

**Project Acronym: Cradle-Alp****Project number: ASP0100003**

D.2.1.1

External expert support group meeting

WP n°:	2
Task n°:	A2.1
Author(s):	PP08 POL – Polymeris PP3 CCB – Chemie Cluster Bayern
Contributors:	LP1 CCIAA Padova PP5 Biz-Up PP7 CCIS
Dissemination level:	PU
Revision:	FINAL
Due Date:	30.04.2024
Date of submission:	30.04.2024

Executive Summary

This deliverable outlines the outcomes of the experts' workshops conducted within the Cradle-Alp project framework in December 2023 with the external expert's support group, in the frame of the Cradle-ALP **Roadmaps to Cradle2Cradle transformation** (Work Package 2) and the activity 2.1 **Develop sectoral Cradle2Cradle industrial transformation roadmaps in five selected sectors**. The workshops were dedicated to advancing the circular transformation roadmap across Cradle-ALP five industrial sectors (Chemistry/Materials, Polymers/Composites, Textiles, Packaging, Wood/Furniture) and addressed two core objectives:

- **Sectoral Ecosystem Analysis for Circular Transformation:** the project partners leader of each industrial sector presented the ecosystem analysis conducted within their industrial sector to the audience. This included an exploration of gaps, barriers, drivers, and potential areas for circular transformation. The experts provided input on missing information and recommendations to ensure a well-rounded understanding of the dynamics and challenges of each sector.
- **Vision and Time Frame Definition:** The external experts' support group was further engaged to collaboratively define visions and time frames for each of the sectoral roadmaps. In addition to individual sectoral visions, the group worked towards establishing a common overarching vision that would unify the diverse sectoral roadmaps. This collective effort aimed to create a cohesive and integrated approach to circular transformation, transcending sectoral and regional boundaries.

The report develops the roadmapping methodology applied to the Cradle-ALP activities. It culminates in a set of recommendations for the establishment of sectoral industrial transformation roadmaps and the definition of a vision for each of the 5 circular transformation roadmaps, aligning with insights and expertise gathered from the participating experts during the workshop.

Cradle-ALP – External experts support group workshop

Contents

1.	Introduction to the Cradle-Alp project.....	3
2.	Roadmap methodology.....	3
3.	Roadmap workflow	5
4.	Experts workshop : objective and scope	6
5.	Sectoral ecosystem analysis.....	7
5.1	Chemistry/Materials.....	7
5.2	Polymer-based Composites.....	8
5.3	Technical textiles	9
5.4	Packaging.....	11
5.5	Wood/furniture.....	12
6.	Visions	13
7.	Annexes	14
	Annex 1 : Agenda.....	14
	Annex 2 : Interactive tool	15
	Annex 3: Attendance list.....	19

1. Introduction to the 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 has many natural resources and the technologies to substitute fossil raw materials and toxic substances from production with circular and environmentally friendly alternatives. This should lead to the fact that materials and products can be led back into a healthy 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.

2. Roadmap methodology

Until the end of April 2023, the project's partners will elaborate **5 circular transformation roadmaps** for 5 industrial sectors of the Alpine space :

- Chemistry
- Polymers
- Packaging
- Textiles
- Wood

The roadmap methodology is prepared by Chemie Cluster Bayern, leader of WP2 **Roadmaps to Cradle2Cradle transformation**, and Polymeris, leader of Activity 2.1 **Develop sectoral Cradle2Cradle industrial transformation roadmaps in five selected sectors**, with the support of all the other Cradle-ALP partners.

It is based on the experience and methodology used by PP05 Biz-Up to develop their **Technology Roadmap: Sustainable Plastics Solutions** and on the guidelines from the **Energy Technology Roadmaps: a guide to development and implementation** elaborated

Cradle-ALP – External experts support group workshop

and published by the International Energy Agency in 2014 and the **European Plastics Pact Roadmap** elaborated by the European Plastic Pact, published in 2020.

According to both experience and guidelines, a successful roadmap “contains a clear statement of the desired outcome followed by a specific pathway for reaching it”. The first step in the roadmapping process is then to identify and determine the desired outcome. To do so, we decided to follow the logic of the roadmap from the **Energy Technology Roadmaps: a guide to development and implementation** and the **European Plastics Pact Roadmap** to identify the key elements to implement a roadmapping process.

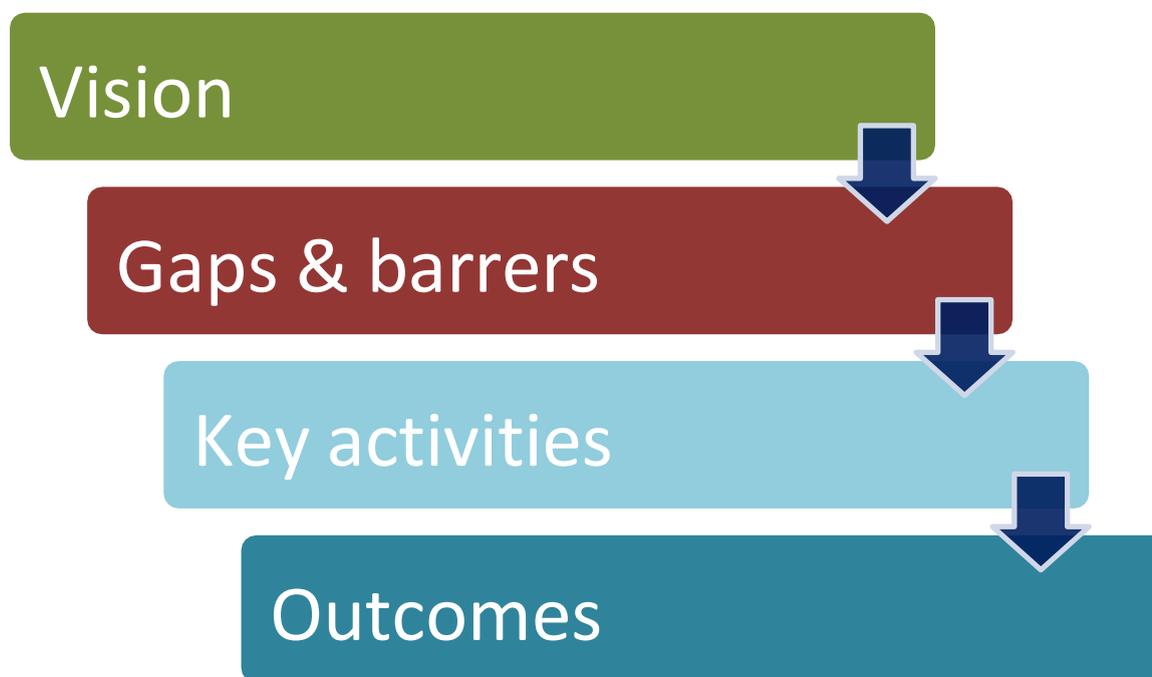


Figure 1 : The logic of the Cradle-ALP Roadmap

The first step is to define a vision that aligns all stakeholders from each of the 5 industrial sectors (businesses, public authorities, academics etc.) on a joint understanding of what is the ideal scenario for the future, in a given time-frame. It refers to a clear and inspirational description of the future state that an industry aims to achieve in order to become more circular.

To do so, the partners first worked on analyzing their industrial sector ecosystem in the Alpine Space region with respect to circular economy in general and the cradle to cradle principles in particular. Based on the information collected by each partner within its region, the TSWG leader elaborated a sectoral ecosystem analysis that was then presented to the experts during the expert’s workshops in order to engage discussion and collect input and recommendation. The expert workshops were organized on the 7th of December 2023 for the Chemistry/Materials, Polymers/Composites, Packaging and Wood/furniture sector and on the 20th of December 2023 for the Textile sector. They gathered experts from each sector in order to collect their understanding and recommendation on the ecosystem analysis but also on the

Cradle-ALP – External experts support group workshop

definition of an overall and realistic goal that the Cradle-ALP partners could set for each of the 5 transformation roadmaps.

Following the exchanges and collection of input from the experts, each TSWG gathered to reflect and identify, based on the information collected, a common vision to set for their industrial circular transformation roadmap.

Once the vision is set-up, the second step of the roadmapping exercise will be to list, with the support of the participants to the roadmapping workshops, any potential gaps in knowledge, technology limitations, market structural barriers, regulatory limitations, public acceptance or other barriers to achieving the vision set-out for each sector.

As a third step, and still in the frame of the roadmapping workshop, key activities must be defined with the input of the participants in order to overcome the gaps and barriers and achieve the vision, in a given time frame. Those key activities should 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. They engage different types of stakeholders and should be classified according to different main outcome which should be seen as the most important actions that gather different stakeholders that will need to be achieved in order to overcome gaps and barriers and lead to the vision. These important actions, “outcomes”, should be structured according to their level of priority and time-frame, considering interconnections among those actions and stakeholder roles and relationships.

3. Roadmap workflow

Below is the timeline and workflow of the Roadmapping process described in section 2, in the frame of the Cradle-ALP WP2 Roadmaps to Cradle2Cradle transformation activities.

Cradle-ALP – External experts support group workshop



4. Experts workshop : objective and scope

As described in the roadmap methodology section, the goal of the expert workshop is to collect input and recommendation from experts in industrial sector and circular transformation in order to define a realistic but ambitious vision for each of the 5 industrial transformation roadmaps that the Cradle-ALP project will develop. This overall objective has been decomposed in 3 sub-objectives presented to the experts' participants during the workshops:

1) **Present the ecosystem analysis** (gaps, barriers, drivers & potential for circular transformation) and the **focus topics** developed by the project's partners for each of the 5 industrial sectors in the frame of the Cradle-Alp circular transformation roadmap

2) Involve Cradle-Alp external experts' support group to receive their **input and recommendation on the ecosystem analysis** conducted by the partners on each of the 5 industrial sectors.

3) Involve Cradle-Alp external experts' support group to **define vision(s) and time frame** for each of the 5 sectoral roadmaps and a common vision to the 5 sectoral roadmaps.

The main output from the experts' workshops have been collected by the TSWG leader, with the support of the other partners, in order to complete the ecosystem analysis.

5. Sectoral ecosystem analysis

In order to prepare the visioning exercise, the Cradle-ALP partners first analysed their industrial sectoral ecosystem in the Alpine Space region with respect to circular economy in general and the cradle-to-cradle principles in particular. Based on the information collected by each partner within its region, the TSWG leader elaborated a sectoral ecosystem analysis that was then presented to the experts during the expert's workshops in order to collect any recommendation and input from their part on some missing aspect or to further develop other points. This ecosystem analysis, which is the current status-quo of the circular economy in each industrial sector, is described below, with the additional input from the experts, collected during the workshops.

5.1 Chemistry/Materials

Gaps: What is missing from our regional ecosystems to achieve circularity in the industry?

- Lack of material data sheets with sufficient information on recycled/biobased material
- Lack of alternatives to fossil materials
- Suitable additives for circular/biobased products
- Precise analysis of compounds in waste/recycled materials
- Lack of targets and requirements for circular products
- Lack of obligatory design specifications for products
- Acceptance from customers

Experts input:

- Lack of complete/comprehensive Life Cycle Assessments proofing the positive impact of a development

Barriers: What are the current obstacles that prevent the actors from our regional ecosystems to achieve circularity in the industry?

- Complexity/Diversity of products
- Complexity of value chains
- Mix of fossil and biobased chemicals
- Uncertainty regarding legal requirements for declaration of recycled materials
- Existing waste regulations restrict use of residual materials (current regulations not aligned with C2C/CE)
- Virgin material is cheaper
- Profitability is still too low
- Insufficient public funding to quickly improve technology dev. and tech transfer

Experts input :

- Energy-intensive processes such as recycling, especially chemical recycling

Drivers/Potential: What are the main challenges to focus on in the future to allow our regional ecosystems to achieve circularity in the industry?

- Functionality vs. Sustainability
- Chemical recycling of polymers
- Improved processes for waste separation
- Strengthening the enforcement of waste regulations/laws
- Increase gradually and predictably prices for undesirable economic practices
Mandatory quotas for recycling
- Suitable funding programs for companies & university research
Advantages in the allocation of project funds for CE project
- economic incentives (e.g. as done for energy savings, tax incentives)
Experts input :
- Opportunity to achieve less complex/simplified value chains

5.2 Polymer-based Composites

Gaps: What is missing from our regional ecosystems to achieve circularity in the industry?

- Clear legal requirements
- Investment in advanced recycling technologies
- Identification of all the type of polymer waste
- Mature technologies to recycle composites materials
- Expertise on eco-design of composites materials
- Identification of markets/products application for recycled composites materials
Experts input :
- Information on material composition of composites structure
- Technologies available for materials separation
- Bio-based polymers no biodegradable

Barriers: What are the current obstacles that prevent the actors from our regional ecosystems to achieve circularity in the industry?

- Regulatory hurdles
- Negative stereotypes towards recycled plastics
- High investment cost for recycling vs low cost of virgin material
- Fragmented value-chains
- No collection system for certain type of products composites
- Small waste streams with no economically viable recycling solutions
- Recycled material with equivalent performance
Experts input :
- Degradation of Polymers during mechanical recycling
- Lack of LCA and no clear understanding of the environmental impact of the whole value-chain

Drivers/Potential: What are the main challenges to focus on in the future to allow our regional ecosystems to achieve circularity in the industry?

- Public awareness towards environmental issues
 - High-added value of recycled composites (carbon fibre for windshield)
 - Legal requirements focusing on composites materials
 - Growing market demand for sustainable products
 - Public funding
 - Corporate identity
 - Reduce CO2 footprint & reduce use of natural resources
 - Legal requirements focusing on polymer industries
 - Common resources for recycling feasibility of composites waste for enterprises
 - New solutions to reduce energy consumption of recycling technologies
 - Technologies for recycling low added-value composites (nautical)
 - Smart plastics in composites for a better following of the life cycle
 - Tailorable degradability of polymers for chemical recycling
- Experts input:
- Solutions for second life of matrix composites
 - Reusability of composite as reinforcement in a second-life cycle
 - New markets for biobased additives
 - New business models to improve economic viability of collection & recycling/recovery of composites wastes.

5.3 Technical textiles

Gaps: What is missing to achieve circularity in your industrial sector?

- Value chain of end-of-life products is not unified or fully developed
- Feedstock for recycling
- A lack of adequate infrastructure for textile recycling
- Not enough technologies for recycling mixed fibers
- Collection and separation
- Application of 10R strategy
- Sorting of dark textiles
- People might not go for more expensive yet sustainable products
- Value chain especially extra-EU

Expert Input

- Automation and digitalisation
- Recycling itself does not work 100% as there is still a high need of new fibres
- Salesianer is a famous feedstock provider for recycling
- Luzern works on recycling - project together with Austria
- Tell-Text company for recycling in Voralberg (Austria) - building a string station to find the right textiles and have higher amounts of recycling
- Loacer - also a company working on waste management of textiles

Cradle-ALP – External experts support group workshop

- Waste management - REPANET - good practice is Amsterdam
- Problem is the collection of textiles in the "Volkshilfe" Container - Netherlands are collecting textiles in the home waste - find new methods for the collection of textile waste
- 10 Rs are not concerned
- Swedish school of textiles - circular business models - new business models need to be created for the circular services to avoid market cannibalization of companies
- No textiles in textile recycling need to be sorted out by hand in lower developed countries
- Developing automated processes to sort out nontextile materials in the recycling process of textiles

Barriers: What are the current obstacles that prevent to achieve circularity in the industrial sector?

- Material mixtures of textiles
- Fast fashion
- Collection system of H&M and co
- Energy demand
- Too many different types of textiles and polymers in 1 clothing
- Consumer demand for cheap products

Expert Input

- We have a lot of cotton fibres, but not in future anymore. Egypt will use the land for food cultivation instead of cotton farming > we need new fibres (cellulose) Tenzel fibres from Lenzing are a good example for that
- Overcoming challenges requires addressing two major barriers: the need for effective policies and sufficient funding.
- 80% of the impact is decided in the design of a product

Drivers: What are the current aspects that help/push to achieve circularity in the industrial sector?

- Customers want it
- Upcoming regulatory affairs
- Sustainable fashion start-ups • Material quality
- Strong legal incentives (extended producer responsibility)

Expert Input

- Cisitac Project in Sweden explores 4 future scenarios for the textile industry in 15 years
- Key drivers: Fast fashion, slow fashion, re-shoring, and offshoring.
- Proposed solution: Shift from fast fashion to slow fashion, prioritize re-shoring for sustainability.
- Concern: Potential increase in fashion cost, reduced accessibility for people.

Cradle-ALP – External experts support group workshop

- Challenge: Explore ways to maintain fast fashion, offshore production, while ensuring sustainability.

Potentials: What are the future potentials seen in achieving circularity in your industrial sector?

- Cooperation with R&D + Funding
- Long-term use
- High potential start-ups
- Chemical recycling of clothing
- Regional value chain
- Supporting local/EU sustainable textile producers
- Digital product passports

Expert Input

- EU must be independent in concern of fibres - we need an own fibre production in the EU
- Textile fibres need to be independent in the EU
- High potential in Slow fashion and production of fashion in Europe
- Diversification through circular design - back to more fashion culture (regional value chain)
- high potential in the region for start ups
- Services as new business models (repair, remanufacturing)

5.4 Packaging

Gaps: What is missing from our regional ecosystems to achieve circularity in the industry?

- SMEs: Not enough capital or no access to it.
 - Lack of adequate technological infrastructure.
 - Ignorance of the C2C concept among the consumers.
 - Ignorance of the C2C concept among the producers.
 - Consumers' demand for convenient single-use packaging.
 - No knowledge, no infrastructure among SMEs.
 - No binding standards.
- Experts input:
- Complexity of material mixtures.
 - Need for increased investment in research and development (R&D) to drive innovation in sustainable packaging materials, technologies, and processes.

Barriers: What are the current obstacles that prevent the actors from our regional ecosystems to achieve circularity in the industry?

Cradle-ALP – External experts support group workshop

- Not enough influence on value chains – especially outside EU.
 - Need for Cross-Function Collaboration: Achieving sustainable packaging goals requires collaboration across different company functions such as product development, manufacturing, and marketing. Varied levels of awareness and commitment in these areas can be a significant barrier - <https://www.mckinsey.com/industries/industrials-and-electronics/our-insights/sustainability-in-packaging-five-key-levers-for-significant-impact>
 - E-commerce needs: The growth of online retail has increased the need for packaging, which can make it difficult to reach sustainability goals - <https://wasteadvantagemag.com/5-challenges-in-sustainable-packaging-and-how-businesses-overcome-them/>
- Experts input:
- Technological limitations for separating and recycling mixed materials.
 - Cost considerations. Companies may prioritize short-term financial gains over long-term sustainability objectives.

Drivers/Potential: What are the main challenges to focus on in the future to allow our regional ecosystems to achieve circularity in the industry?

- Supporting local and sustainable packaging producers.
 - Recycling, collecting, sorting.
 - Bottom-up pressure to have a clear legislation.
 - Promotion of C2C -> consumers' demand for c2c packaging.
- Experts input:
- Producer Responsibility Organization (PROs) mission: PROs can help the large-scale adoption of best practices, thanks to their role in complying with the Extended Producer Responsibility schemes on behalf of the obliged companies - <https://www.conai.org/download/packaging-business-models-in-europe-english-version/?tmstv=1700142068>
 - Already existing recycling target deadlines from The Packaging and Packaging Waste (PPWD) directive (also to lower the concentration of substances of concern in plastic packing).
 - Innovation in packaging design (design principles can lead to packaging that is easier to recycle, reuse, or compost, thus closing the loop within the circular economy.)

5.5 Wood/furniture

Gaps: What is missing from our regional ecosystems to achieve circularity in the industry?

- Insufficient use of sustainable or recycled wood materials.
- Lack of standards and certifications for circular products in the wood and furniture sector.
- Insufficient data on the lifespan and recyclability of furniture products.

Cradle-ALP – External experts support group workshop

- Limited design innovations that facilitate disassembly and recycling.
- Lack of customer awareness and demand for circular furniture products.
- Insufficient integration of life cycle assessment (LCA) tools specific to wood and furniture.
- Low availability of non-toxic, environmentally friendly adhesives and finishes.
- Limited recovery facilities for furniture and wood products.

Barriers: What are the current obstacles that prevent the actors from our regional ecosystems to achieve circularity in the industry?

- High cost of sustainable materials compared to virgin wood.
- Complexity in furniture design that hinders recycling and reuse.
- Limited market for recycled wood products.
- Regulatory and logistical challenges in the collection and separation of end-of-life furniture.

Experts input:

- Lack of economic incentives for companies to invest in circular design and production methods.
- Consumer preference for new and inexpensive furniture, discouraging reuse and refurbishment.
- Energy-intensive processes required for refurbishing or recycling wood products.

Drivers/Potential: What are the main challenges to focus on in the future to allow our regional ecosystems to achieve circularity in the industry?

- Encouragement of modular furniture design that allows for easy repair, disassembly, and recycling.
- Increased consumer education on the benefits of circular furniture products.
- Development and implementation of industry-wide standards for sustainable and circular furniture.
- Technological advancements in the recycling and refurbishing of wood and furniture products.
- Economic incentives such as tax reductions for companies practicing circular economy principles.

Experts input:

- Strengthening regulations that favor the use of recycled materials and sustainable practices in furniture manufacturing.
- Collaboration among manufacturers, designers, and recycling firms to create a more cohesive circular furniture ecosystem.

6. Visions

Based on the sectoral ecosystem analysis and the input and recommendation collected from the experts, each TSWG defined, through discussions, a vision for the circular transformation roadmap of their sector. The vision for each of the 5 industrial sector are indicated below:

Cradle-ALP – External experts support group workshop

- Chemistry/Materials

“Clean material cycles by sustainable chemicals available at scale in the Alpine Space by 2035”

- Polymers/Composites

Extend the lifespan of polymer-based composites to bring down landfill disposal of composites to 10% of the total waste generated by 2035 (based on the Landfill Directive, part of the EU Circular Economy Package adopted in 2018).

- Technical textiles

50% of all textiles produced in the EU being made from recycled or renewable materials by 2030.

- Packaging

By 2035 packaging will be a key component of a circular economy, with materials being continuously recycled and reused. Innovative packaging designs and materials will enable efficient recovery and recycling, reducing the need for virgin materials and minimizing waste.

- Wood/furniture

By 2035, wood and furniture designs will be modular to facilitate easy disassembly and recycling, reducing waste to landfills by 90%. All wood used will be sourced from sustainably managed forests or consist of recycled materials. The sector will leverage advancements in non-toxic, biodegradable adhesives and finishes to further enhance sustainability.

7. Annexes

Annex 1 : Agenda

Workshop 7th December 2023

Topic	Moderators	Duration
Introduction of the workshop and its frame (Cradle-Alp project)	Polymeris & Chemie Cluster Bayern	10 min
Warm-up exercise on the Mural tool	Polymeris & Chemie Cluster Bayern	10 min
Sectoral roadmaps discussions for each sector : A. 3-minutes presentation of the sector's status quo analysis conducted by the project's partners and the topics of focus. B. Experts share any additional input and missing information on the status quo analysis. C. Experts write down on the mural tool their vision(s) for the circular transformation of the sector. D. Discussions and exchanges on the visions.	Chemistry : Chemie Cluster Bayern Polymers : Polymeris Packaging : Chamber of Commerce and Industry of Slovenia Wood : Chamber of Commerce of Padua	80 min (20 min x 4)
Conclusion : What would be the common vision for the trans-sectoral circular transformation of the Alpine Space industries ?	Polymeris & Chemie Cluster Bayern	10 min

Cradle-ALP – External experts support group workshop

Workshop Textile

Annex 2 : Interactive tool



Focus of Chemistry/Materials sector

Chemicals for the transition to a green and circular economy

- Additives for recyclable, bio-based, compostable materials (e.g. plasticizer, flame retardant, UV protection, catalysts...)
- Colorants, inks, pigments
- Adhesives, Lubricants, Fillers, Coatings

Keep in mind:

- Substitutes for 'Substances of Concern' according to REACH
- CO₂-based chemicals (CCU)

3 mins present focus & info
8 mins to make notes
8 mins to discuss

Sector: Chemistry/ Materials

Gaps
What is missing to achieve circularity in your industrial sector?

- Lack of material data sheets (into or recycled/bio-based materials)
- Lack of alternatives to fossil mat.
- Additives for circular products
- Compound analytics in recy. mat.
- No targets/requirements for circ. prod.
- No obligatory design specs
- Acceptance from customers

Drivers
What are the current aspects that help/push to achieve circularity in the industrial sector?

- Functionality vs. Sustainability
- Chemical recycling of polymers
- Strengthening the enforcement of waste regulations/levies
- Increasing prices for unsustainable economic practices
- Mandatory quotas for recycling
- Funding for corporate academia
- Advantages in the allocation of project funds for CE projects
- Economic incentives (e.g. tax)

Barriers
What are the current obstacles that prevent to achieve circularity in the industrial sector?

- Complexity/Diversity of products
- Complexity of value chains
- Mix of fossil/bio-based chemicals
- Uncertainty about legal reqs. for declaration of recycled material
- Existing waste regulations restrict use of recycled materials
- Virgin material is cheaper
- Profitability is still too low
- Insufficient public funding

Potentials
What are the future potentials seen in achieving circularity in your industrial sector?

- Improved processes for waste separation
- Functionality vs. Sustainability
- Europe as domestic recycling market
- Waste as valuable resource
- Reduction of CO₂ emissions
- CO₂ as resource

Vision for the sector roadmap

Briefly outline your vision(s) for the sector regarding circular economy (CE) on a mid-term and a long-term. The vision is the ambitious, inspiring, in the future achievable goal of the sector. It shall provide a common objective WHAT we want to achieve within the scope of the transformation roadmap and give orientation to the participants of the roadmaping workshops. Please remember that will both focus on business models and technologies for our roadmaps & your vision(s) can encompass those aspects.

Cradle-ALP – External experts support group workshop

Focus of Polymers sector

Circular transition of polymer-based composites :

- Bio-sourced materials/bio-based composites
- Identification, Collection, sorting of composites wastes
- Recycling processes & technologies

3 mins present focus & info
8 mins to make notes
8 mins to discuss

Gaps
What is missing to achieve circularity in your industrial sector?

- Clear legal requirements
- Investment in advanced recycling technologies
- Identification of all the type of polymer waste
- Mature technologies to recycle composites materials
- Expertise in eco-design of composites materials
- Identification of markets/products application for recycled composites materials

Sector : Polymers-based composites

Barriers
What are the current obstacles that prevent to achieve circularity in the industrial sector?

- Regulatory hurdles
- Negative stereotypes towards recycled plastic
- High investment cost for recycling vs low cost of virgin material
- Fragmented value-chains
- No collection system for certain type of products: composites
- Small waste streams with no economically viable recycling solution
- Recycled materials with equivalent performance

Drivers
What are the current aspects that help such to achieve circularity in the industrial sector?

- Public awareness towards environmental issues
- High-added value of recycled composites (carbon fiber for wind on/off)
- Legal requirements focusing on composites materials
- Growing market demand for sustainable products
- Public funding
- Corporate identity
- Reduce CO2 footprint
- Reduce use of natural resources

Potentials
What are the future potentials seen in achieving circularity in your industrial sector?

- Legal requirements focusing on polymer industries
- Common resources for recycling feasibility of composites waste for enterprises
- New solutions to reduce energy consumption of recycling technologies
- Technologies for recycling low added-value composites (nautilus)
- Expansion in composites for a better following of the life cycle

Vision for the sector roadmap

Briefly outline your vision(s) for the sector regarding circular economy/C2C on a mid-term and a long-term.
The vision is the ambitious, inspiring, in the future achievable goal of the sector. It shall provide a common objective WHAT we want to achieve within the scope of the transformation roadmap and give orientation to the participants of the roadmapping workshops. Please remember that will both focus on business models and technologies for our roadmaps a your vision(s) can encompass those aspects.

Cradle-ALP – External experts support group workshop

Focus of Packaging sector

Transformation into sustainable packaging:

- plastic packaging
- paper & cardboard packaging
- mixture (plastics – paper/cardboard)

3 mins present focus & info
8 mins to make notes
8 mins to discuss

Gaps
What is missing to achieve circularity in your industrial sector?

- DfE: Not enough capital or no access to it
- Lack of adequate technological infrastructure
- Ignorance of the C2C concept among the consumer producers
- Consumers' demand for convenient lightweight packaging
- Lack of knowledge, no infrastructure among SMEs
- No binding standards

Sector: Packaging

Barriers
What are the current obstacles that prevent to achieve circularity in the industrial sector?

- Not enough influence on value chains - especially outside EU
- Mixture of materials
- Cross-function collaboration
- E-commerce needs - the growth of online retail

Drivers
What are the current aspects that help to achieve circularity in the industrial sector?

- Funding of companies with sustainable BM
- Supporting local and sustainable packaging producers
- A more binding legislation - EU Revision of Packaging and Packaging Waste Directive
- Promotion of C2C
- Adoption of best practices

Potentials
What are the future potentials seen in achieving circularity in your industrial sector?

- Reusable packaging
- Sustainable packaging
- 4th design
- collection & sorting of waste paper
- Advanced recycling systems

Vision for the sector roadmap

Briefly outline your vision(s) for the sector regarding circular economy/C2C on a mid-term and a long-term. The vision is the ambitious, inspiring, in the future achievable goal of the sector. It shall provide a common objective WHAT we want to achieve within the scope of the transformation roadmap and give orientation to the participants of the roadmapping workshops. Please remember that will both focus on business models and technologies for our roadmaps as your vision(s) can encompass those aspects.

Mid-term

Long-term

Cradle-ALP – External experts support group workshop

Focus of Wood/Furniture sector

Sub-Sectors analysed: furniture, construction products and their components
 Furniture: mid-high end (so that competition is not on lower prices)
 Construction products: panels, partitions (windows, doors)

Note: the long lifespan of these products can pose challenges

3 mins present focus & info
 8 mins to make notes
 8 mins to discuss

Gaps
What is missing to achieve circularity in your industrial sector?

- Small Price Gap Between New/Used Furniture
- Concerns Over Recycled Wood Product Quality
- Increase in Misleading Greenwashing Practices
- Intense Competition from Low-Cost Producers
- Traditional Design Practices Limit Circularity
- Challenges in Sustainable Sourcing, Deforestation Issues

Sector: Wood/furniture

Barriers
What are the current obstacles that prevent to achieve circularity in the industrial sector?

- Limited Disclosure of Hazardous Substances in Products
- Need More Training in Circular Economy, Tech
- Reuse Underemphasized Compared to Recycling, Incineration
- Challenges in Collection, Reverse Logistics
- Complex Supply Chains Hinder Traceability
- Ambiguity in Wood-Furniture Waste Regulations
- Technological Gaps in Wood Recycling, Repurposing

Drivers
What are the current aspects that help/push to achieve circularity in the industrial sector?

- Increasing Demand for Sustainable Furniture
- Wood as Vital Natural Resource
- Wood: Natural Carbon Dioxide Storage
- Promotes Long-Term Product Use
- Easy Reuse of Wood Materials
- Thermo Utilization at Life's End
- Cascopic Use of Wood Materials

Wood finishing, resins & manufacturing processes

Potentials
What are the future potentials seen in achieving circularity in your industrial sector?

- Adopt IoT, AI in Wood-Furniture Sector
- Innovate Materials, Processes for Circularity
- Implement O&S Strategy, Focus on Modular Design, Easy Disassembly
- Define End-of-Life Thermal Use
- Develop Biobased Glues, Sustainable Plywood Chemicals
- Utilize Wood Residues for Novel Materials

Vision for the sector roadmap

Briefly outline your vision(s) for the sector regarding circular economy/C2C on a mid-term and a long-term.
 The vision is the ambitious, inspiring, in the future achievable goal of the sector. It shall provide a common objective WHAT we want to achieve within the scope of the transformation roadmap and give orientation to the participants of the roadmapping workshops. Please remember that will both focus on business models and technologies for our roadmaps your vision(s) can encompass those aspects.

Mid-term

Long-term

Digital Product Passport

Cradle-ALP – External experts support group workshop

Focus of Textile sector

Textiles for the transition into a circular and regenerative economy

Not focusing on commercial clothing industry, focus on functional and industrial textiles. (e.g. Automotive, Firefighter, Carpets, ...)

Keep in mind difference between synthetic fibers and natural fibers. Bring back into the right loop (Re-use, Repair, Recycling Vs. Biodegradability)

3 mins present focus & info
8 mins to make notes
8 mins to discuss

Gaps

What is missing to achieve circularity in your industrial sector?

- Value chain of end-of-life products is not unified or fully developed
- Feedstock for recycling
- A lack of adequate infrastructure for textile recycling
- Not enough technologies for recycling mixed fibers
- Collection and separation
- Application of 10R strategy
- Sorting of dark textiles
- People might not go for more expensive yet sustainable products
- Value chain especially extra-EU

Sector Textiles

Barriers

What are the current obstacles that prevent to achieve circularity in the industrial sector?

- Material mixtures of textiles
- Fast fashion
- Collection system of H&M and co
- Energy demand
- Too many different types of textiles and polymers in 1 clothing
- Consumer demand for cheap products

Drivers

What are the current aspects that help to push to achieve circularity in the industrial sector?

- Customers want it
- Upcoming regulatory efforts
- Sustainable fashion start-ups
- Material quality
- Strong legal incentives (extended producer responsibility)

Sector Textiles

Potentials

What are the future potentials seen in achieving circularity in your industrial sector?

- Cooperation with R&D - Funding
- Long-term use
- High potential start-ups
- Chemical recycling of clothing
- Regional value chain
- Supporting local EU sustainable textile producers
- Digital product passports

Vision for the sector roadmap

Briefly outline your vision(s) for the sector regarding circular economy/C2C on a mid-term and a long-term. The vision is the ambitious, inspiring, in the future achievable goal of the sector; it shall provide a common objective WHAT we want to achieve within the scope of the transformation roadmap and give orientation to the participants of the roadmapping workshops. Please remember that will both focus on business models and technologies for our roadmaps & your vision(s) can encompass those aspects.