Interreg Co-funded by the European Union
Alpine Space

Cradle-ALP

Project Acronym: Cradle-Alp

Project number: ASP0100003

D.2.1.3
Sectoral Cradle2Cradle industrial transformation roadmaps

WP nº:	2
Task nº:	2.1
Transformation roadmap group:	Textiles
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Dissemination level:	PU
Revision:	Final
Due Date:	30.04.2024
Date of submission:	30.04.2024

This project is co-funded by the European Union through the Interreg Alpine Space programme.

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1. Summary

The EU Interreg project Cradle−ALP intends to support small and medium−sized enterprises (SMEs) of the alpine region to adopt cradle to cradle approaches and circular economy models in five different industrial sectors: chemistry and materials, polymers, packaging, textile, and wood/furniture sectors.

European SMEs are confronted with numerous challenges in their efforts to transform their manufacturing processes and business models to more sustainable and circular concepts.

To address these challenges, interested stakeholders and experts from Austria, Slovenia, Switzerland, Bavaria, and Baden−Württemberg were invited to contribute to the development of a transformation roadmap. For each sector, an individual transformation roadmap has been developed which outlines proposed activities on a technological, business, and legal/political level. Stakeholders comprised experts from industry, academia, and business support organizations.

The transformation roadmap for textiles had two major focal points: non−fashion textiles (e.g.: fibers for carpets) and functional wear (such as outdoor clothing, work wear etc.). During three separate online workshops, participants developed many possible solutions to address current challenges. The resulting activities were grouped into specific categories and assigned a time frame for their expected realization (short−, mid− and long−term).

The resulting roadmap demonstrates to SMEs the ideas and suggestions of participants and experts on how to overcome current challenges on the way to a circular economy. Furthermore, it will serve as a means for the consortium partners to provide direct support to interested SMEs in identifying technology partners and establishing circular business models.

2. Introduction to Cradle-ALP project

Cradle−ALP aims for mainstreaming cradle to cradle (C2C) approaches, circular design, and circular substitutions (from the alpine region) for linear products in industrial processes, in different industrial sectors. The Alpine Space is abundant in natural resources and possesses the technology necessary to replace fossil raw materials and toxic substances in production with sustainable, eco−friendly alternatives. This transformation facilitates the reintegration of materials and products into a healthy, closed−loop cycle after use. The focus of this project shall be on the substitution of chemical and fossil based/unsustainable materials with more circular, sustainable, and bio−degradable ones.

First, the partners will build a broad awareness and understanding in the public, the relevant industries as well as among stakeholders from policy and innovation intermediaries, for the opportunities, barriers, and mechanisms of the transformation of industrial products towards higher circularity by means of C2C approaches, circular design and circular substitutions. Business support providers shall be trained to accompany the transformation of businesses along more circular value chains.

In a second step, the partners will explore in details and test opportunities for implementing C2C approaches, circular design, and circular substitutions along specific value chains in the chemistry/plastics and wood/forestry sectors supported by digital technologies. Building on a thorough multidimensional (technology, policy, economy, etc.) roadmapping exercise, transnational groupings of stakeholders – including businesses – will be installed, with the aim to transfer the C2C roadmaps into industrial practice along exemplary value chains.

Finally, the partners will work towards ensuring a transnational policy convergence towards transnational S4 strategies in the priority sectors of the project and initiate common cross border funding instruments for the industrial C2C transformation.

3. Objectives and scope of the Transformation Roadmap Textiles

The objective was the development of a transformation roadmap in the Textiles sector to show existing and upcoming technologies (digital and engineering) and legal and normative requirements which can foster the transformation of industrial practices towards circular economy. This includes the substitution of materials with bio–based and/or recyclable alternatives.

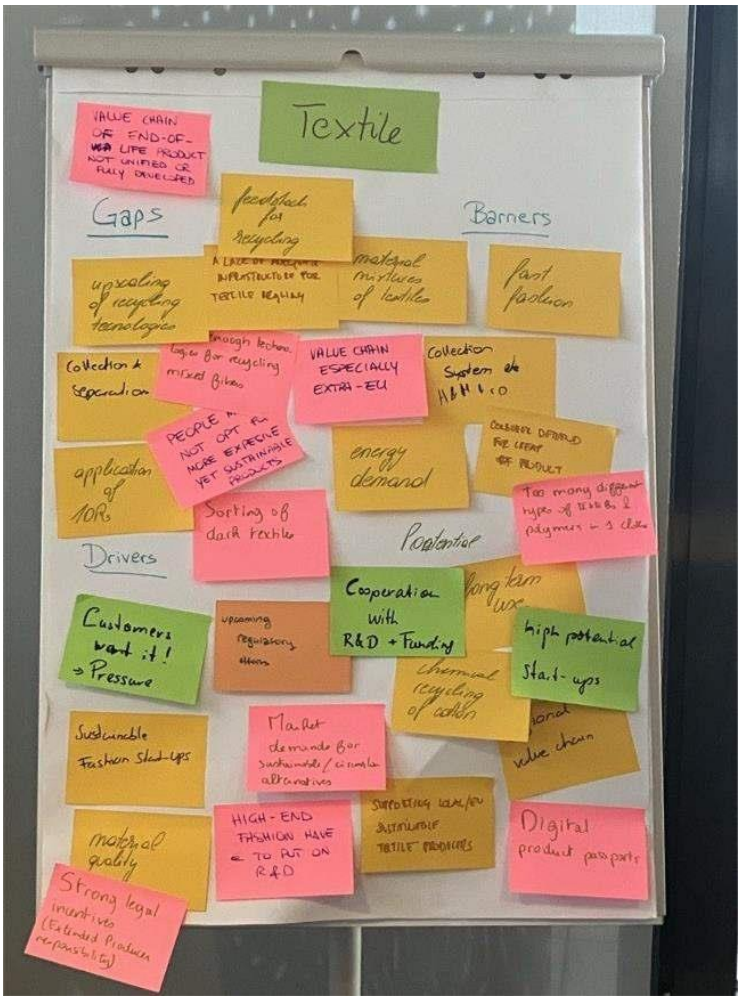

Figure 1: results from the first fact–finding discussion with our partners.

In discussions and workshops, we collected gaps, obstacles, driving forces and potentials for their industrial sector. Subsequently, we developed a transnational sectoral system analysis for the textiles sector, considering the contributions of the individual regions and partners. This analysis made it possible to better define the scope and objectives of the transformation roadmap and served as a basis for discussion with the external

support group workshop to define a vision for each sector. Together with our TSGW partners (Chamber of Commerce and Industry of Slovenia, INNONET Kunststoff, University of Natural Resources and Life Sciences) and our expert group, especially Professor Luible−Bär we set our Vision: 50% of all textiles produced in the EU being made from recycled or renewable materials by 2030. In detail, this means that the production processes in the technical and functional textiles industry are to be revolutionized in such a way that a circular economy is to be achieved by maximizing resource efficiency and minimizing waste to promote sustainability and innovation in the industry.

4. Roadmapping procedure & participating organisations

An external expert support group workshops were held at the beginning. In the textiles area, there was a discussion with Dr Christiane Luible−Bär. She is a professor on the fashion & technology program at the University of Art and Design Linz. Her academic work focuses on practice−orientated design research in the field of fashion. The external expert in the workshop identified several gaps, barriers, key drivers, and potentials for sector of textiles.

A vision was established in the discussion with Professor Luible−Bär: 50% of all textiles produced in the EU being made from recycled or renewable materials by 2030. Our vision for the industrial sector of technical and functional textiles is to revolutionize production processes, achieving circularity by maximizing resource efficiency and minimizing waste, thereby spearheading sustainability and innovation in the industry.

To elaborate possible future solutions as content for the roadmap three online workshops were designed using a Mural whiteboard following the same procedure and engaging the participants in three exercises:

1) Identifying potential gaps and barriers in knowledge, technology limitations, market structural barriers, regulatory limitations, public acceptance or other gaps and barriers preventing the industry to achieve the vision set out following the experts' workshop.

2) Defining solutions and key activities to implement in order to overcome the gaps and barriers previously identified. Those key activities must concern each component of the industrial sector, including technology development and deployment, development of business models and market opportunities, development of regulations and standards, policy formulation, creation of financing mechanisms, and public engagement.

3) Assigning the solutions and key activities according to their field (Technology, Business Model, legal/political) and their timeframe (short−term, mid−term, long−term) and voting on the activities that are the most important to implement and achieve.

All information was combined and sorted to be visualized on a timeline.

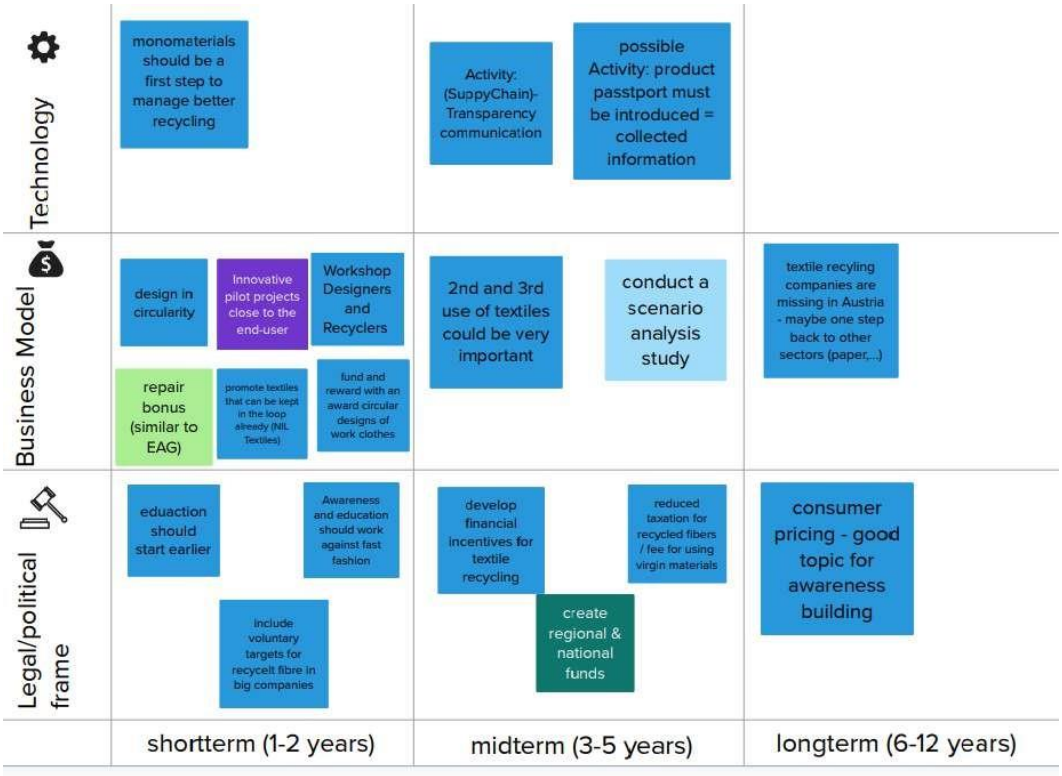

Figure 2: Exemplary screenshot showing results of discussions of one workshop (workshop 2) assigned on the time scale.

As mentioned, a comparable concept was discussed and defined in consultation with the respective TSWG managers. A standard mural template was developed by the lead partner (CCB) and made available to each TSWG group for the respective dates. This was adapted for the textile workshops' own purposes. The TSWG decided on the dates and

organization of the 3 roadmapping workshops. The three events were held virtually to make it easier for international partners and stakeholders to participate.

The textile−focused workshops were held in two weeks in March 2024:

- March 13, 2024: Material & Resources
- March 19, 2024: Product design for reusability, recyclability
- March 20, 2024: Recovery: collection, sorting, reuse & recycle

Date 1 focused on materials and resources, date 2 on product design for reusability and recyclability. Session 3 focused on the recovery processes (collecting, sorting, reusing, and recycling). The points identified were allocated to the overarching topics of technology, business models and legislation & regulation.

The workshops identified numerous challenges within the textile sector. In terms of technology, there's a need for advanced sorting systems, especially for multi−layer textiles, alongside difficulties posed by excessive elastane and the detection of hard components. Sorting complexities arise from the wide array of textile waste and fibre mixtures, further complicated by challenges in separating them. Solutions include exploring innovative recycling technologies and embracing design strategies for circularity.

Regarding business models, challenges include establishing separate collection systems for textile recycling and reevaluating the focus of existing sorting companies, which predominantly target the second−hand market. The development of local businesses and value streams is essential, along with the formulation of effective business models that support circularity. Additionally, implementing return systems where buyers can return textiles to sellers could facilitate recycling efforts.

In terms of legislation and regulation, there's a call for full cost coverage for textile recycling to incentivize proper waste management practices. Controlling value chains and ceasing the export of post−consumer waste are deemed crucial measures. Moreover, demanding mandatory "design for circularity" regulations and establishing a dedicated

waste industry for textiles could streamline recycling processes and regulations, thereby promoting sustainability within the sector.

In total, over 50 people from Austria, France, Slovenia, Germany took part in the three workshop days and discussed the challenges and opportunities of the respective sub–topics.

5. Challenges in the industrial sector - gaps & barriers analysis

The textile sector is considered an "important part of the European manufacturing industry" according to the European Union. In 2021, 1.3 million Europeans were employed in a job considered part of the textiles industry and the turnover of the same year sat at €147 billion, which puts it at a little more than half of the turnover of the plastics industry in the same year.

Still, the European textile industry is facing some challenges, as laid out by the European commission. These include:

- Low profit margins
- Fierce international competition
- High labor costs
- High costs of compliance with existing environmental and chemical legislation

While all these factors are of course valid and understandable disadvantages, the European Union, and the players within should not be discourages in their efforts to continue fostering a strong textile industry. Especially in terms of specialization and high–quality production that integrates new materials, the EU has a significant advantage over textile sectors in other countries or regions.

This was also the reason why the initial focus was decided to be put on functional textiles (outerwear, functional wear, technical and industrial textiles) as these sectors seemed to be the most relevant ones in the context of an Alpine Space project.

At the beginning of the process, there was an expert workshop followed by roadmapping sessions where we talked about and gathered information on the gaps and barriers. These discussions laid the groundwork for identifying possible solutions later. These gaps and barriers cover different factors aligned along the three chosen focal points: technologies, business models and legal frameworks. The categories of gaps identified by both experts and participants provide insights into various challenges associated with the introduction of cradle−to−cradle principles and circularity into textile companies and organizations.

Overall, gaps and barriers were discussed in three settings:

- Within an expert workshop
- During the project partner meeting workshop in Linz
- Within the three roadmapping workshops with participants from the textile sector

All these discussions have resulted in a wide range of identified gaps and barriers that have worked as the baseline for the upcoming roadmaps. A point mentioned rather specifically in the workshops with the experts was the matter of sorting and recycling, as there seems to be significant lacks in available technologies to facilitate these processes. A solution to this could be an increased use of mono−materials, which were also identified as a current gap, which relates to the lack of technologies available for complex material mixtures, dark materials and also potentially harmful chemicals used in the textile industry.

Another issue that was observed is the set−up of the value chain and how much of it is outside of the European Union, making certain processes difficult, either in terms of the life of the textile product before it came to the EU or for the handling of it afterwards. This goes hand in hand with a non−unified value chain of end−of−life products which makes the tracking and tracing of “what happens afterwards” rather difficult. What comes with this point is not just the factual, theoretical understanding of the value chain but also useful policies that discuss these matters accordingly. However, a lack of fitting regulations was also mentioned as a general point.

Eco−design and design for circularity was also discussed within the workshops with a gap here being the lack of modular design principles as well as implementing high quality, long−lasting materials to increase the lifespan of the product at hand.

Summary of identified gaps:

- Price−sensitivity among consumers reducing the likelihood of purchasing sustainable items.
- Lack of an understanding of the Value chain, especially outside of the EU, as well as the overall infrastructure related to circular use of textiles.
- Lack of efficient processes for handling complex material mixtures or certain colors in textiles.
- Absence of comprehensive solutions to address the use of harmful chemicals in textile production.
- Limited exploration and adoption of technologies for recycling textile waste and producing recycled fibers.
- Insufficient emphasis on using and designing durable, high−quality materials to increase garment lifespan and reusability.
- Lack of widespread implementation of modular design for easy disassembly and repair of garments.
- Limited promotion and adoption of mono−materials for improved recycling.
- Encouraging companies and consumers to use recycled clothes and fibers faces resistance.
- Lack of effective policies and regulations to drive sustainability in the textile industry.
- Lack of implementation of ecomodulation to incentivize environmentally friendly practices.
- Absence of regulations addressing environmental and social standards in textile production outside the EU including the consideration of end−of−life treatment of textiles outside the EU, hindering understanding of full lifecycle impacts.

Table 1: Summary displaying the gaps identified during discussions with experts and participants

When it comes to barriers a discussion around the challenge emerged regarding the establishment of business models integrating repair and reuse practices, despite the presence of exemplary cases such as Patagonia. Participants highlighted the complexities inherent in shifting consumer behavior towards valuing longevity and sustainability over disposability. This is closely linked to the identified significant economic obstacles that hinder efforts to tackle the challenges associated with recycling and reusing textiles. Participants emphasized the need for innovative financing mechanisms, supportive government policies, and collaboration across industry sectors to overcome these economic hurdles and foster a more sustainable approach to textile recycling and reuse.

In terms of regulations, two interesting points were discussed. Firstly, a lack of mandates for the utilization of recycled fibers acts as a barrier to stimulating demand and incentivizing investment in recycling infrastructure was mentioned. Secondly, there were discussions surrounding the challenges associated with regulating overconsumption and addressing the prevalent throwaway culture in textile consumption. It was acknowledged that the complexities of implementing regulations to curb these behaviors require collaborative efforts between policymakers, industry stakeholders, and consumers to enact meaningful change towards a more sustainable textile industry.

In addition, it was apparent that in theory there is already a plethora of laws and regulations in the works in order to pave the way for a more sustainable and circular future for textiles. These ideas are currently still being held up or further clarified, which slows down the process overall and makes it more difficult to achieve goals related to circularity and sustainability.

Summary of identified barriers:

- Barrier to transitioning to automated sorting methods for improved efficiency.
- Economic obstacles hindering efforts to address the challenges of recycling and reusing textiles.
- Difficulty in establishing business models that incorporate repair and reuse, despite examples like Patagonia.
- Resistance to increasing incineration costs as an incentive for recycling efforts.
- Limited consumer awareness about the benefits of recycled textiles and sustainable practices.
- Implementation hurdles for product passports aimed at traceability along the supply chain.
- Incomplete Extended Producer Responsibility (EPR) frameworks for end-of-life product management.
- Limited financial support for companies transitioning to sustainable business models.
- Lack of mandates for the use of recycled fibers to stimulate demand and investment in recycling infrastructure.
- Challenges in addressing overconsumption and throwaway culture in textile consumption through regulations.

Table 2: Summary displaying the barriers identified during discussions with experts and participants.

Having had the opportunity for these discussions with a variety of stakeholders has shown a very interesting approach: though the aim was to discuss gaps and barriers first, a lot of the points mentioned in that first part of the workshop were already phrased as solutions or suggestions. This just goes to show that there is drive and willingness within the textile industry to improve, with specific ideas.

6. Vision of the Transformation Roadmap Textiles

The first step of the Cradle−ALP roadmapping process was to define a vision that guides the involved stakeholders and experts (businesses, public authorities, academics etc.) in each industrial sector on a joint understanding of what is the ideal future scenario in the specific industrial sector. It refers to a clear and inspirational description of the future state that an industry aims to achieve. The vision formulates a hypothetic objective or, generally speaking, an idea of how the future is imagined.

To provide such a frame for discussion the project partners discussed ideas for the sectoral visions with external experts.

Based on the input of the experts, for the sector Textiles the following vision was elaborated: ‘50% of all textiles produced in the EU being made from recycled or renewable materials by 2030’.

7. Roadmap structure – topics, levels, time scale

This chapter is identical to the respective chapter in the chemistry roadmapping report as the exact same approach and structure were followed in the textile sector to increase comparability. The transformation roadmap for the textiles sector is structured into three layers, summarizing activities in

- technologies, research & development, (Raw) materials,
- business model approaches and
- legal and political framework and general aspect.

The outcomes and activities are described in the subsections of the following chapter. We assumed a time scope of ten years and divided it into three segments:

- short−term: 1−2 years, 2024 – 2025
- mid−term: 3 years, 2026 – 2028
- long−term: 5 years, 2029 – 2033.

The following chapter summarizes the findings and outcomes of the transformation roadmap Textiles. It was initially thought to mainly focus on functional textiles, both in terms of workwear out outerwear but also when looking at non−clothing applications of textiles, but the workshop discussions showed that it is difficult to exclusively discuss these two aspects within the textile industry. In the end, the discussion was opened to include all experiences and touchpoints with textiles, making the answers broader and occasionally also relating specifically to regular fashion items rather than the initially intended scope.

For each of the three layers the findings are summarized in a table and described in more detail in the text. The findings were grouped into ‘outcomes’ to summarize several activities which may be related. The activities are assigned to the three different time frames as determined by the workshop participants.

The outcomes are summarized in an overview graphic indicating when the activities should start and how much time might be needed to implement them.

8. Transformation Roadmap Textiles

Roadmap outcomes: a graphic summarizing only the major outcomes in a graphical overview along the timeline.

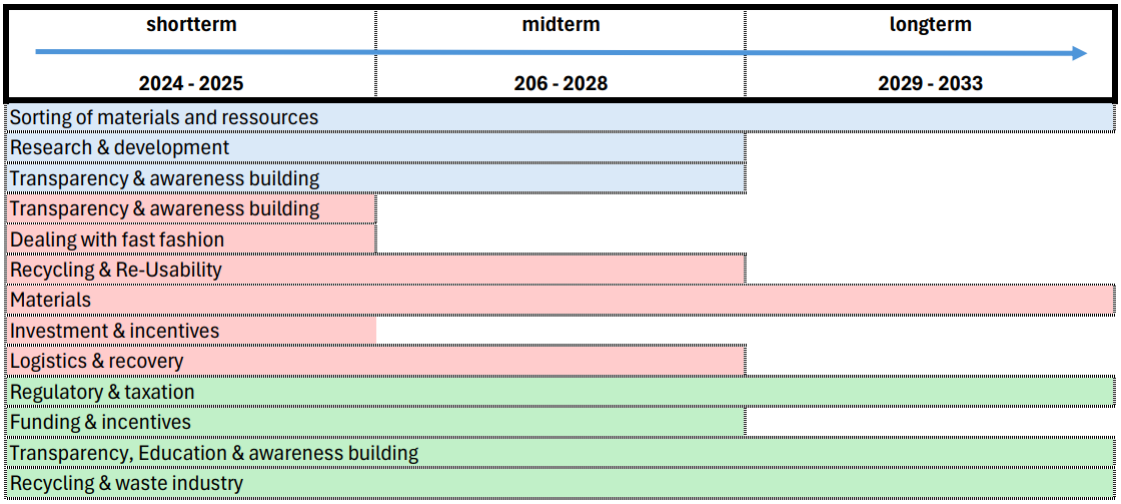

Figure 3: Overview of the roadmap results on the time scale displaying the outcomes (grouped categories) on three levels: technological (blue), business model (red), legal/political framework (green)

a. Technology

Outcomes	Activities		
	shortterm (2024 - 2025)	**midterm (2026 - 2028)**	**longterm (2029-2033)**
Sorting of materials and ressources	Develop sorting lines that are sorting for material and not only quality for second hand		Automated sorting
Research & Development	Research funding		
	Mono Materials should be a first step to manage better recycling	More research on biobased fibres	
		Niche products should also be researched more	
Transparency & awareness building	(Supply Chain−) Transparency communication	product passport must be introduced = collected information	

Sorting of materials and resources

Develop sorting lines that are sorting for material and not only quality for second hand: Developing processes to handle complex material compositions efficiently and techniques to separate various fiber types for recycling.

Automated sorting: Transitioning from manual to automated sorting methods to improve efficiency. Implementing automated sorting technologies can improve efficiency and accuracy in textile recycling processes, facilitating the recycling of different materials and reducing waste.

Research & Development

Research funding: There is currently not much research on the use of recycled fibres in clothing, and recycled fibres are more expensive than primary materials (compared to packaging). Attractive research funding could increase the level of research in this area.

Mono Materials should be a first step to managing recycling better: The use of mono−materials could be a first big step towards achieving better recycling.

More research on biobased fibers: Currently, biobased fibers are not researched enough to make a definitive statement about whether they may be a useful alternative in the future. Encouraging their research might enable a different, nuanced approach to the production of clothes and other textile products. Ideally, this would also already come with a matching system for recycling as to avoid the current state of bio−polymers where they are produceable in theory but not yet recyclable in any meaningful way.

Niche products should also be researched more: While niche products might make up a rather small portion of the market, they can still contribute to the overall development of the sector. At the same time, sustainability is often reduced to being a problem only “the big guys” can solve. This can be observed on a country level, where small countries in Europe look to bigger countries, where Europe looks to China or India. A similar pattern can be observed in industries, where small firms point towards big firms, big firms point towards bigger industries. However, by constantly shifting blame and responsibility rather than taking action in one’s own ecosystem, progress will always be halted.

Transparency & awareness building

(Supply Chain−) Transparency communication: More transparency on decision making and value chains in the sector how are purchasing decisions made, how production is handled in detail.

Product passport must be introduced = collected information: Supporting projects that develop digital product passes for textiles can enhance transparency in the supply chain, enabling consumers to make informed choices about their purchases.

b. Business Model approaches

Outcomes	Activities		
	shortterm (2024 - 2025)	**midterm (2026 - 2028)**	**longterm (2029-2033)**
Transparency & awareness building	raising interest/awareness: good design & good marketing		
	Show good practice Examples in materials & ressources, design for circularity and value recovery		
	Promote textiles that can be kept in the loop already (NIL textiles)		
	Design in circularity		
	Innovative pilot projects close to the end−user		
	Workshops for designers and recyclers		
Dealing with fast fashion	Promote good quality textiles and make fast fashion less attractive		
	Fund and reward with an award for circular designs of work clothes		
Recycling & **Re-Usability**	Recycling partner –> companies are not the producer itself, e. g. plastic bottles	2nd and 3rd use of textiles could be very important	
	Find partners for recycling –> mixed materials	Conduct a scenario analysis study	
		More research on the economic benefit of textile recycling	
Materials		Monomaterials, but not (only) for technical cloathing	Textile recycling companies are missing in Austria – maybe one step back

			to other sectors (e.g. paper)
		Mono material for fashion items	
Investment & Incentives	Repair bonus (like EAG)		
	Invest into hip secondhand shops		
Logistics & recovery		Develop logistics structure to get textiles from consumer households need to be developed	
		Build up logistics for collection	

Transparency & awareness building

Green washing and transparency: green washing is still often recognizable and should no longer be accepted. One possible activity could be: Implementation of transparency in the entire supply chain − e.g. by implementing the planned supply chain law. The identified (company) results could be incorporated into communication work in a "green washing−free" manner. Good examples that are not "green washing" are already suffering from this. There are already (very) good solutions, but in many cases, they are still underrepresented or simply unknown. It is precisely for this reason that green washing should be reduced to make genuinely circular economy work recognizable.

Raising interest/awareness: good design & good marketing: Emphasizing good design and effective marketing strategies can make sustainable clothing more appealing to consumers, driving demand for eco−friendly fashion. −> Make it interesting for the people

Show good practice examples in materials & resources, design for circularity and value recovery: Encouraging the sharing of successful sustainable practices among textile companies can accelerate the adoption of environmentally friendly methods and technologies throughout the industry.

Promote textiles that can be kept in the loop already: Hight efforts in explaining the differences to customers needed, education of the consumers − presenting them positive aspects of recycled textiles.

Design for circularity: garments should be designed to be easily disassembled and repaired, enabling consumers to replace faulty parts or customize clothing instead of discarding them.

Innovative pilot projects close to the end−user: Value Chains and consideration of social impacts of production changes: localized value chains to increase production standards.

Workshops for designers and recyclers: Circular design could/should be a big step forward in the waste industry and collaboration of the value chain is required. Designers and recyclers should work together. Get designers and recyclers in the same room, include the waste industry in the efforts. The waste management industry in europe should be a pioneer in this area and set an example.

Dealing with fast fashion

Promote good quality textiles and make fast fashion less attractive: Do we need fast fashion? and: Do we need mixed fibers? Using durable, high−quality materials such as organic cotton, recycled polyester, or linen can help increase the durability of garments and promote their reusability. The quality of the products is very important − the quality has an impact on the whole recycling process.

Fund and reward with an award for circular designs of work clothes: Potentially a less conventional idea but still one that holds merit in the context of circular and C2C transformation is an award, which was named as a representative measure to increase the spotlight on sustainability measures and ideas. Especially by focusing on a branch like work−related textiles, an overall statement can be made.

Recycling & Re-Usability

Find partners for recycling –> companies are not the producer itself (e. g. plastic bottles): This aspect touches upon the fact, that materials are often not recycled into what they came from or from the product they came from. While as consumes a label indicating that the item is “made from a plastic bottle” isn’t foreign to us, in order for this to be a possibility and an option, optimized logistics and strong partnerships are essential.

Find partners for recycling –> mixed materials: Similarly to the aforementioned point, strong relationships are also necessary for the recycling of mixed materials in order to diversify expertise. Mixed recycling of fabrics and fibers can be difficult to achieve one a one−firm basis so extensive networks can facilitate this.

2nd and 3rd use of textiles could be very important: The better the raw material, the better it can be recycled and brought into a new cycle. The same applies to the processing of materials. Heavily treated textiles (washing, bleaching, dyeing, etc.) are more difficult to recycle and therefore more difficult to integrate into a new cycle.
Conduct a scenario analysis study: to increase feasibility and transparency.
More research on the economic benefit of textile recycling: Search for technologies to use textile waste again, industrial processes to produce recycled fibers.

Materials

Mono materials, but not (only) for technical clothing: The term “mono material” is incredibly common when talking about polymers already but also applies in other recycling heavy industries such as textiles. Items and products that consist of only one material can be deconstructed much easier as there is no separation necessary. Such an approach would also be useful in the textile sector.
Textile recycling companies are missing in Austria − maybe one step back to other sectors (e.g. paper): Technologies for textile sorting are available, but there is currently a lack of a larger number of textile recycling companies − the textile industry is currently lagging other sectors (paper, plastics, ...).

Investment & Incentives

Repair bonus (like EAG): Extend the repair bonus to textiles to encourage reuse and repair of textiles.

Invest into hip secondhand shops: Supporting second−hand shops financially can help them overcome challenges and become economically viable, ensuring their sustainability in the long run. Also: Providing financial support to establish new second−hand shops can expand the availability of pre−owned clothing options, contributing to a more circular economy.

Logistics & recovery

Develop logistics structure to get textiles from consumer households need to be developed: Collection systems are needed for the collection of textile waste. However, there are currently still problems for brands & companies: The amount of recyclable goods is too small compared to the amount needed for the development process of e.g. yarns.

Development/build up logistics for collection: to remedy the lack of infrastructure for the efficient collection of textiles. This includes the establishment of a waste industry that is dedicated to rationalizing the textile industry's recycling processes and ensuring proper waste management.

c. Legal and political framework & general aspects

Outcomes	Activities		
	shortterm (2024 - 2025)	**midterm (2026 - 2028)**	**longterm (2029-2033)**
Regulatory measures & taxation		Regulatory measures like taxes to promote sustainable cloathing	Find solutions not only in the EU, also outside the EU
		Reduce taxation for recylced fibres/fee for using virgin materials	Restrictions and laws should be done on EU level
		CSDDD/"Supply chain law" regulations o national basis	
		need of regulations for recycling textiles	
Funding & incentives		Fund projects for digital product passes for textiles	
		Funding SMEs	
		Develop financial incentives for textile recycling	
Transparency, Education & awareness building	Education should start earlier	Ban "fast fashion"	Consumer pricing – good topic for awareness bulding
	Awareness and education should work against fast fashion		
	Include voluntary targets for recycled fibre in big companies		
	Education and awareness building for children & adults		
Recycling & waste industry	Restricts to stick to the loops and define recycling, recycled materials, etc. And develop reliable certification systems	Waste industry is missing –> we need waste industry for textile	

Regulatory measures & taxation

Regulatory measures like taxes to promote sustainable clothing/ fee for using virgin materials: Financial incentives, both positive and negative, have proven to be a useful tool in fostering certain business decisions. It is not surprising that taxation also in the context of textiles and the choice of source of the textiles in question has been suggested.

Find solutions not only in the EU, also outside the EU: Collaborating with international partners, including countries like Bangladesh where the textile industry is significant, can foster global cooperation and innovation in sustainable fashion practices.

Reduce taxation for recycled fibers: Similarly to the aforementioned point about increasing taxation on non−sustainable fiber and textile choices, the opposite can be achieved by lowering taxes on sustainable options.

Restrictions and laws should be done on EU level: By making decisions EU−wide, it can be assured that all countries are following the same laws or at least the same directives in order to achieve sustainability goals.

CSDDD/"Supply chain law" regulations o national basis: providing solutions like the "CSDDD" can really work out to be successful. A step in this direction could be the enforcement of regulations such as the "CSDDD" or the "Supply Chain Act" at national level to ensure compliance and accountability throughout the supply chain.

Need of regulations for recycling textiles: Overall, a lack of recycling regulations has been mentioned and observed, a beneficial tool that needs to be explored further in order to even the playing field and ensure a common goal.

Funding & incentives

Fund projects for digital product passes for textiles: Supporting projects that develop digital product passes for textiles can enhance transparency in the supply chain, enabling consumers to make informed choices about their purchases. −> A product passport must be introduced = this provides collected information throughout the entire supply chain.

Funding SMEs: Funding for SMEs: Small and medium enterprises (SMEs) in the textile sector should receive financial support to invest in sustainable practices, technology upgrades, and innovation, fostering their growth and contribution to sustainable development.

Develop financial incentives for textile recycling: Grants and subsidies for companies that want to change their business model could have a positive impact. The provision of financial incentives such as grants and subsidies can encourage textile companies to transition to more sustainable business models and practices.

Transparency, Education & awareness building

Ban "fast fashion": Fast fashion has revolutionised the fashion industry, but has also led to environmental problems and ethical concerns. In order to tackle the problem of fast fashion, people should be more aware of their purchases, opt for sustainable and ethical brands and repair or recycle clothes instead of throwing them away.

Consumer pricing – good topic for awareness building: One way to counteract the problem of fast fashion could be to reflect consumer prices by including the true cost of the environment and labour in prices. This could lead to greater appreciation and more conscious consumer behaviour.

Awareness and education should work against fast fashion: Hight efforts in explaining the differences to customers needed, education of the consumers − presenting them positive aspects of recycled textiles.

Include targets for recycled fiber in big companies: We must motivate companies and also costumers to use/war recycled clothes and fibres. On the one hand, companies should be motivated to act more circularly through incentives. On the other hand, consumers are also very important and should also be educated and their awareness raised.

Education and awareness building for children & adults: The education should start earlier, like in school and even in pre−school/Kindergarden.

Recycling & waste industry

Restricts to stick to the loops and define recycling, recycled materials, etc. and develop reliable certification systems: It is currently significantly more expensive to produce textiles that are suitable for the circular economy than to produce them linearly: Recycled and reused materials are more expensive because of the additional processes (additional labour, technologies, more resources, etc.). Certifications could help to reduce the costs of circular textiles. Through standardised certifications, manufacturers and consumers can ensure that certain standards for recycling, reuse and environmental sustainability are met. This could

help build confidence in recycled and reused materials and strengthen the market for these products.

Waste industry is missing –> we need waste industry for textile: Like in other important sectors like paper or plastics.

9. Annex

All images seen in this document were either created by the authors or taken by the authors during the various workshops conducted. Therefore, all copyrights are owned by the authors.

The content of chapter 5 partially builds on information that can be found here: https://single-market-economy.ec.europa.eu/sectors/textiles-ecosystem/textiles-leather-fur_en