

# Toward an efficient and competitive circular textile industry

**National roadmap for minimizing and valorizing  
pre-consumer textile waste**

*Morocco*

English Edition



Funded by the European Union, with co-funding from the Government of Italy and the Government of Catalonia, the SwitchMed Programme is being implemented under the leadership of the United Nations Industrial Development Organization (UNIDO) in partnership with the United Nations Environment Programme (UNEP) Economy Division and MedWaves, the United Nations Environment Programme Mediterranean Action Plan (UNEP/MAP) and Regional Activity Centre for Sustainable Consumption and Production (formerly known as SCP/RAC). The initiative is being carried out in close collaboration with the European Commission's Directorate-General for Neighbourhood and Enlargement (DGNEAR).

Each implementing organization contributes specialized experience and tools to partner with the eight beneficiary countries on policy development, capacity building, business support services, demonstration activities and networking.

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The concept of the circular economy is of paramount importance for the fashion business today due to its potential to address and mitigate the various environmental and sustainability challenges of the conventional linear model of fashion production and consumption. With this in mind, this document argues for a radical improvement in recycling in the textile and clothing value chain so that the industry can capture the value of materials that are wasted during the transformation process from raw materials to stores.

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# Executive summary

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The concept of the circular economy is of paramount importance for the fashion business today due to its potential to address and mitigate the various environmental and sustainability challenges of the conventional linear model of fashion production and consumption.

In recent years, fashion brands have started to commit to the circular economy model, adopting various strategies such as developing second-hand and resale platforms, and introducing circular design practices, recycling initiatives, and commitments to use recycled materials in their collections. The impact of a brand's circular strategies is reflected all along its supply chain, where suppliers are forced to source recycled fibers from a market that is not yet ready to supply the volumes required.

According to the waste mapping study implemented within the framework of the SwitchMed project, 83,200 tons of pre-consumer textile waste were generated by Moroccan's textile and clothing industry per year. This is a remarkable volume, the majority of which could be channelled into textile-to-textile recycling in the cotton supply chain. On the other hand, waste consisting of blends of various fibers – synthetic, cellulosic, natural, or pure synthetic – needs to find a different end use. For most of these, non-woven applications will be the primary option.

This document provides a brief on the pre-consumer waste recycling value chain in the textile industry as well as an assessment of its state of the art in Morocco, followed by a description of the SwitchMed pilot projects aimed at demonstrating the business case for the valorization of pre-consumer textile waste in the country. The main part of this document is the "Way ahead" section, which presents a comprehensive roadmap of actions to support the development of a textile waste valorization value chain in the country.

This roadmap aims to stimulate and guide stakeholder discussion on key steps, objectives, and timelines for developing and implementing a strategic plan for leveraging circular business models to make the Moroccan textile industry more competitive and reduce its environmental impact. It also provides a tentative framework for coordinating actions among various stakeholders involved in industry interest representation, business activities, research and development, and policy development and implementation.

Three pilot projects were implemented in Morocco, engaging the following group of companies:

- i. The vertically integrated spinner and weaver EVLOX, who produces denim fabrics and is willing to invest in the recycling business;
- ii. A producer of non-woven applications;
- iii. A group of local garment manufacturers of international brands.

In addition, several stakeholders were involved, such as AMITH (Association Marocaine des Industries du Textile et de l'Habillement) and the Casa Moda Academy, besides the two ministries of industry and environment. Two of the three pilot projects aimed at demonstrating the technical-economical-environmental benefits of valorizing the high-quality pre-consumer textile waste for the fashion market and the lower quality waste for non-woven applications.

In total, almost 160 tons of textile waste were collected and segregated to be recycled into more than 900,000 pairs of new jeans containing 20% recycled content. The third pilot project established national capacities at the Moroccan Fashion Design Academy on circular design techniques by involving students in the realization of a first capsule collection made entirely of upcycled and recycled fabrics.

The pilot projects demonstrated that waste segregation at source, i.e. right on the textile or ready-made garment (RMG) company's factory floor, is more efficient and increases the possibility of generating value from waste. However, textile and RMG companies do not see segregation as part of their business, rather, it is perceived as an additional cost, so it can be difficult to sell the concept of effective waste segregation and management to them. Some form of public support or incentive could help overcome this obstacle.

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Besides the fashion and textile industry, which is the core industry involved in the input phase of the recycling value chain and a key player in higher-value recycled fibers for textile-to-textile applications, other industries could also be involved:

- The furniture and bedding industry use lower-value recycled fibers to fill mattresses and other upholstered items of furniture such as sofas, chairs, etc.
- The automotive industry uses lower-value recycled textiles in rigid shapes for sound insulation.
- The construction industry is a destination for thermal and acoustic insulation materials that can be produced locally using lower-value recycled textiles to make panels and sheets for walls and ceilings.

Building upon the findings about the volumes and the types of textile waste generated in Morocco and based on the experience gained in the implementation of the three pilot projects, seven objectives and eleven related actions have been defined and are presented in chapter 3 of this roadmap, which, if achieved, can foster the development of a circular economy approach in the Moroccan textile industry.

The key axes of intervention defined in this roadmap highlight:

- i. The importance of raising awareness and training garment manufacturers to segregate waste at source;
- ii. The adoption of market-based incentives to promote investments in new recycling capacity as well as digital and physical infrastructure to create a significant market for the aggregation and recovery of textile waste;
- iii. The implementation and enforcement of various policy instruments, in particular to create an effective regulatory framework for waste management and boost local market demand for textile products with recycled content;
- iv. Finally, the engagement of brands sourcing in Morocco to establish new partnerships for circular initiatives in the country.

*The pilot projects demonstrated that waste segregation at source, i.e. right on the textile or ready-made garment (RMG) company's factory floor, is more efficient and increases the possibility of generating value from waste.*



# A. CONTEXT



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# 1. Introduction

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## The textile industry and the circular economy

### *The circular economy and the fashion industry*

The circular economy concept has the potential to address and mitigate various environmental and sustainability challenges inherent in the conventional linear model of production and consumption. The essential nature of the challenge for the textile industry is due to its position as the second largest consumer goods sector, after food. The economic and material size of this sector means that it has a significant impact both on the environment and on society.

Critical factors affecting the sustainability of the fashion industry are the depletion of natural resources, including water, emission of GHGs and toxic chemical pollutants, and the enormous amount of waste generated at both the pre- and post-consumer stages. On the other hand, circularity in fashion is too often considered in its most simplistic form, merely highlighting the “recycling route.”

The concept of the waste hierarchy, adopted by policymakers in many countries and regions, including the EU, has been fixed since the publication of the Waste Framework Directive in the 1990s. Indeed, the preferred policy for addressing the issue of waste is prevention, by reducing the generation of waste, while the next best policy is reuse, by giving products a second life before they become waste. Recycling comes third in this hierarchy, just above energy recovery through incineration and disposal, and becomes a priority when waste is created and materials cannot be reused without further processing.

When recycling comes into play, several factors need to be considered, including:

- Is the reclaimed material safe? Or is it potentially polluted by hazardous chemicals?
- Do the reclaimed materials come from the pre- or post-consumer stages?
- Can the material be recycled, and what is the most suitable recycling technology?
- What is the best enduse for recycled materials? Can recycled materials re-enter the textile and fashion sectors, or is their use in industrial symbiosis in other sectors more environmentally and technically sound?
- How can textile and fashion products be designed to enable better recycling?

The answers to these questions will define the features of a circular economy business model.

Fashion brands have begun to commit to the circular economy model in recent years, adopting various strategies such as developing second-hand and resale platforms, introducing circular design practices, recycling initiatives, and committing to using recycled materials in their collections. Polyester, wool, polyamide, and cotton are the most commonly recycled fibres. The impact of a brand’s circular strategies is reflected throughout its supply chain, where suppliers are pressured to source recycled fibres from a market that is not yet prepared to supply the requested volumes.

In recent years, the recycled fibre market has been characterized by a strong expansion in demand, driven by the fashion brands’ growing appetite for more sustainable materials. According to the latest Textile Exchange Annual Report, recycled fibre production grew by 26.5% (CAGR 4.8%) from 2017 to 2022, double the growth rate of virgin fibres (+12.7%, CAGR 2.4%). Notwithstanding this rapid growth, the market share of recycled fibres in the global textile fibre market remains below 10% (7.9% in 2022).

However, the existing production capacity limits the supply of recycled fibers, especially for recycled materials from textile applications. Over 90% of currently available recycled fibers is polyester from plastic bottles, and less than 1% of the global fiber market is from pre- and post-consumer recycled textiles.

Due to supply limitations, the available recycled fibers are not sufficient to meet the demands of brands and other end users and have driven up the prices for rPET (recycled polyester) and recycled cotton in recent years. Creating the right conditions for the expansion of global textile waste recycling capacity is essential to reducing the resource and energy intensity of the fashion industry.



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## *About the SwitchMed II project*

Launched by the European Union and managed by the United Nations Industrial Development Organization (UNIDO), the SwitchMed programme has demonstrated the potential for a green and circular economy in Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestine, and Tunisia since 2014. SwitchMed accelerates the transition to sustainable consumption and production practices in the Southern Mediterranean region through industry demonstrations, policy development, networking opportunities, and support for start-ups and green entrepreneurs. The project was funded by the European Commission's Directorate-General for Neighbourhood and Enlargement (DG NEAR), the Italian Development Cooperation, and the Catalan Waste Agency.

Stimulating the creation of business opportunities that can reduce the inefficient use of resources and the environmental footprint of industrial activities offers the region a chance to respond to economic, social, and environmental challenges. Designing out waste, reducing pollution, and extending the useful life of products and materials are all cornerstones of a circular economy. These principles also define UNIDO's activities in the development of resource-efficient and circular industries as part of the second phase (2019-2024) of the SwitchMed programme. This phase launched an initiative targeting the industrial textile supply chains of Egypt, Morocco, and Tunisia. Collaborating with international brands and expert organizations, UNIDO has engaged national stakeholders in developing circular value chains to valorize post-industrial and pre-consumer textile waste, aiming to guide textile industries toward the adoption of safer chemical protocols.

The SwitchMed initiative for the valorization of textile waste in Morocco aims to demonstrate the recycling potential of pre-consumer textile waste and transfer know-how to develop a local value chain for textile fiber recycling, focusing on two key components of the circular economy business model:

- The design of new garments aimed at minimizing waste and making garments easily recyclable under the eco-design concept.
- The valorization of existing waste, primarily generated during manufacturing, also known as post-industrial and pre-consumer waste.

The elimination of hazardous chemicals from the textile supply chain is a prerequisite for safe circular production. Through its collaboration with the ZDHC Foundation, UNIDO has enhanced its expertise in the safer management of chemicals within the Moroccan textile industry.

The SwitchMed textile initiatives were implemented in two phases:

- A first phase focused on understanding the business environment, including a waste mapping survey during 2020,
- And a second phase, commencing in 2022, implemented three pilot projects involving circular textile business models relevant to the Moroccan context.

## *Purpose and scope of the roadmap*

This document provides a brief overview of the pre-consumer waste recycling value chain in the textile industry and an assessment of its state of the art in Morocco, followed by a description of the implemented SwitchMed pilot projects aimed at demonstrating the business case for the valorization of pre-consumer textile waste in the country. The core content of the document is the "Way ahead" section, which presents a roadmap of actions to support the development of a textile waste valorization value chain in the country, taking stock of the lessons learned and the results of each pilot project conducted by UNIDO.

This roadmap aims to stimulate and guide stakeholder discussion on the key steps, objectives, and timelines for developing and implementing a strategic plan to leverage circular business models to make the Moroccan textile industry more competitive and reduce its environmental impact.

It also provides a provisional framework for coordinating actions among various stakeholders involved in representing the industry's interests, business activities, research and development, and policy development and implementation. An equally important role is to enhance transparency by clearly articulating the steps and processes involved in developing the roadmap.

The roadmap also incorporates international experience from other projects and policies dealing with the circularity and sustainability of textiles and aims to complement the policy recommendations and findings of other projects concerning the circular business model for textiles that has been implemented in Morocco and in the MENA region in recent years.









## 2. Assessment of the textile and clothing value chain and pilot project interventions

### The textile recycling value chain

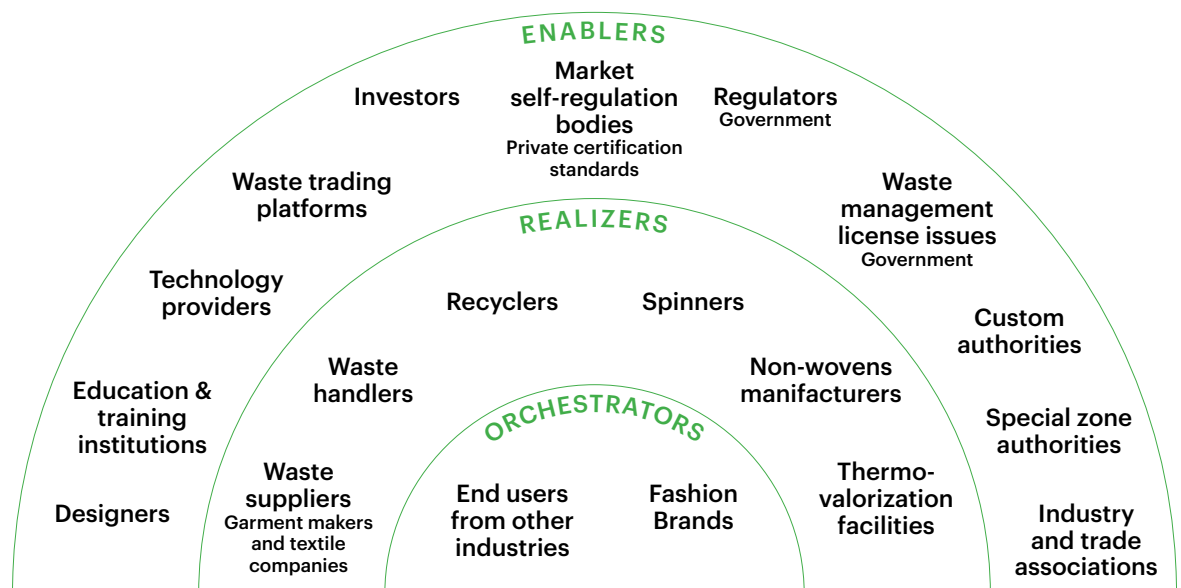
#### *Textile waste valorization as an “ecosystem”*

The textile waste valorization ecosystem involves a network of interconnected participants (“stakeholders”) across industry boundaries and with different roles. Policies aimed at valorizing textile waste and promoting circular business models in the textile and fashion supply chain need to take into account the various elements and stakeholders in the ecosystem and go beyond the strict boundaries of the textile value chain.

Some of these participants play the role of *orchestrators*, maintaining direct contact with the end markets; they may be in the fashion sector (fashion brands, fabric manufacturers, etc.) or other enduser industries of textile fibers in different sectors (automotive, furniture, construction, etc.). These commercial players identify the needs and requirements of the market and match them with the realizers’ capabilities.

*Realizers* are providers of products, such as recycled fibers and yarns, and services, such as collection, transportation, treatment and recycling of textile materials, in the waste valorization value chain.

*Enablers* are supporters of both realizers and orchestrators. They can be private organizations or government institutions, and contribute as regulators, maintainers of voluntary standards, market connectors, such as trade or traceability platforms, or technology providers. It is also interesting to note that a single player can play several roles in the ecosystem. For example, a textile company or brand can simultaneously act as a supplier (of textile waste) and buyer (of recycled fibers).

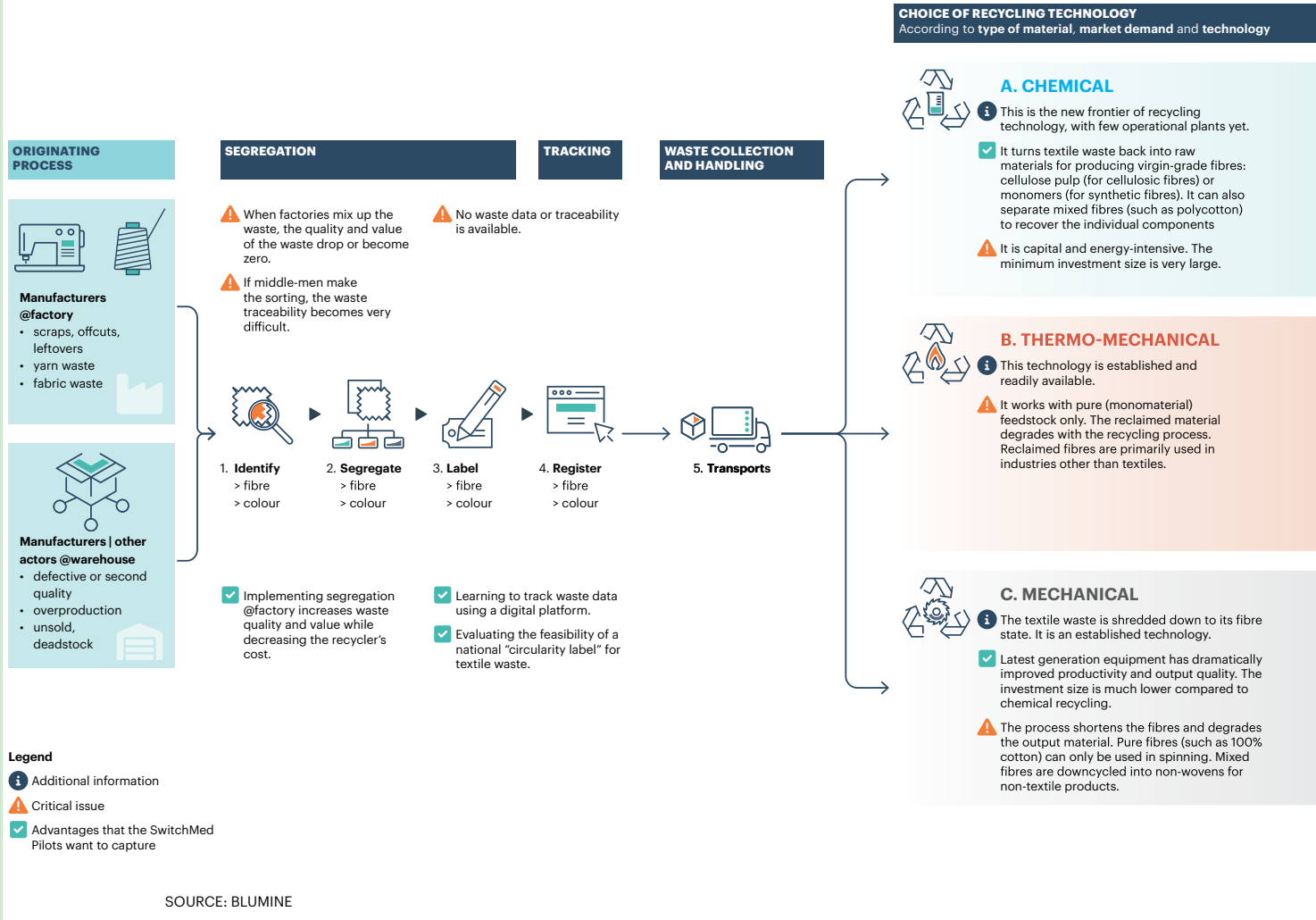


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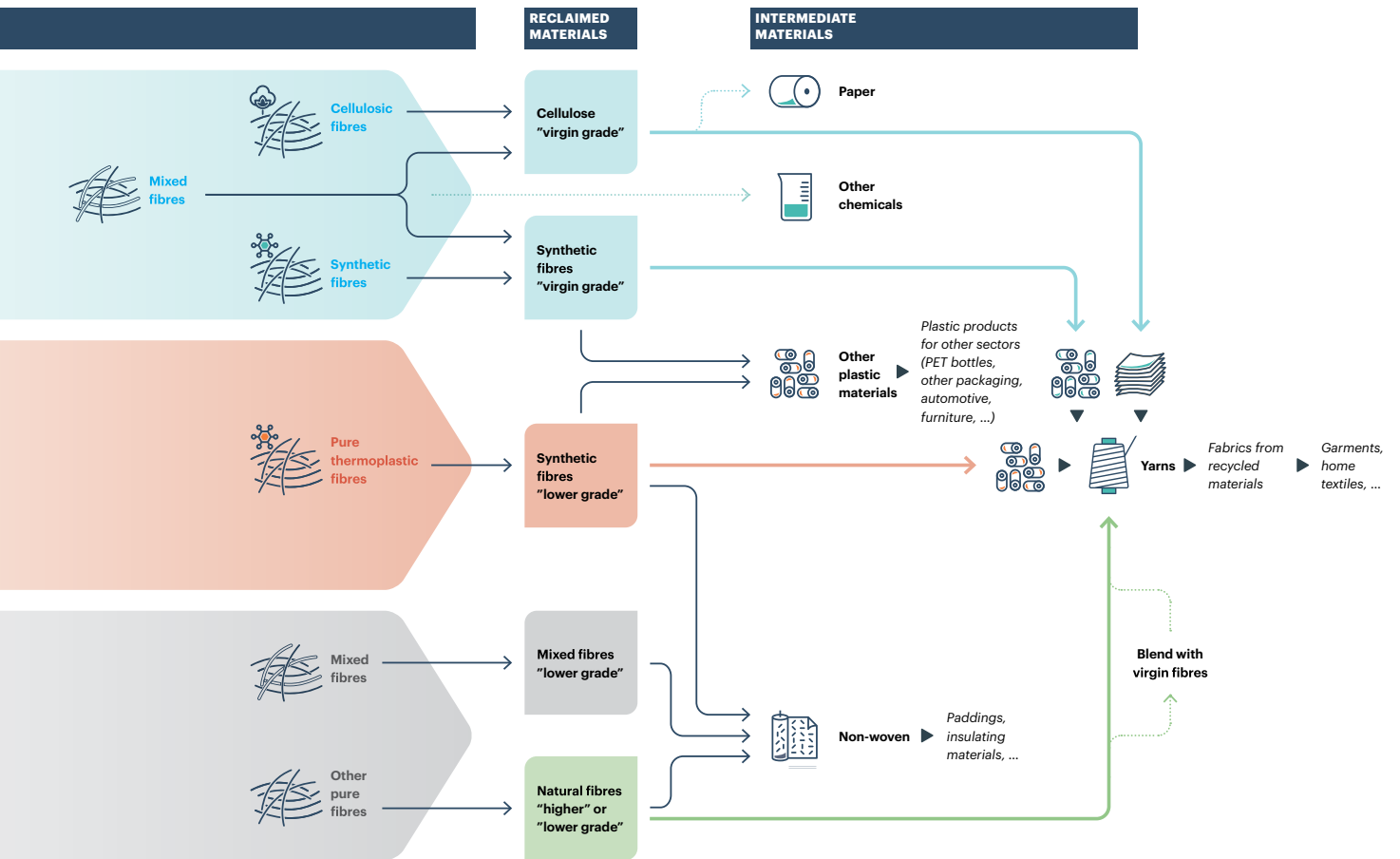
Figure 1 - The textile waste valorization ecosystem



Figure 2 - The post-industrial textile recycling value chain







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# An assessment of the textile recycling value chain in Morocco

## Methodology

In 2021, UNIDO commissioned Blumine and Reverse Resources to conduct a waste mapping study with the support of AMITH (Association Marocaine des Industries du Textile et de l'Habillement). The study analyzed the textile waste value chain, involving a representative group of key market players and estimating the pre-consumer textile waste flows generated by the Moroccan textile and clothing industry to be 83,200 tons per year.

The survey was instrumental in validating the circular business models best suited to the Moroccan sector, the key players and the dynamics of the waste recycling market, as well as the sector's specific needs and opportunities for modernization. Three pilot projects were defined at the end of the waste mapping phase: this roadmap builds on the lessons learned from the practical experience of working with all the actors in the textile value chain.

## Baseline Analysis

"The quantities of waste are steadily increasing. In the absence of waste prevention and reduction measures, our modes of production and consumption take on a dimension of waste and overconsumption of resources." According to the waste mapping study, pure cotton and cotton-rich (>85% cotton) waste accounts for 56% of the 83,200 tons per year of pre-consumer textile waste generated by Morocco's textile and clothing industry. This is a remarkable volume, most of which could be channelled into textile-to-textile recycling in the cotton supply chain. On the other hand, most of the remaining 44%, consisting of blends of various fibres – synthetic, cellulosic, natural, or pure synthetic – needs to find a different end use. For most of them, nonwoven applications will be the primary option.

Cutting scraps makes up the largest share (62%) of the waste flow, and more than 77% comes from just two macro-regions, Great Casablanca and Tangier.

The concentration of waste in these two areas minimizes transportation costs and maximizes synergies through collaborations and shared facilities, keeping costs down for recycling operations in Morocco. The mapping study also found significant economic potential for recycling high-value 100% cotton and cotton-rich pre-consumer textile waste in Morocco.

The information collected during the SwitchMed project does not provide evidence of a structured textile value chain for higher-value (cotton and cotton-rich) or lower-value (other blends and synthetics) waste. With a few remarkable exceptions in both textile-to-textile and non-woven applications (wadding, felt, insulation boards, and mattresses), the information indicates that higher-value waste is often exported as is, without undergoing any transformation.

On the other hand, garment manufacturers rarely, if ever, have information on the destination of the waste they hand over to waste treatment companies, and their clients do not impose any traceability requirements on them regarding waste management practices. The lack of information and traceability pose significant obstacles to the successful implementation of circular business models.

Without adequate information on the origin, composition, and condition of these materials, it is impossible to guarantee the quality and safety of products made from them:

- compliance with regulations promoting sustainability and waste reduction becomes impossible, leading to legal and reputational risks for businesses.
- sustainability claims regarding circularity in terms of both the use of recycled materials and responsible management of the brand's own waste can be considered greenwashing.
- the accurate assessment of the environmental footprint of products using LCA or LCA-like approaches is a challenging task.

Overcoming the obstacles created by the lack of information and traceability requires collaboration between stakeholders, the adoption of standardized tracking systems, and appropriate digital technology to enable accurate data collection and sharing throughout the supply chain.

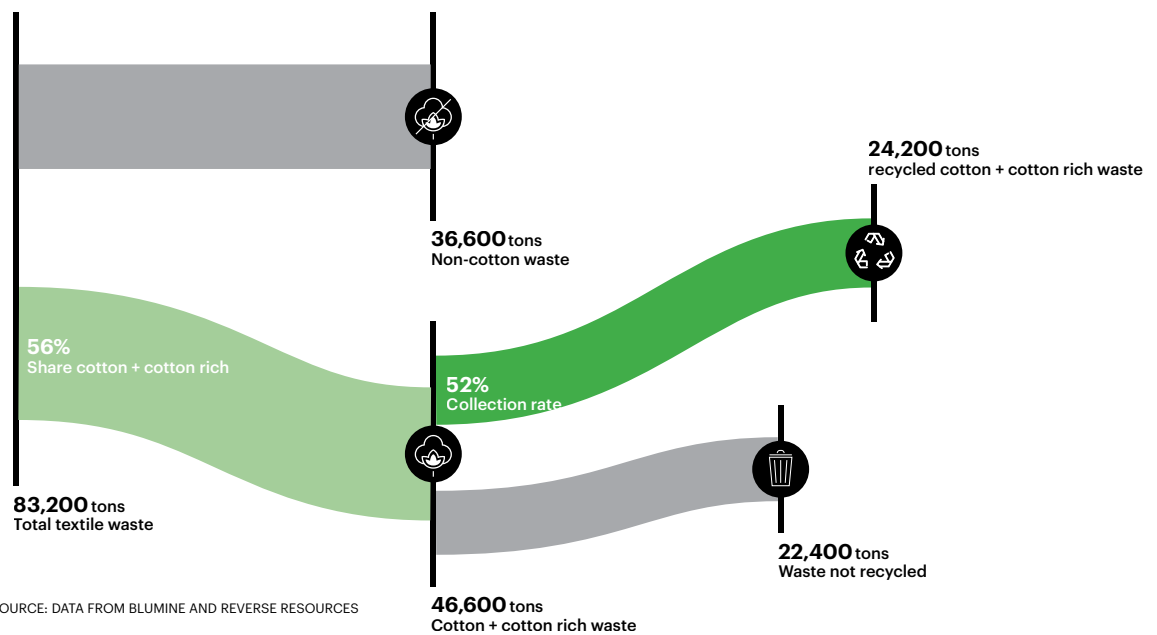


Figure 3 – Estimate of cotton + cotton-rich waste available for recycling into the textile-to-textile value chain

## Outcomes of the textile waste valorization pilot projects

### The pilot projects

The pilot projects were selected in co-operation with AMITH (Association Marocaine des Industries du Textile et de l'Habillement) and the Casa Moda Academy in Morocco. The three pilot projects were designed and implemented with the aim of testing and demonstrating the economic, technical and environmental benefits of three different circular business models: fashion-to-fashion fibre recycling, industrial symbiosis for valorizing textile pre-consumer waste into other value chains (furniture, automotive, construction, etc.), and design for circularity.

The decision to focus the valorization pilot projects exclusively on post-industrial waste (spinning and weaving waste, cutting scraps) and pre-consumer waste (second-quality and defective garments, overproduction, dead stock) as well as on circular design, was motivated by five considerations:

- Dealing with post-industrial waste is the action with the greatest short-term impact on the valorization of textile waste. Recycling post-consumer waste is much more challenging and requires the prior establishment of a complex supply chain for collecting and managing used clothing.
- The volume of resources in post-industrial and pre-consumer waste is huge, and so far untapped.
- Working with post-industrial and pre-consumer waste directly supports companies' competitiveness.

- The valorization value chain created for post-industrial and pre-consumer waste can easily be extended to post-consumer waste in the future.
- Integrating circularity principles at the garment design stage through the adoption of appropriate techniques (use of sustainable fabrics, design for disassembly, up-cycling, etc.) is the most cost-effective strategy for implementing a circular economy in the fashion industry.

### ***Pilot project A: Manufacturing quality open-end yarns with recycled content and testing a local supply network for quality waste***

This pilot project was undertaken with EVLOX, a leading denim manufacturer based in Settat and part of a Spanish group. With an annual production of 15 million metres of premium denim, EVLOX intends to increase the share of recycled cotton fibre in its denim fabrics and explore the potential of investment in a recycling plant.

The pilot project had three goals:

- a. Improving open-end spinning techniques for recycled and virgin cotton blends in order to achieve higher quality yarns from recycled fibres;
- b. Promoting investment in a textile waste recycling line integrated into EVLOX's current production configuration;
- c. Creating a network of garment manufacturers supplying properly segregated and managed textile waste as a feedstock for EVLOX's new recycling line.

#### ***Achievements***

- An investment of over €1 million in a recycling line, decided and planned for 2024.
- Establishment of a waste recycling ecosystem composed of five garment manufacturers committed to and trained in efficient textile waste segregation.
- 160 tons of textile waste collected and segregated for recycling.

### ***Pilot project B: Textile waste recycling for nonwoven products***

This pilot project was undertaken with Novimat, a Moroccan producer of polyester fibre from mechanically recycled PET, with an annual polyester fibre production capacity of 15,000 tons. The company has recently invested in manufacturing equipment for nonwoven products. The pilot project benefited from insights and assistance of other local stakeholders such as CETEMCO (Centre des Techniques et Matériaux de Construction), FNPI (Fédération Nationale des Promoteurs Immobiliers), C2TM (Cluster des Textiles Techniques Marocain), and other companies in the construction industry.

- a. The objectives of the pilot project included: providing technical assistance to improve non-woven textile production processes and product development at Novimat;
- b. Conducting a market study on the opportunities for using recycled textile fibres in the production of non-woven insulation boards for houses;
- c. Evaluating the business case for investing in a textile shredding unit to feed the production of insulation panels and identifying potential investors.

#### ***Achievements***

- A company was trained to improve the efficiency and quality of non-woven production.
- A potential investor was identified, and a business plan delivered.
- Nine potential waste suppliers were identified and five of them were trained in waste segregation and management.
- A market study was conducted for insulation boards in the construction industry, which has an estimated potential of over 500 million Dirhams in Morocco.

### ***Pilot project C: Fashion design techniques and practices for circularity and upcycling***

This pilot project was undertaken with the Casa-blanca fashion school Casa Moda Academy and involved organizing a programme of four workshops for students and teachers. The workshops were held by renowned international experts in circular business models, sustainable materials for fashion, eco-design and upcycling/remanufacturing of fashion items.

The students were guided and tutored in the implementation of upcycling and eco-design projects to produce a capsule collection of clothing, presented at an event held at the school's premises in Casablanca. A selection of the best students' projects was documented with pictures and videos at the Milan White Show during Women's Fashion Week in Milan in January 2024.

#### ***Achievements***

- A local fashion design school was engaged and empowered to teach students about the principles and practices of circular garment design.
- Four training workshops were held with international experts in circular economy and circular materials in the fashion sector.
- Three local companies provided textile scraps and supported the students' projects.
- Six teachers from the Casa Moda Academy were trained in circular design principles and practices.
- Sixteen students were trained and participated in designing a circular capsule collection.
- A student fashion show was held in Casa-blanca and an exhibition was held during Milan Fashion Week.









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## Lesson learned from the pilot projects

The implementation of the pilot projects indicates that the circular business models tested during the implementation of SwitchMed are feasible and potentially scalable in the Moroccan context. A number of critical factors and priorities have also been identified to guide the actions of the roadmap.

The following lessons may be learned, not necessarily listed in order of importance:

- Waste handlers play a crucial role in the circular value chain: an increase in the quantity and quality of the waste collected can hardly be achieved without their involvement.  
The challenge is to make it profitable and convenient for informal waste handlers to transition to more formal, efficient and transparent business models.
- At this stage, fashion brands (donneur d'ordres) are essential in engaging the local supply chain in circular projects. Many Moroccan RMG manufacturers function as subcontractors. They have limited decision-making power and lack awareness and transparency about the destination of their waste after it has been delivered to waste handlers.  
On the other hand, fashion brands are interested in evaluating new projects for sustainability and circular business models provided that they are credible, i.e. that the proposing company has the know-how and the capacity to manage such projects: RMG companies that invest in developing this capacity and know-how gain in competitiveness and can improve their dialogue with brands.
- Individual companies can hardly succeed in implementing a circular business model alone. A collaborative approach is needed, involving all parties – waste suppliers, waste handlers, recyclers, textile companies and garment manufacturers – to behave efficiently and transparently.
- Lack of co-operation and transparency can jeopardize the best efforts and dramatically increase costs.
- Waste segregation at source, i.e. right at the garment manufacturer's facility, is more efficient and can produce economic advantages for all players in the cascading recycling value chain.
- Guidance from experts on sustainability and the circular economy is essential, given the current state of awareness and know-how in the country.

### Opportunities

Pure cotton and cotton-rich waste accounts for 56% of the 83.200 tons of post-industrial and pre-consumer waste generated by the textile value chain in Morocco. The collection rate in international best practice is in the 50%-55% range.

Considering the midpoint of the best practice range and assuming a medium-term 52% collection rate for Morocco leads to a 24,000 tons target for higher-value cotton-rich waste segregated, collected, and recycled locally in the medium term.

### Challenges

The pilot projects have demonstrated that waste segregation at source, i.e. right on the textile or ready-made garments (RMG) company's "factory floor," is more efficient and increases the opportunity to generate value from waste. However, textile and RMG companies do not see segregation as part of their business, and see it as an additional cost, making it difficult to sell the concept of efficient waste segregation and management to these companies. Some form of public support or incentive could help overcome the obstacle.

The competitive landscape in the textile recycling value chain is changing quickly. Several ambitious textile recycling projects were announced in 2023, some in Morocco and others in the broader Mediterranean region and Europe.

- The €60 million investment by the Spanish company Recyclados in an integrated recycling and spinning facility in the Tangier region, supported by the IFC, the International Finance Corporation, part of the World Bank Group.
- The planned €90 million investment by the Portuguese company Valérius Têxteis' in a recycling facility in association with the Moroccan company SG3H.

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Investments in recycling capacity have also been announced in neighbouring countries.

- In Spain, the company Recover specializes in recycling and spinning textiles. It raised new capital in 2023 for a major investment to scale up the production of recycled fibres and yarns to over 350,000 metric tons by 2026.
- Demand for textile waste is expected to rise sharply as the first chemical recycling plants move from demonstration units to industrial-scale investments, such as the Re:Newcell plant already in operation in Sweden, and new players enter the scene, such as Infinited Fiber in Finland and GR3N/ Intecsa in Spain.

The rapid increase in textile recycling capacity and demand for textile waste could trigger a spike in feedstock prices and speculative behaviour on the part of waste handlers, putting the economic viability of investments in the recycling value chain at risk, especially if brands do not accept a higher price for recycled fibres.

On the other hand, an orderly increase in the prices of textile waste and recycled fibres, reflecting the forces of supply and demand without being influenced by speculative positions or lack of market transparency, could serve as a valuable incentive for establishing new recycling facilities.

### *Stakeholder engagement*

Besides the fashion and textile industry, which is the main industry involved in the input phase of the recycling value chain and a key player in higher-value recycled fibres for textile-to-textile applications, other industries could also be involved:

- The furniture and bedding industry uses lower-value recycled fibres to fill mattresses and other upholstered items of furniture such as sofas, chairs, etc.
- The automotive industry uses lower-value recycled textiles in rigid shapes for sound insulation.
- The construction industry is a destination for thermal and acoustic insulation materials that can be produced locally using lower-value recycled textiles to make panels and sheets for application to walls and ceilings.

Guidance from experts on sustainability and the circular economy is essential, given the current state of awareness and know-how in the country.

All the pilot projects were developed with an international mindset, in line with the demands and strategies of global brands. While certain features of the pilot projects exhibit distinct national characteristics, they can be applied across all Mediterranean regions where a significant volume of textile waste is generated through by textile supply chain operators.



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## High-level analysis of textile valorization value chain opportunities for Moroccan industry

The implementation of the pilot projects has clearly revealed the Moroccan textile industry's strengths and weaknesses, as well as a number of business opportunities and potential threats

to be taken into account in defining a strategy and action plan for an efficient and competitive circular textile industry in Morocco.

### *Strengths*

Morocco is an established sourcing destination for global fashion brands.

Transportation costs for textile waste are low in Morocco, as over 75% of textile waste is concentrated in three neighbouring regions.

Good practices exist in Morocco for nonwoven applications.

Proximity to the European market is a valuable advantage over Asian suppliers.

### *Weaknesses*

The valorization of waste flows is limited by non-existent or poor on-site waste segregation and sorting; waste collection is mainly managed by the informal sector.

No traceability system for waste handling and recycling is established in the country, and there are no transparent waste trading platforms available.

Local garment makers and their customer fashion brands are unaware of or do not have information about the destination of the cutting waste after it is delivered to waste handlers.

There is a lack of modern recycling capacities and spinning facilities dedicated to, or specializing in, making yarn from shorter fibres of recycled origin.

Awareness of waste management laws and regulations is poor, and the legal framework for waste management is weak and needs to be modernized to promote circular business models.

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### *Opportunities*

International brands increasingly demand recycled yarns and fabrics for their collections and seek alternatives for responsible waste management.

The Règlement Thermique de Construction au Maroc (RTCM) has created excellent market potential for insulation boards from recycled textiles in the construction sector.

Demand is growing for quality textile waste from local recyclers and brands.

The domestic market for nonwoven applications (automotive, construction, bedding) is growing.

### *Threats*

Investments in textile waste recycling capacities in competing Mediterranean countries are increasing rapidly.

The race has begun to become the favoured circular sourcing destination for global fashion brands.

Waste is a resource that needs to be valorized locally. Large-scale chemical recycling projects are in search of waste.

Figure 4 - SWOT Analysis



# B. ROADMAP





# 3. The way ahead

## Objectives of the roadmap

The roadmap has been developed on the basis of ten main objectives, categorized into four principal areas of priority and expressed through eleven key actions. A card has been created for each action, including a description, a set of key performance indicators (KPIs) and the stakeholders responsible for implementation.

Ten of the eleven action cards are aimed at Moroccan industry and society; an additional action aims to engage international brands in the journey toward establishing an efficient and competitive circular textile industry in Morocco. The table below summarizes the objectives and actions of the roadmap.

Objectives	Roadmap actions
Establish a clear and modern regulatory framework for efficient and transparent textile waste management and recycling.	1,2
Boost the domestic demand for textile products with recycled content.	3,4
Reduce waste generation in textile and RMG manufacturing.	5
Expand recycling capacity and modernize recycling equipment to increase productivity, quality and profitability.	6
Increase the volumes of textile waste collected and directed to recycling.	7,8
Integrate sustainability and circularity in the education system for future technicians, engineers, product managers and fashion designers.	9
Raise awareness of the textile value chain business actors on circularity to promote new initiatives and partnerships.	10, 11

Figure 5 - Roadmap objectives and actions

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# Toward an efficient and competitive circular textile industry

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## 1 – Reform of Law No. 28-00 on waste management and disposal

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<b>Type of action</b>	Policy instrument
<b>Description</b>	<p>Notwithstanding some later modifications regarding the definition of hazardous waste and regulations restricting waste imports and exports, the structure of Morocco's legal framework for waste management is still based on Law No. 28-00, introduced 24 years ago and primarily concerned with safe dumping of hazardous waste in landfills. The reform and modernization of the law are critical factors for developing an efficient and effective ecosystem for valorizing textile waste in the country. It will be essential to bring the law into line with the principles introduced by the most recent developments in waste management regulation in the EU and other Mediterranean countries such as Egypt and Tunisia.</p> <p>The key innovations of a reformed waste management law should be the introduction of principles such as "polluter pays" and "extended producer responsibility", as well as clear criteria for "end of waste" status.</p> <p>Further key provisions include:</p> <ul style="list-style-type: none"><li>• The establishment of a public register of licenced textile waste recyclers.</li><li>• The introduction of a mandatory industrial waste register for textile and garment manufacturers.</li><li>• The obligation for companies in the recycling supply chain to disclose information on the volumes and types of waste generated, delivered, traded, and recycled to a newly established national waste management authority.</li><li>• A clear framework for textile waste management and trade in the free trade zones to facilitate transparency in the textile recycling sector.</li></ul>
<b>Objective</b>	Establish a clear and modern regulatory framework for efficient and transparent textile waste management and recycling.
<b>KPIs</b>	Law approved, executive decrees issued, and creation of the national waste management authority.
<b>Key stakeholders</b>	Government institutions and ministries, waste handlers, recyclers, textile and garment companies.

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## 2 – Upgrade the waste handlers’ subsector by promoting the integration of informal recycling operators

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<b>Type of action</b>	Policy instrument
<b>Description</b>	<p>A considerable proportion of the recycling value chain still operates on the informal market, which limits overall efficiency and significantly reduces the transparency and traceability of the value chain. Policy actions aimed at integrating the informal sector represent a real challenge for governments. On the other hand, they can contribute to creating a favourable environment for the gradual integration of informal businesses into the formal economy, promoting efficiency and transparency while improving the well-being of workers. Finally, these actions can contribute to upgrading and aligning the informal sector with a circular vision and market for textiles.</p> <p>Dedicated policy instruments could include:</p> <ul style="list-style-type: none"><li>• Establishment of a national register of waste handlers and collectors, following licencing and compliance inspection procedures.</li><li>• Guidelines and mandatory requirements for the segregation and collection of post-industrial waste.</li><li>• Provision of financial micro-credits to support the aggregation of the Informal sector, alongside training in the fields of traceability, digitization and transparency.</li></ul>
<b>Objective</b>	Establishment of a clear and modern regulatory framework for efficient and transparent textile waste management and recycling.
<b>KPIs</b>	Implementation of regulations/guidelines, number of licenced waste management companies, number of employees of formalized waste handling operations.
<b>Key stakeholders</b>	Government institutions and ministries, specialized government agencies and task forces, SMEs and micro companies, and workers in the informal sector.



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### 3 – Green public procurement incentives for textile-to-textile recycled applications

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<b>Type of action</b>	Policy instrument
<b>Description</b>	<p>In addition to the direct impact of Law No. 28-00, other policy instruments can function as catalysts for domestic demand for recycled fibres. An example is the introduction of “green public procurement” regulations as part of public expenditure, setting specific criteria such as a minimum recycled content for textile products and uniforms purchased by the public administration. Establishing green procurement regulation at municipal/regional/national level will increase the national demand for fabrics/garments with recycled content, stimulating the expansion of textile waste recycling value chains.</p>
<b>Objective</b>	Boost the domestic demand for textile products with recycled content.
<b>KPIs</b>	Share of “green purchases” in the public administration’s overall purchases of textiles and garments.
<b>Key stakeholders</b>	Government bodies and public administration at municipal/regional/national level.

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### 4 – Enforcing Decree No. 2-13-874 Règlement Thermique de Construction au Maroc (RTCM)

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<b>Type of action</b>	Policy instrument
<b>Description</b>	<p>Morocco recently adopted a new law for the construction sector to promote energy-efficient green building. According to the data collected during the pilot projects, the law is still insufficiently applied, and only a small number of the new buildings in Morocco actually comply with the RTCM.</p> <p>The law is a crucial driver in boosting the demand for recycled textile waste (particularly lower quality waste that can only be used for non-woven application) that can be used in Morocco for the production of insulation boards. This measure will be economically attractive for the construction sector in Morocco considering that the country currently imports the majority of insulation boards placed on the market.</p>
<b>Objective</b>	Boost the domestic demand for textile products with recycled content..
<b>KPIs</b>	Percentage of new buildings compliant with the RTCM.
<b>Key stakeholders</b>	Government bodies and administrations, construction companies, architects, property developers.

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## 5 – Investing in material efficient technology and software

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<b>Type of action</b>	Market-based incentives for investments
<b>Description</b>	<p>Modern digital and automated systems, such as pattern-making software and automated cutting machines, will help to substantially reduce waste volumes and save fabrics at source for garment manufacturers. For example, CAD cutting optimization increases design accuracy during the design process and creates a digital pattern that allows the pattern to be manipulated several times without wasting resources or grading. This optimizes the cutting process and reduces the amount of cutting waste. Seamless knitting technology makes it possible to produce ready-to-wear garments without any lateral seams, as it eliminates seam production (cutting and sewing). In addition, it minimizes the risk of defects and damage, resulting in almost zero fabric waste.</p> <p>Implementing state-of-the-art technology for preventing cutting waste at source requires investment. Green investments can be fast-tracked or prioritized in existing investment incentive schemes. Incentives in the form of grants, low interest loans, guarantee schemes or accelerated depreciation can be a determining factor.</p>
<b>Objective</b>	Reduce waste generation in textile and RMG manufacturing.
<b>KPIs</b>	Total value of investments leveraged.
<b>Key stakeholders</b>	Government institutions and ministries, specialized government agencies and task forces, textile and garment manufacturers.

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## 6– Incentivize investment in recycling equipment

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<b>Type of action</b>	Market-based incentives for investments
<b>Description</b>	<p>The business plan prepared for the pilot projects demonstrated that investment in mechanical recycling equipment quickly pays back. Based on the volume of textile pre-consumer waste generated in Morocco, there is the potential to establish approximately</p> <p>15 new recycling units located within the three key regions with a high concentration of textile industries, Casablanca, Tangier and Rabat-Fes-Meknes. However, the amount of investment required can be high for SMEs. Green and resource-saving investments could be fast-tracked or prioritized in existing investment incentive schemes. Incentives in the form of grants, low interest loans, guarantee schemes or accelerated depreciation could be a determining factor.</p>
<b>Objective</b>	Expand recycling capacity and modernize equipment to increase productivity, quality and profitability.
<b>KPIs</b>	Total value of investments leveraged.
<b>Key stakeholders</b>	Government institutions and ministries, specialized government agencies and task forces, recyclers, textile and garment manufacturers.

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## 7 – Efficient waste segregation and management procedures at garment factories

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<b>Type of action</b>	Training and awareness raising
<b>Description</b>	<p>Waste segregation at source has proven to be a fundamental prerequisite for reducing waste management costs and increasing the value of waste delivered to the recycler. However, garment manufacturers may be reluctant to commit to auditing and training sessions, which tend to be perceived as a pure cost in the short term.</p> <p>A national training programme in textile waste segregation should be planned to promote the circular economy. It could include “training the trainers” and grant incentives for company audits of waste management procedures, hands-on in-factory training, and verification of the implementation of quality waste management procedures.</p> <p>A national certificate or quality label in waste management could also be established for companies that successfully complete the audit, training, and verification stages.</p> <p>The activities mentioned in this action have a clear link with the digitization of waste management procedures, information flows and trade infrastructures (action sheet 8).</p>
<b>Objective</b>	Increase the volumes of textile waste collected and sent for recycling.
<b>KPIs</b>	Number of companies trained.
<b>Key stakeholders</b>	Government institutions and ministries, specialized government agencies and task forces; textile business associations, textile schools and technical research institutes; textile companies and garment manufacturers.

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## 8 – Waste management infrastructure for textile waste aggregation and traceability

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<b>Type of action</b>	Market-based incentives for investment
<b>Description</b>	<p>The circular textile value chain is not limited to waste segregation and shredding. It requires significant physical infrastructure, such as storage and logistics hubs, and digital infrastructure, including monitoring and traceability systems and platforms, as well as dedicated marketplaces for trading and exchanging waste.</p> <p>Provide not only economic incentives for logistic hubs, but also training programmes and capacity-building initiatives to help businesses develop the skills required to effectively integrate digital technologies into their supply chains. This action should be planned in conjunction with action 7.</p>
<b>Objective</b>	Increase the volumes of textile waste collected and sent for recycling...
<b>KPIs</b>	The total value of investment leveraged; volumes of waste traded on the digital infrastructure.
<b>Key stakeholders</b>	Government institutions and ministries, specialized government agencies and task forces, waste handlers, recyclers, textile and garment companies, software publishers and digital platforms.



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## 9 – Introducing circular business models and design for circularity into higher education curricula

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<b>Type of action</b>	Training and awareness-raising
<b>Description</b>	<p>The principles and practices of sustainability and circularity for textile and fashion processes and materials must be integrated into higher education course curricula for textile engineering and management and Technical Vocational Education and Training (TVET).</p> <p>This includes the development of higher education courses focused on sustainability and circularity for aspiring fashion designers.</p> <p>A complementary activity to building the national circularity skills of local designers is the implementation of educational campaigns to inform, educate, and inspire individuals about the benefits of textiles from recycled rather than virgin fibres and the preference for durable rather than disposable garments. The aim is to create a local culture among</p>
<b>Objective</b>	Integrate sustainability and circularity into the education system for future technicians, engineers, product managers and fashion designers.
<b>KPIs</b>	Number of courses taught, number of students attending.
<b>Key stakeholders</b>	Ministry of Education, universities, fashion and design schools.

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## 10 – Awareness-raising actions targeting the Moroccan textile, garment, and apparel manufacturing ecosystem

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<b>Type of action</b>	Training and awareness-raising
<b>Description</b>	<p>The following activities will be implemented, primarily targeting the Moroccan business community and society as a whole:</p> <ul style="list-style-type: none"><li>• Workshops on eco-design practices, proper waste management, and opportunities for valorization.</li><li>• Dissemination of case studies, good practices, and guides or toolkits on the transition to circular business models in the textile industry.</li><li>• Communication campaigns involving local companies, international brands and technology providers.</li><li>• Social media campaigns targeting millennials and young generations, involving international sustainability ambassadors from international brands and local companies committed to sustainability and the circular economy.</li></ul>
<b>Objective</b>	Raise awareness of circularity among business actors in the textile value chain to promote new initiatives and partnerships.
<b>KPIs</b>	Number of events, number of companies participating in the events.
<b>Key stakeholders</b>	AMITH (Association Marocaine des Industries du Textile et de l’Habillement), Ministry of Industry, Ministry of Environment, civil society actors (NGOs), consumers’ associations, citizens..

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## 11 – Involving international brands in circular economy projects

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<b>Type of action</b>	Communication outreach
<b>Description</b>	<p>Launch a communication plan targeting international brands sourcing from Morocco, demonstrating achievements and capabilities of the Moroccan textile industry in terms of sustainability and the circular economy, in order to establish new partnerships.</p> <p>Brands play a crucial role in engaging the local supply chain in circular projects. Much of the Moroccan RMG industry operates as subcontractors with limited independence when it comes to decision-making. Conversely, brands are keen to evaluate new projects and establish collaboration with their suppliers and other actors in the textile recycling value chain to move forward with circular business models.</p>
<b>Objective</b>	Raise awareness of circularity among players in the textile value to promote new initiatives and partnerships.
<b>KPIs</b>	Number of brands involved; new partnership/programmes launched.
<b>Key stakeholders</b>	Ministry of Industry, AMITH (Association Marocaine des Industries du Textile et de l’Habillement), international organizations (e.g. UNIDO), brands, donors.

## Implementation timeline

The implementation of the roadmap is organized in phases according to the priority of intervention. All but one of the measures are short-term priority interventions for 2024-2027, while approximately 40% of the measures are expected to

continue over the period 2027-2030 to generate the impact required to transform the recycling value chain into an efficient, modern circular economy.

	Priority 2024-2027	Advanced 2027-2030
Establish a clear and modern regulatory framework for efficient and transparent textile waste management and recycling.	✓	✓
Boost domestic demand for textile products with recycled content.	✓	✓
Reduce waste generation in textile and RMG manufacturing.	✓	
Expand recycling capacity and modernize recycling equipment to increase productivity, quality and profitability.	✓	
Increase the volumes of textile waste collected and sent for recycling.	✓	✓
Integrate sustainability and circularity into the education system for future technicians, engineers, product managers and fashion designers.	✓	✓
Raise awareness of circularity among business actors in the textile value chain to promote new initiatives and partnerships.	✓	



