustainability Specialist

We thank the companies and organizations participating in the consultations that led to the development of this sector guidance:

Accelerating Circularity, Avery Dennison, Aditya Birla, Bally, BCSD Türkiye, China National Textile and Apparel Council, Circle Economy, CircularIQ, Cradle to Cradle, Ellen MacArthur Foundation, EY, Fédération de la Mode Circulaire, Global Fashion Agenda, Handshake, KPMG, SUN Tekstil, Textile Exchange, Turkey Circular Economy Platform and Vaayu.

Circular Transition Indicators co-authors

WBCSD: Jeff Turner, Irene Martinetti, Larissa van der Feen
KPMG: Arnoud Walrecht, Suzanne Kuiper, Julius Groenendaal
THE BIODIVERSITY CONSULTANCY: Hollie Booth, Graham Prescott, Alice Bouchez Brendan Edgerton, Carolien van Brunschot

Circular Transition Indicators Advisory group

African Circular Economy Network, CIRAIG, Circle Economy, Cradle to Cradle Products Innovation Institute, Ellen MacArthur Foundation, European Remanufacturing Council, MVO Nederland, Platform for Accelerating the Circular Economy, Sitra.

About the CTI Fashion Initiative

The CTI Fashion Initiative is a collaboration spearheaded by WBCSD, VF Corporation/VF Foundation, Deloitte Switzerland and industry leaders such as Avery Dennison and Aditya Birla. It equips value chain stakeholders in the fashion industry to use the robust set of circularity metrics for business included in CTI, and helps companies improve decision-making, mitigate risks, demonstrate value creation, and report their progress toward circularity. Explore more in the following white paper: **Kicking circular fashion into high gear**.

About the Circular Transition Indicators

In recent years, the circular economy has increasingly appeared as the new model to pursue sustainable economic growth. For companies to be able to assess their circular performance, they require consistent measurement processes and metrics. To address this need, jointly with our members and stakeholders, we have developed a universal framework to measure circularity. The Circular Transition Indicators (CTI) is a transparent, objective and evolving framework that can be applied to businesses of all industries, sizes, value chain positions and geographies. Explore more at the following link: **https://www.wbcsd.org/wcedf**.

About WBCSD

The World Business Council for Sustainable Development (WBCSD) is a global community of over 225 of the world's leading businesses driving systems transformation for a better world in which 9+ billion people can live well, within planetary boundaries, by mid-century. Together, we transform the systems we work in to limit the impact of the climate crisis, restore nature and tackle inequality.

We accelerate value chain transformation across key sectors and reshape the financial system to reward sustainable leadership and action through a lower cost of capital. Through the exchange of best practices, improving performance, accessing education, forming partnerships, and shaping the policy agenda, we drive progress in businesses and sharpen the accountability of their performance.

Follow us on **X** and **LinkedIn**

www.wbcsd.org

World Business Council *for Sustainable Development*

Geneva | Amsterdam | London | New York City | Singapore