SCIRT.

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Deliverable 5.5 Set of guidelines and recommendations on key policy interventions



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Keywords

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Abbreviations and acronyms

Acronym	Description
DPP	Digital Product Passport
ESPR	Ecodesign for Sustainable Products Regulation
EPR	Extended Producer Responsibility
F2F	Fibre to fibre recycling
GRS	Global Recycling Standard
PRO	Producer Responsibility Organisation
SME	Small and Medium Enterprise
WFD	Waste Framework Directive

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1 Introduction

The EU Strategy for Sustainable and Circular Textiles envisions textiles that are durable, recyclable, to a great extent made from recycled fibres and free from hazardous substances, with a focus on phasing out fast fashion and promoting reuse and repair services. The industry, while driving economic growth, remains resource-intensive and polluting. Key challenges include resource use, chemical pollution, waste, greenhouse gas emissions, and poor labor conditions. The SCIRT project exemplifies textile-to-textile recycling, supporting circular economy practices and regulatory goals to foster a greener, more resilient European textile industry.

1.1 Context and Problem statement

The EU Strategy for Sustainable and Circular Textiles (March 2022) aims for circular fashion by 2030, with the Ecodesign for Sustainable Products Regulation (ESPR), effective July 2024, playing a crucial role in implementing the strategy's objectives. It enforces eco-design criteria for textiles, including a ban on the destruction of unsold goods and promotes sustainable practices through Digital Product Passports. The upcoming ESPR delegated acts will set standards for recyclability, recycled content, durability, and reusability, requiring advancements in recycling technologies. However, the transition to a circular textile economy faces challenges in material selection, design, and lifecycle management, requiring coordinated industry efforts and strong policy measures.

Key challenges include:

- **Limited collection and sorting capacity:** hampers recycling, and most textiles are made of blends, which cannot be recycled into high-quality fibres.
- **Lack of sufficient recycling capacity and technologies and need for R&D** investments to further develop Fibre-to-fibre recycling.
- **Lack of public awareness**: more public attention must be drawn to the environmental impacts related to fashion consumption, encouraging more sustainable purchasing and use behaviour.
- **Lack of a level playing field**: the high cost of recycled fibres and competition from cheap fast fashion makes cost-effectivity of recycling challenging.
- **Lack of transparency**: companies, as well as customers have limited knowledge of the environmental impacts and sustainability of the products they purchase.
- **Inadequate textile waste management**: only a fraction of textile waste is separately collected and less than 1% of textile waste is recycled, while most used textiles get exported outside Europe where a significant part is burned or landfilled.

This document compiles insights from the SCIRT project, gained from stakeholders on advancing a sustainable textile industry, highlighting recommendations, required changes, and how SCIRT's results could contribute to a more resilient European Textile industry through circular economy practices, transparent supply chains, and regulatory alignment.

Since the launch of SCIRT, progress has been made at the EU level, including a revision of the Waste Framework Directive (WFD) and the introduction of Extended Producer Responsibility (EPR) initiatives in different EU Member States. However, SCIRT's insights, gathered over the past four years, remain highly relevant for refining these policies, closing existing gaps, and accelerating the industry's transition toward full circularity and sustainability.

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1.2 Laying the foundation for a sustainable and circular textile economy

The SCIRT project aimed to address key challenges in the textile industry, such as the overuse of virgin fibers, low recycling rates, and lack of transparency, which hinder the industry's ability to meet the EU's ambitious sustainability objectives. By developing practical solutions, SCIRT sought to close the gaps between the current state of the industry and the EU's goals, contributing to a more circular and responsible fashion industry. The project focused on four critical areas essential for success: eco-design, sorting and recycling, business models, and extended producer responsibility (EPR), forming the foundation for achieving a sustainable and circular textile economy.

- SCIRT promotes design practices that enhance recycling and reduce environmental impact, focusing on low-impact fibers, durability, repairability, and timeless styles, while phasing out harmful chemicals to support a circular system.
- SCIRT improves sorting and recycling efficiency by designing products for recycling, enhancing sorting and dismantling technologies, advancing recycling technologies to ensure materials are reintegrated into production.
- SCIRT develops sustainable business models that enable waste prevention, longer use, recycling, and social justice, fostering collaboration, transparency, and traceability across the value chain.
- SCIRT supports an EPR framework to ensure textiles meet eco-design and performance standards, aiming for a harmonized regulatory approach across the EU to drive sustainability and circularity.

Addressing all of these focus areas via research and technology development, complemented with continuous validation and input from external experts across the value chain as well as the general public via dedicated events, such as User Boards and Citizen Labs (D5.2 & D5.3)[1], enabled the SCIRT project to gain insights and actionable results that can serve as integral components that could be used when implementing the EU strategy to achieve a circular textile economy.

[1] Chiba, S., Pérez, E., & Brand, C. (2024a). *D5.3 Final Report on User Board workshops*. SCIRT. https://scirt.eu/resources/
Chiba, S., Pérez, E., & Brand, C. (2024b). *D5.2 Description of findings of the consumer behavioural flow interventions*. SCIRT. https://scirt.eu/resources/

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2 SCIRT´s strategic approach

In the initial stage of the project, SCIRT described the state-of-the-art of the fashion system, assessed market needs for recycled fibers and created a vision and roadmap for a circular fashion system using a backcasting approach. This vision was validated by experts and aligned with the EU textile strategy and the Ecodesign for Sustainable Products Regulation (ESPR).

This approach laid a strong foundation for understanding the current state of the textile industry, helping to identify key gaps and opportunities for advancing sustainability, such as critical factors for successful fiber-to-fiber recycling and gaps in eco-design standards, transparency, certifications, textile collection, recycling processes, eco-modulation, and EPR. These gaps were further explored through ongoing engagement with external experts, value chain actors, and the public throughout the project.

Regular interaction with stakeholders across the textile value chain ensured the integration of the latest industry insights while capturing valuable consumer perspectives on purchasing habits, garment disposal, textile recycling, and potential behavioural changes.

This comprehensive approach not only revealed an urgent need and shared desire for systemic transformation across the entire value chain from production to recycling, but also pinpointed specific areas where improvements are critical to achieving a circular textile economy. These elements are listed in Table 2.

Table 1: Elements of a Circular Fashion System

Elements of a Circular Fashion System	
Low impact fibres	**Waste prevention**
Use of recycled fibres	Minimising overproduction
Use of renewable fibres	Minimising production waste
Reduce micro-fibre shedding	Minimising packaging waste
Low impact processes	Minimising post-consumer waste
Sustainable agricultural practices	**Recycling**
Efficient water use	Design for recycling
Efficient energy use	Improved waste collection and sorting systems
Phase out chemicals of concern	High quality recycling technologies
Recude CO2 emissions	Phasing out waste exports
Reduce transport and logistics	**Social justice**
Longer use of garments	Healthy and safe working conditions
Design for durability	Fair wages
Design for repair	Increased social protection
Long-lasting fashion styles	No forced labour, nor child labour
Re-use and second-hand markets	Non-discrimination
Sharing models (e.g. garment rental systems)	**Value chain collaboration**
	Transparency throughout the value chain
	Traceability of the supply chain
	Partnerships between producers and waste processors

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Building on the stakeholder input and findings, SCIRT identified key focus areas essential for addressing these key gaps and opportunities, with design and production, recycling and EPR emerging as a pivotal phase requiring targeted interventions.

The following section delves into the key focus areas, emphasising the critical elements cited by the stakeholders.

2.1 Design and production

In the design and production phases, key elements identified include eco-design, transparency across the value chain and certification.

Eco-design

The design stage is pivotal for material selection (e.g., recycled, renewable, or fossil-based), construction methods affecting durability and repairability, and ensuring recyclability. Eco-design promotes using low-impact fibers, waste prevention, and extended product life cycles through durable, repairable designs and efficient recycling.

Stakeholders strongly support mandatory eco-design requirements and propose measures for policymakers to consider:

- Develop and enforce EU-wide eco-design standards, including targets for recycled content (e.g. 10% by 2026, 50% by 2030 or similar), however, taking into account durability, repairability, and recyclability.
- Define recycled content standards for individual products, product groups, or companies, allowing flexibility through a modular compliance system.
- Establish a monitoring and verification system to ensure adherence to eco-design and recycled content standards.
- Mandate design for recycling and limit fiber types and blends to enhance recyclability.
- Encourage local recycling.
- Ban harmful chemicals and monitor for their presence in recycling; set limits on microplastics release from textiles.
- Enforce an import ban on low-quality apparel to reduce fast fashion's environmental impact by requiring minimum durability standards.

Transparency

Experts and consumers emphasized the need for greater transparency in the textile industry. Key measures include:

- Digital Product Passports: Mandatory by 2030, these should provide detailed information on fibers, chemicals, production locations, working conditions, and recycled content, alongside simplified consumer-friendly scores (e.g., repairability and wearability) to support informed purchasing.
- Standardised labels: consistent labels and certifications to educate consumers on sustainability and combat greenwashing.
- Awareness campaigns: EU-wide initiatives to promote transparency in production, recycling, and garment disposal, encouraging honest brand communication.

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- Sustainability education: partnerships between schools and the fashion industry to foster conscious consumption among young people.

This approach ensures transparency across technical, environmental, and social factors while empowering consumers and promoting industry accountability.

Certification

Stakeholders deemed increased use of sustainability certifications essential to promote recycled content, reduce environmental impact, and ensure controlled value chain conditions, combating fast fashion. Fashion brands rely on these certifications to guarantee quality, with stakeholders valuing the following in the textile industry:

- GRS (Global Recycling Standard)
- GOTS (Global Organic Textile Standard)
- OEKO-TEX

To streamline the use of certificates, the stakeholders suggested the following measures:

- Mandate certification and labeling for all textiles, domestic and imported, monitored by independent organizations to guide sustainable consumer choices.
- Limit the number of certifications to avoid overwhelming consumers, with legislation requiring brands to use meaningful certifications ensuring ethical production.
- Create harmonized, reliable, and mandatory certification schemes for consistent, trustworthy standards.
- Establish a single EU eco-label with unified calculation methods and requirements for recyclability, durability, recycled content, and environmental footprint.
- Set mandatory sustainability standards and streamline certification to be affordable and accessible, with regulatory and financial support for smaller companies to comply.

2.2 Recycling

In the recycling phase of the value chain, stakeholders identified significant gaps in collection, sorting, and recycling processes, offering valuable insights to address these challenges.

Collection and Sorting

Starting in January 2025, EU member states are required to collect discarded textiles. The EU faces a shortage of collection sites and advanced sorting technologies are necessary for effective recycling of fibers with new technologies.

To address these challenges, stakeholders proposed the following measures:

- Increasing collection points to facilitate easier disposal of post-consumer textiles and ensure sufficient feedstock for sorting and recycling.
- Educating consumers on proper disposal methods and the fate of discarded textiles through clear communication from the EU and brands.
- Establishing an EU-wide base collection rate (e.g. 20–30%) with country-specific adjustments, aiming for harmonized targets over time.
- Harmonizing recycling legislation to align with reuse and repair objectives.

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- Supporting efficient collection systems that complement, rather than disrupt, reuse and resale models.
- Expanding sorting and dismantling capacities to accommodate increased volumes of collected textiles.

Fibre-to-Fibre recycling

Currently, less than 1% of discarded textiles are reprocessed into high-quality fibers through fiber-to-fiber (F2F) recycling (Ellen MacArthur Foundation, 2017). Despite its potential, significant challenges are hindering F2F recycling, including the prevalence of multi-material fiber blends, and textiles with trims, zippers, and labels made from different materials. Moreover, existing F2F recycling technologies are still under development and not yet commercially viable.

To address these challenges and scale F2F recycling, stakeholders proposed the following measures:

- Establish specific textile recycling targets and minimum recycled fiber content requirements, for example using quota trading and financial incentives.
- Promote investment in advanced recycling technologies.
- Provide subsidies to expand recycling capacity and financial support for smaller companies.
- Enact regulations to retain and recycle raw materials from discarded textiles within the EU, reducing reliance on waste exports.
- Rebuild European textile manufacturing to minimise supply chain disruptions, shorten transport routes, and boost local employment.

2.3 Extended Producer Responsibility for Textiles

EPR schemes are vital for enabling brands to adopt circular strategies such as take-back programs and recycling initiatives. Integrating eco-design requirements and eco-modulated fees into EPR systems can drive sustainable product design and recycling. Stakeholders highlighted the importance of a harmonised and standardised EPR framework to foster sustainability, promote reuse, and ensure accountability across the textile value chain.

Stakeholders proposed the following key recommendations:

- **Harmonization and compliance**:
  - Clarify producer responsibilities and standardize EU EPR schemes, ensuring consistent recycling standards for both EU and non-EU imports.
  - Ensure value chain actors have access to required information, enforcing EU standards across all products on the market.
- **Reuse and lifetime extension**:
  - Provide financial support for lifetime extension measures within EPR schemes.
  - Implement reuse or repair obligations for retailers to prevent reusable repairable items from being prematurely sent for recycling.
  - Establish local reuse quotas for collected post-consumer textiles.
- **Eco-modulation principles**:

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    - Develop clear principles for eco-modulation, including requirements for quality, durability, limited material blending, and repairability.
    - Standardize eco-modulation criteria, impact measurement methods, and databases to reflect true costs.
- **Monitoring and certification**:
    - Use certified data on garment environmental performance, accessible to supply chain actors and consumers.
    - Set consistent certification rules for recycling facilities, requiring regular reporting to Producer Responsibility Organizations (PROs) on recycling performance.
    - Establish a monitoring system to promote high-quality products and restrict those below minimum standards.
- **Implementation timeline**:
    - Define collection roles and responsibilities for viable business models, distinguishing between recycling and reuse.
    - Assign temporary collection responsibilities to producers, importers, or third-party organizations during the transition period (2025–2027) until full EPR obligations are operational.

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3 Key themes and policy recommendations

SCIRT's stakeholder engagement identified three pillars for a circular textile system: harmonization, standardization, and transparency. These pillars support accountability and align with the ESPR to drive circular textile initiatives.

- **Harmonization**: EPR schemes across the EU need to be aligned for consistent recycling standards, including harmonizing textile collection and recycling rate targets, and ensuring recycling and repairability targets complement each other.
- **Standardization**: EU-wide eco-design standards should cover durability, repairability, recyclability, and recycled content, while Digital Product Passports should be standardized by 2030. Consistent, reliable certifications and eco-labels should be mandated, along with eco-modulated fees based on environmental impact.
- **Transparency**: Transparency, through Digital Product Passports and standardized labels, enables informed choices by consumers and businesses, fostering trust and accountability while preventing greenwashing.

The stakeholders emphasized that integrating these elements into ESPR's delegated acts is critical for achieving sustainability goals and fostering a more environmentally conscious textile sector.

Additionally, identifying key themes from stakeholders' and the consortium's needs enabled SCIRT to distill the most pressing gaps hindering circular fashion. This process informed five policy recommendations which were subsequently validated by the SCIRT Advisory Board and consortium:

1. Establish clear definitions and terminology at the EU Level for the textile industry.
2. Establish harmonised EU eco-design standards for all products, including imports, with a strong monitoring system, to ensure compliance on eco-design and recycled content.
3. Establish mandatory recycling rates for textiles.
4. Harmonise Extended Producer Responsibility (EPR) schemes across the EU ensuring consistent recycling efforts and compliance for non-EU imports.
5. Harmonise principles for eco-modulation.

The following sections presents the policy recommendations proposed by stakeholders in more detail.

Table 2: Policy recommendation 1 details

Policy recommendation 1: **Establish clear definitions and terminology at the EU level for the textile industry**
Key objectives: Develop standardised definitions and terminology to ensure clarity and consistency across the textile industry. **Key Actions:** This terminology list should include clear, harmonized definitions for terms listed below, providing a simplified and uniform framework to support industry compliance with the European Sustainable Product Regulation (ESPR).

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The terms:

1. "recycled content"
2. "local sourcing and production"
3. "Recyclability": Define the criteria a product must meet to be considered recyclable, including material composition and ease of disassembly.
4. "Upcycling": Define upcycling standards, where waste materials are transformed into higher-quality or more valuable products.
5. "Ethical Sourcing": Establish clear guidelines for what constitutes ethical sourcing, including labor practices, environmental considerations, and transparency in the supply chain.
6. "Durability": Establish standards for product longevity, specifying under normal use without significant degradation.
7. "Repairability": Define the requirements for a product to be easily repaired, such as availability of spare parts, accessibility to repair services, and modular design.
8. "Circularity": Provide a clear definition of circular economy principles, focusing on product lifecycle management, reuse, and recycling.
9. "Biodegradable": Set strict criteria for what constitutes a biodegradable textile, including timeframes for breakdown and environmental impact.
10. "Post-consumer Waste": Clearly define post-consumer textile waste.

Related insights from SCIRT:
This policy recommendation is overarching and not related to any specific SCIRT technical results.

Table 3: Policy recommendation 2 details

Policy recommendation 2: **Establish harmonized EU eco-design standards for all products, including imports, with a strong monitoring system, to ensure compliance on eco-design and recycled content.**
Key objectives: ● Establish EU-wide eco-design standards for all products, including imports, to promote use of recycled materials, recyclability, durability, and repairability. ● Increase awareness of product lifespan, repairability, and design-for-repair. **Key Actions:** ● Set Minimum Eco-Design requirements: define performance criteria for durability, quality, recyclability and recycled content, allowing companies flexibility with modular compliance options. ● Implement a mandatory recyclability index, based on a modular approach: o Designs should be recyclable (i.e. contain recyclable materials in an assembly allowing high-quality recycling). o Designs should include a minimum percentage of recycled or repurposed materials from post-consumer or post-industrial waste. o Modular approach: allow flexibility for companies to comply to this Recyclability Index using either or both of these options. ● Standardize Materials and Blends for Eco-Design Compliance: o Develop a list of approved materials and blends that support recyclability and proper waste management, favouring mono-materials. **Monitoring System:** Implement a robust, EU-wide monitoring and verification system to ensure full compliance with the established eco-design requirements and Recyclability Index.

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- This system should regularly audit and track product compliance, ensuring transparency and accountability across the value chain.
- Limit the sale and distribution of products that do not meet the requirements, ensuring only compliant products are allowed on the EU market.
- Non-compliant products should be subject to penalties, including market restrictions, fines, or mandatory improvements to meet the requirements.
- Mandatory requirements should be set at EU level and a certification scheme for all products brought on the EU market should be streamlined.

Related insights from SCIRT:

- SCIRT provides practical tools, such as a step-by-step circular design guideline, enabling brands to meet EU eco-design objectives. These tools cover circular principles, including repairability, durability, and recyclability, and can be aligned with certification or ecolabelling standards.
- SCIRT has developed an interactive True Cost Calculator tool, based on lifecycle impact assessment, allowing designers to quantify the environmental and social impacts associated with a garment's lifecycle. This tool enables data-informed decision making on material choice and quality (translated to technical lifetime), manufacturing processes, and end-of-life options, aiming at reducing external costs and navigating trade-offs.
- SCIRT has prepared a list with a selection of low-impact fibres and alternatives for elastane that support recyclability and reduced environmental impact.
- SCIRT has piloted new garment designs, made of recycled fibres, as well as investigated alternative business models to ensure financial viability for circular systems, defining roles across the circular value chain and identifying industry-specific limitations. However, while the objective of SCIRT was to develop new garments made from a minimum of 50% recycled fibres, the results show that this is not possible for all garment types without compromising on yarn specifications (e.g. thickness) or quality.
- SCIRT monitored the presence of possible chemicals of concern in the recycled textile fibres. While all samples met the REACH regulation, particular attention needs to be paid to the sorting process and recycling process to prevent any unwanted substances to (re)circulate, especially for brands that want to comply with certification labels such as OEKO-TEX.

Potentially suitable policy instruments, according to the stakeholder consultation:

- Promoting Low-Impact Fibers:
  - Implement mandatory regulations to reduce micro-fiber shedding and set minimum requirements for recycled and renewable fiber usage.
  - Introduce economic incentives, such as tax breaks for recycled fibers and taxes on used textile exports, to encourage the adoption of circular materials.
  - Allocate government funding for fiber research and expand regulatory audits to cover raw materials, chemicals, and production processes.
  - Develop a digital product passport with transparency on production, chemicals, and supplier traceability, enhancing consumer labeling and informed choices.
  - Foster a European fiber market by imposing strict EU production standards, controlling imports, and restricting post-consumer textile exports to encourage local recycling and innovation.
- Advancing Circular Design:
  - Enforce mandatory ecodesign requirements with a focus on durability, repairability, and the inclusion of post-consumer textile content.

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  - Support voluntary ecodesign guidelines and establish new product standards to complement existing ones like the Global Recycled Standard (GRS).
  - Provide financial incentives for brands adopting circular models, such as tax breaks for second-hand sales and repair services.
- Encouraging Sustainable Processes:
  - Mandate regulations for low-impact processes, including banning harmful chemicals and introducing due diligence guidelines for sustainable practices.
  - Offer grants and financial incentives to support energy and water-efficient production and encourage sustainable farming practices.
  - Promote local production within Europe to enhance traceability, reduce transport emissions, and support local jobs and skills.
- Reducing Fast Fashion:
  - Consider policies to limit the number of collections per year and encourage the production of timeless, high-quality, and durable garments.
  - Mandate repair services from retailers and integrate repair education into school curricula to foster a culture of reuse and prolonged product life.
- Educating Consumers:
  - Enhance consumer awareness through product labeling that highlights recycled content, environmental impacts, and repairability.
  - Encourage responsible purchasing and reduced consumption by aligning pricing with the true environmental and social costs of garments.
- Extended Producer Responsibility (EPR):
  - Implement EPR schemes that prioritize repairability, incentivize second-hand sales, and incorporate the environmental impacts of production and end-of-life processes.

Table 4: Policy recommendation 3 details

Policy recommendation 3: Establish mandatory recycling rates for textiles
Key objectives: To build a robust textile recycling system across the EU, mandatory recycling targets need to be established, supported by strategic subsidies, incentives and innovation investments. **Key actions:** ● Set eco-design requirements on recyclability. ● Phase out waste exports towards developing countries to assure adequate waste management and development of a strong recycling market in Europe. ● Make sure used textiles are separately collected and sorted into different fibre fractions, in order to allow high quality recycling and re-spinning into high-quality garments. ● Support overall improvement of sorting and recycling technologies. **Related insights from SCIRT:** ● SCIRT has demonstrated a complete textile-to-textile recycling system, addressing previously downcycled or incinerated textiles and engaging all value chain players to improve value retention. The project has showcased advanced recycling processes for natural, synthetic, and blended fibers. It has also piloted industrial-scale yarn and garment production with ambitions levels of recycled fiber use, exploring technical feasibility and demonstrating economic viability.

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- SCIRT has developed and piloted efficient sorting and dismantling systems, including Fibersort and Trimclean, allowing improved material categorization, cleaning, and preparation for recycling with high accuracy and scalability.
- SCIRT has developed interoperable data-sharing guidelines aligned with the Digital Product Passport (DPP) to ensure accessible reverse supply chain data for improved sorting and recycling processes.

Potentially suitable policy instruments, according to the stakeholder consultation:
There is strong support for government action on phasing out waste exports and improving waste collection systems. Most stakeholders favor non-mandatory policies for design for recycling (e.g., mono-materials) and high-quality recycling technologies. However, support is high for mandatory collection of used textiles, with separate reuse and recycling targets and waste disposal regulations for consumers, potentially supported by deposit systems.

- Subsidies and financial support for investments: Provide subsidies and financial incentives to companies, particularly SMEs, to help build recycling capacities and markets for recycled fibers. This will encourage investments in recycling infrastructure, improve resource efficiency, and support the scaling of textile recycling. Tax incentives could help leading companies set the pace.
- Support technology and innovation: invest in technologies and promote innovation to support textile recycling and closed-loop systems. Ensure that sufficient financial and technological investments are brought into the EU market to meet recycling demands.
- Incentives for high sustainability standards: offer additional financial incentives to companies that exceed the minimum recycling rates or meet high sustainability benchmarks, encouraging industry leadership and innovation.
- Flexible quota trading: allow organizations to trade recycling quotas if one company falls below the minimum recycled content requirement, offering flexibility for compliance while maintaining overall targets.

Table 5: Policy recommendation 4 details

Policy recommendation 4: **Harmonise Extended Producer Responsibility (EPR) schemes across the EU ensuring consistent recycling efforts and compliance for non-EU imports.**
Key objectives: • Define producer responsibility within the supply chain and ensure that non-EU imports comply with EU standards. • Establish a feasible interim solution which includes a phased approach to the long-term solution (collection responsibility in the period 2025 – 2027/28 until the PRO´s responsibilities and requirements are established and ready for implementation).
Key actions: • Define clear roles and responsibilities for all stakeholders involved in the collection and sorting of textiles (producers, collection facilities, sorters, and recyclers). • Establish collection models to efficiently handle textiles destined for recycling, resale, or reuse ensuring accountability at each stage of the process. These models should streamline sorting and handling procedures, enabling textiles to be processed according to their potential for reuse, repair, or recycling, ensuring optimal resource use and minimal waste. • Establish an Extended Producer Responsibility (EPR) policy and set standardized sorting requirements to identify and divert repairable and reusable items from recycling, extending their lifecycle and reducing environmental impact.

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- Establish an EU-level standard collection rate for textiles, ranging from 20% to 30%, to be implemented gradually over time. Set a timeline for member states to progressively increase collection rates with country-specific targets aligned to EU standards, fostering improved textile recycling and reuse practices across the EU.

Related insights from SCIRT:

- SCIRT has developed an EPR framework which establishes clear roles and responsibilities for governments and Producer Responsibility Organizations (PROs), ensuring effective implementation and stakeholder accountability.
- SCIRT has defined key success factors for an effective EPR scheme, including:
    - long-term legal frameworks (15-year horizon) to provide stability, promote infrastructure development, and secure stakeholder engagement,
    - specific and achievable collection, reuse, and recycling targets,
    - true cost based eco-modulated fees and transparent cost structures to incentivize eco-design while reflecting end-of-life costs,
    - reliable monitoring, enforcement, and data systems, enabling accurate reporting and preventing non-compliance.

Potentially suitable policy instruments, according to the stakeholder consultation:
The current fashion system's focus on overproduction and discounting leads to waste and overconsumption. To address this, restrictions on sales and discounts, penalties for unsold stock, and a ban on destroying unsold items are proposed. Brands should reduce production volumes, adopt on-demand manufacturing, and design durable, repairable, and recyclable products, with EPR schemes enforcing these criteria. Quality controls on imported textiles are also needed. Consumers should be encouraged to reduce consumption by removing incentives like sales promotions.

Table 6: Policy recommendation 5 details

Policy recommendation 5: Harmonise principles for eco-modulation

Key objectives:
Establish harmonized principles for eco-modulation across the EU to drive sustainable practices in the textile industry, with tailored support for companies of varying sizes, including SMEs.

Key actions:

- Set clear eco-modulation standards: define core objectives and set minimum criteria for eco-modulation, focusing on key parameters like recyclability, product quality, longevity, material content, durability, and repairability.
- Tailored requirements for SMEs: adjust eco-modulation requirements based on company size, providing flexibility for SMEs to comply effectively with eco-design standards.
- Support for SMEs: offer targeted support to SMEs through subsidies, technical assistance, and phased timelines, enabling a smooth transition to sustainable practices across companies of all sizes.

These measures will standardize eco-modulation across the industry while promoting inclusive sustainability compliance.

Related insights from SCIRT:
SCIRT has developed the True Cost Calculator tool and underlying calculation model, allowing quantification and monetization of environmental and social externalities, revealing the real societal costs of garments throughout their lifecycle, as well as identifying the most harmful

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(production) stages and highlighting opportunities for improvement. Results from this tool can inform eco-modulation systems for EPR.

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4 Conclusion

This policy report, developed through continuous engagement with stakeholders during the SCIRT project, provides a roadmap to guide the EU in fostering a sustainable, circular textile industry. By addressing critical gaps and leveraging SCIRT's stakeholder insights, the EU can align with its circularity goals while driving environmental efficiency, innovation, and market transformation.

Key boundaries and limitations

While the SCIRT project's stakeholder engagement has made significant progress in identifying gaps and proposing actionable recommendations, certain limitations must be acknowledged:

- **Scope of influence**: SCIRT's recommendations are advisory, relying on policymakers, industry actors, and stakeholders to adopt and implement them.
- **Technological and economic barriers**: many key actions require significant investment, which may not be immediately feasible for smaller companies or less-developed regions.
- **Regulatory challenges**: aligning policies and implementation across EU member states remains complex due to differing national priorities and infrastructure.
- **Consumer behavior**: achieving circularity depends on consumer awareness and behavioral change, requiring sustained educational efforts.
- **Global market dynamics**: the global nature of textile supply chains presents challenges to localizing production, reducing waste exports, and building robust EU recycling infrastructure.

Implementation strategies

The SCIRT project has identified the following actionable measures to drive progress in the textile industry's transition to sustainability and circularity:

- **Clear definitions**: establish precise definitions for terms like sustainable, circular, and durable fashion to combat greenwashing and ensure clarity.
- **Sector-wide targets**: introduce mandatory or voluntary targets for recycled content in textiles.
- **Product norms and standards**: develop benchmarks to support sustainable procurement and ban non-compliant products.
- **Digital Product Passports**: mandate traceable, transparent product information to support end-of-life waste processing.
- **Voluntary ecolabels**: harmonize labels to guide consumers and reduce misleading claims.
- **Collaboration**: encourage partnerships across the value chain to improve recycling loops and drive innovation.
- **Support for SMEs**: provide financial and technical assistance to help smaller companies adopt sustainable practices.
- **Recycling infrastructure**: establish Producer Responsibility Organizations (PROs) and mandatory recycling rates to enhance recycling capacity and reduce waste exports.

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- **Balanced policy instruments**: combine legal, financial, and voluntary measures to ensure compliance and support long-term change.

Key outcomes and benefits

- **Reduction in textile waste**: sustainable product design enhances recyclability, extends product lifespans, and minimizes waste.
- **Market transformation**: regulations and incentives foster innovation and sustainable business models.
- **Consumer empowerment**: transparent labeling empowers consumers to make informed, environmentally responsible choices.
- **Enhanced environmental efficiency**: unified eco-design standards reduce resource consumption and environmental impacts and increase the yield of recycling processes
- **Fair competition**: consistent EU-wide standards level the playing field, especially for SMEs.
- **Flexibility for innovation**: voluntary initiatives encourage companies to exceed minimum requirements.
- **Circular economy development**: standards for recycled content, repairability, and reuse promote sustainable production and consumption.

Path forward

By adopting the policy recommendations outlined in this report, the EU can address persistent challenges, harmonise standards, and create a transparent framework that supports a resilient and innovative textile sector. While progress has already been made through initiatives like the (revised) Waste Framework Directive (WFD) and the introduction of Extended Producer Responsibility (EPR) schemes, SCIRT's stakeholder insights offer a foundation for refining these policies and closing remaining gaps.

This approach ensures accountability, drives meaningful change, and positions the EU as a global leader in sustainable fashion. By aligning regulatory frameworks with industry innovation and consumer empowerment, the EU can achieve significant environmental, economic, and societal benefits, transforming the textile industry into a model of sustainability and circularity.

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References / Bibliography & Appendices

Boschmeier, E. (TU Wien). (2022). *D1.3 identified market needs for recycled fibres*. SCIRT. https://scirt.eu/wp-content/uploads/2022/06/SCIRT-D1.3-Identified_market_needs_for_recycled_fibres.pdf.

Budde, I., Heinen, M., & circular.fashion. (2024). A set of integrated circular design guidelines including visuals and text. https://scirt.eu/wp-content/uploads/2024/07/D4.4-A-set-of-intergrated-Circular-Design-Giudelines-including-visuals-and-text.pdf.

bvse. (2020). Bedarf, Konsum, Wiederverwendung und Verwertung von Bekleidung und Textilien in Deutschland. Bundesverband Sekundarrohstoffe und Entsorgung e.V.

Chiba, S., Pérez, E., & Brand, C. (2024a). *D5.3 Final Report on User Board workshops*. SCIRT. https://scirt.eu/resources/.

Chiba, S., Pérez, E., & Brand, C. (2024b). *D5.2 Description of findings of the consumer behavioural flow interventions*. SCIRT. https://scirt.eu/resources/.

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

Ellen MacArthur Foundation. (2017). A new textiles economy: Redesigning fashion s future.

EU. (2020). Circular Economy Action Plan.

European Commission. (2024, July 19). Textiles strategy. Environment. https://environment.ec.europa.eu/strategy/textiles-strategy_enFinancial Sustainability Assessment of F2F Recycling. WRAP.

Girn T, Livingstone C and AP Benson Limited (2019) WRAP 2017: Economic and Financial Sustainability Assessment of F2F Recycling. Banbury: WRAP.

Harmsen, P., Scheffer, M., & Bos, H. (2021). Textiles for Circular Fashion: The Logic behind Recycling Options. Sustainability, 13(17), 9714. https://doi.org/10.3390/su13179714

https://ec.europa.eu/environment/strategy/circular-economy-action-plan_en.

Jönsson, C., Wei, R., Biundo, A., Landberg, J., Schwarz Bour, L., Pezzotti, F., Toca, A., M. Jacques, L., Bornscheuer, U. T., & Syrén, P. (2021). Biocatalysis in the Recycling Landscape for Synthetic Polymers and Plastics towards Circular Textiles. ChemSusChem, cssc.202002666. https://doi.org/10.1002/cssc.202002666

Köhler, A., Watson, D., Trzepacz, S., Low, C., Liu, R., Danneck, J., Konstantas, A., Donatello, S., & Faraca, G. (2021). Circular economy perspectives in the EU textile sector: Final report. (Vol. JRC125110). Publications Office of the European Union. https://data.europa.eu/doi/10.2760/858144

Manshoven, S. (VITO), & Van Opstal, W. (2022). *D1.4 Vision and Roadmap towards a circular Fashion system*. SCIRT. https://scirt.eu/wp-content/uploads/2022/11/SCIRT-D1.4-Vision-and-roadmap-towards-a-circular-fashion-system.pdf

This project has received funding from the Horizon 2020 Programme under grant agreement n°101003906.

Manshoven, S., Christis, M., Vercalsteren, A., Arnold, M., Nicolau, M., Lafond, E., Mortensehn, L., & Coscieme, L. (2019). Textiles and the environment in a circualr economy. European Topic Centre Waste and Materials in a Green Economy. https://www.eionet.europa.eu/etcs/etc-wmge/products/etc-reports/textiles-and-the-environment-in-a-circular-economy

Nickel, A. L. (2024, July 5). ESPR Guide – What is it & How to prepare (2024 Update) | Ecochain. Ecochain. https://ecochain.com/blog/espr-2024-overview/#:~:text=ESPR)%2520%E2%80%93%25202024%2520Overview-,Ecodesign%2520for%2520Sustainable%2520Products%2520Regulation%2520(ESPR)%2520%E2%80%93%25202024%2520Overview,norm%2520on%2520the%2520EU%2520market.

Piribauer, B., & Bartl, A. (2019). Textile recycling processes, state of the art and current developments: A mini review. Waste Management & Research: The Journal for a Sustainable Circular Economy, 37(2), 112–119. https://doi.org/10.1177/0734242X18819277

Repp, L., Hekkert, M., & Kirchherr, J. (2021). Circular economy-induced global employment shifts in apparel value chains: Job reduction in apparel production activities, job growth in reuse and recycling activities. Resources, Conservation and Recycling, 171, 105621. https://doi.org/10.1016/j.resconrec.2021.105621

Rotimi, E. O. O., Topple, C., & Hopkins, J. (2021). Towards A Conceptual Framework of Sustainable Practices of Post-consumer Textile Waste at Garment End of Lifecycle: A Systematic Literature Review Approach. Sustainability, 13(5), 2965. https://doi.org/10.3390/su13052965

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