

# Circular makerspaces: training program



# FOREWORD

Welcome to the training program on circular economy designed specifically for makerspaces! In a world where sustainability and resource efficiency are paramount, this program is tailored to empower makerspace enthusiasts with the knowledge and skills to thrive in the dynamic intersection of creativity and circular principles. Explore the essential concepts and working methods driving sustainable innovation and join us in reshaping the future of making through this immersive learning experience.

In the changing field of innovation, makerspaces play a crucial role in shaping the future of creative projects. As we navigate a world increasingly focused on sustainability and responsible resource management, the need for a circular mindset within makerspaces becomes ever more apparent. This circular training program is designed to empower makers with the knowledge, skills, and inspiration to infuse circular principles into their projects, fostering a community of innovators committed to both creativity and environmental responsibility. Welcome to a transformative journey, where making meets sustainability, and together, we shape a more circular and thoughtful future.

**Circular Spaces Project Team**

*Empowering makerspace communities with a comprehensive view on circular economy principles, fostering sustainable innovation, resource efficiency, and a circular mindset*

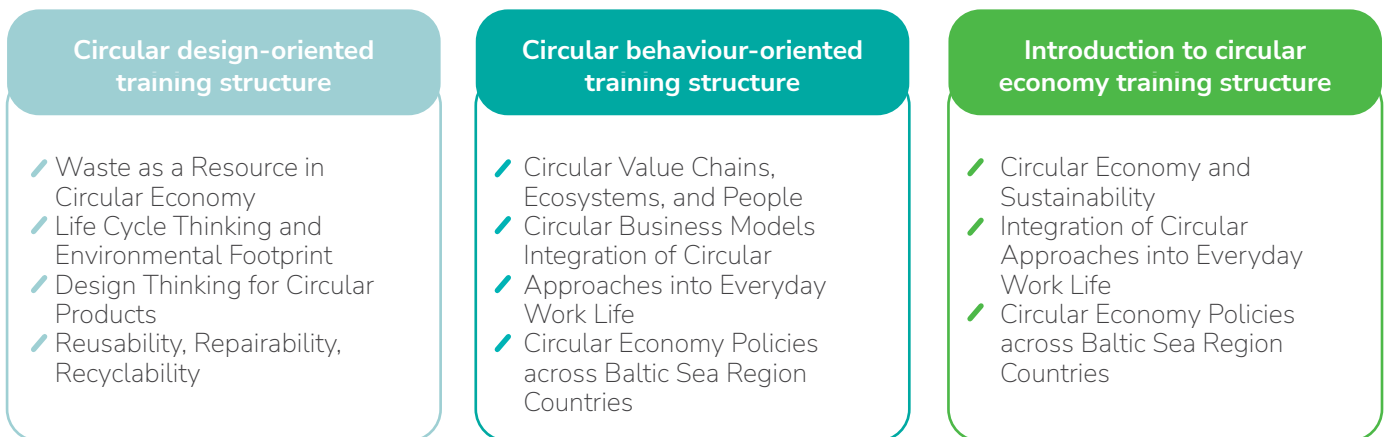
This education program was developed under the Circular Spaces project, funded by Interreg Baltic Sea Region programme 2021-2027

# How to make use of this program?

Circular makerspaces training program consists of 9 Topics closely complementing each other. Topics 1-4 and 9 focus on building trainees' theoretical knowledge regarding different aspects of circular economy, while Topics 5-8 target practical application of gained insights.

1. Circular Economy and Sustainability
2. Waste as a Resource in Circular Economy
3. Circular Value Chains, Ecosystems, and People
4. Circular Business Models
5. Life Cycle Thinking and Environmental Footprint
6. Design Thinking for Circular Products
7. Reusability, Repairability, Recyclability
8. Integration of Circular Approaches into Everyday Work Life
9. Circular Economy Policies across Baltic Sea Region Countries

While the most benefits for trainees come from the exploration of all Topics, each trainer can decide individually how to structure their organization of trainings by utilizing different selected topics. Examples below suggest a few formations of such option.



**Each Topic begins with methodological notes** which serve as a guiding material for trainers during the preparation and the organization of training activities. These notes include a summary of each Topic, expected training outcomes, defined training benefits for different target groups, training plan and other necessary information for carrying out the training.

**Action required tasks**, such as discussions, workshops or case analyses, are marked with **blue text** and activity icon. It is up to the trainer to decide how these tasks will be carried out. For example, trainees can go through the theoretical materials individually and implement action required tasks in groups.



Activity icon

In addition to this document, **each Topic is accompanied with slides** which can be utilized as a supporting material for trainers when presenting training content. The slides can be freely accessed **here**.

This document can be used both as an **instruction manual for the trainer** and as **informational material for the trainees**. Training organisers are invited to add their own insights, local best practices or creative practical exercises to the material presented.

# Integration of circular approaches into everyday work life

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Developed by

Lithuanian Innovation Centre

Topic

8

The Topic focuses on equipping participants with the knowledge and skills to seamlessly integrate circular economy principles into their daily work routines. Participants will explore practical strategies for waste reduction, resource optimization, and sustainable decision-making, fostering a workplace culture that aligns with circular approaches for long-term environmental and economic benefits.

## Expected training outcomes

After completing this Topic, trainees will...

... have a sound understanding of circular consumption, circular behaviour and circular approaches;

... be able to apply circular economy-oriented thinking in different everyday situations.

### Notes for target groups

Different target groups can achieve the following benefits of this training Topic:

#### Makerspace

Stronger and more equipped facilitation of circular economy-oriented community formation. Stipulation of circular approaches' integration into everyday work life, leading to a more sustainable use of resources on the organizational level.

#### Maker

Broader application of circular economy-oriented thinking in various environments. Stipulation of circular approaches' integration into everyday work life, leading to a more sustainable use of resources on the individual level.

#### Suppliers

Stronger circular economy-oriented engagement with partners. Stipulation of circular approaches' integration into everyday work life, leading to a more sustainable use of resources both on the organizational and on the individual level.

#### Start-ups

Broader application of circular economy-oriented thinking in various environments. Stipulation of circular approaches' integration into everyday work life, leading to a more sustainable use of resources both on the organizational and on the individual level.

#### SMEs

Broader application of circular economy-oriented thinking in various environments. Stipulation of circular approaches' integration into everyday work life, leading to a more sustainable use of resources both on the organizational and on the individual level.

#### Business support organizations

Improved readiness to promote circular transformation of businesses. Stipulation of circular approaches' integration into everyday work life, leading to a more sustainable use of resources both on the organizational and on the individual level.

## Training plan

<b>Introduction</b> (15 min / 1-8 slides)	<b>Main part</b> (3 h / 9-22 slides)	<b>Conclusion</b> (15 min / 23-26 slides)
Introduction to the topic and different stages of knowledge uptake, based on Bloom's Taxonomy.  <i>Reading/presentation, discussion, self-reflection.</i>	Exploration of the „circular approaches“ concept and the examples of circular economy-oriented activities. Workshop „Application of circular approaches in makerspaces“.  <i>Reading/presentation, discussion, case-analysis, workshop.</i>	Application of Continuous improvement approach to achieve long term implementation of circular approaches.  <i>Reading/presentation, discussion, self-reflection</i>

Total duration for the Topic 8: 3-4 h

## Training modes

<b>In person</b>	<b>Online</b>	<b>Hybrid</b>
The trainer decides the format in which the trainees will be introduced to the theoretical training material (e.g., by utilizing slides or by ensuring individual learning). Tasks requiring action (marked in blue colour text) should be carried out among the trainees in a facilitated discussion manner.	Trainer decides the format in which the trainees will be introduced to the theoretical training material (e.g., by utilizing slides and online presentations or by individual reading tasks for trainees before the online session). Tasks requiring action (marked in blue colour) should be carried out online among the trainees. Trainer decides how to ensure a pro-active participation of trainees (e.g., by creating interactive polls) and ensures the facilitation (both thematic and technical) of the online session.	Trainer decides the format in which the trainees will be introduced to the theoretical training material (e.g., by utilizing slides and hybrid presentations or by individual reading tasks for trainees before the hybrid session). Tasks requiring action (marked in blue colour) should be carried out in a hybrid format among the trainees. Trainer decides how to ensure a pro-active participation of trainees both online and on site (e.g., by utilizing digital solutions) and ensures the facilitation (both thematic and technical) of learning process.

## Notes for the trainer

<b>Required previous experience and theoretical knowledge</b>	<b>Ethical aspects of carrying trainings</b>	<b>Training tools and resources</b>
Theoretical foundations of the circular economy. Preferably, Topics 1-7 from this training programme have been covered.	It is important to ensure equal opportunities for trainees to be involved in the activities outlined in the training, e.g. by organising workshops.	<p><i>The trainer</i> should utilize all materials provided in this topic; create visual presentation (optional); ensure equipment required to carry out the training in online or hybrid format (optional); provided necessary stationary for trainees participating in the workshop.</p> <p><i>Trainees</i> should utilize the materials provided in this topic optionally by themselves or with the support of the trainer.</p>

# Introduction

This training Topic is aimed at facilitating practical application of circular economy-oriented practices into everyday operation of makerspaces. The following material is designed to guide makerspace communities on how theoretical knowledge about the circular economy can be integrated into existing work routines. By taking a more proactive approach on circular transformation, makerspaces can not only be more environmentally conscious, but also better align their activities with economic efficiency, innovation, and societal expectations.

Makerspaces are by definition quite circular, as they encourage the sharing of tools, equipment, materials, knowledge, and skills within their communities. By turning creative ideas into physical products, makers are well aware of the value of the resources used and the amount of work required for this process. The unique features of makerspaces position them into a favourable setting of mainstreaming circularity ideas even broader.

## Discussion



See the example of Amman Valley MakerSpace project

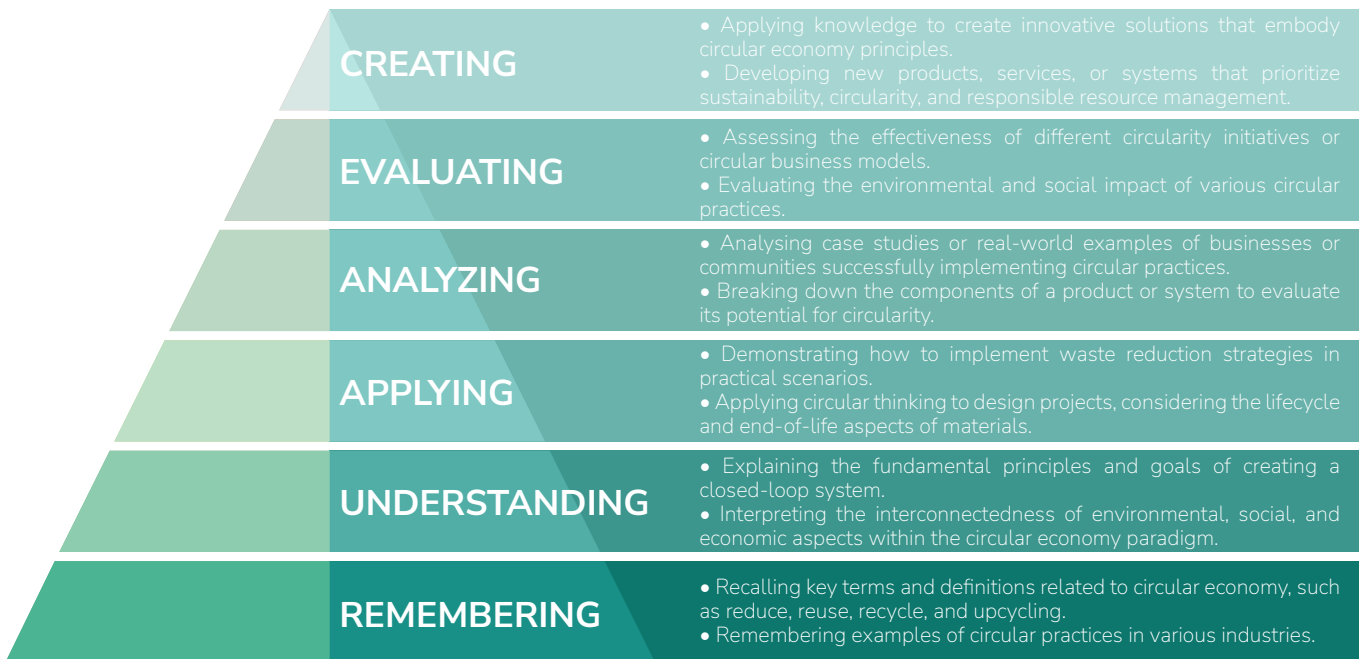


and discuss the following question:

*What are the similarities and differences between the Amman Valley MakerSpace and your local makerspace in terms of sharing (1) tools, equipment, and materials (2) knowledge and skills among the community members?*



Previous topics in this training program provide a wealth of information on different circular economy subjects. In order to unlock the long-term value of this knowledge, this Topic utilizes Bloom's Taxonomy approach that provides a structured framework both for trainers and trainees to engage with the principles and concepts of circularity. Knowledge capture and the formation of competences and skills are strengthened as progress is made towards the higher steps of the pyramid.

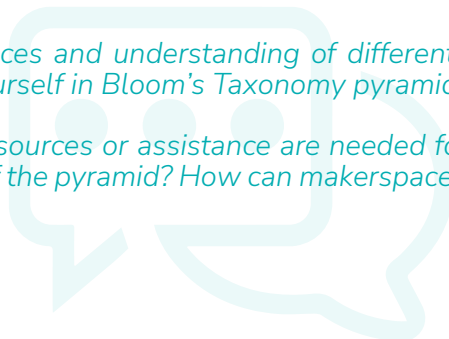


Based on this Taxonomy, the integration of circular approaches in everyday work life depends on the individual's (or organisation's) ability to apply the knowledge in different settings. For example, when analysing the organisation's activities, setting new goals or evaluating existing initiatives, all related to mainstreaming circular economy approaches.

### Discussion and self-reflection



1. Based on your experiences and understanding of different circular economy ideas, where would you place yourself in Bloom's Taxonomy pyramid? Why?
2. What further actions, resources or assistance are needed for you to advance further towards the higher steps of the pyramid? How can makerspace community support your advancement?

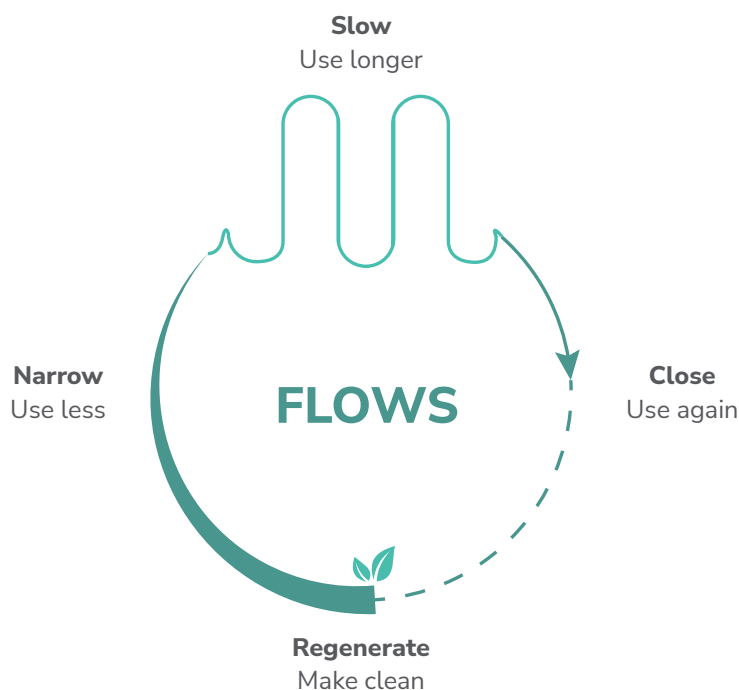




# Circular approaches

What is meant by circular approaches? In a general sense, it is the application of knowledge about the circular economy to the different decision-making processes. These processes can range from the simplest and routine, such as sorting packaging properly or using public transport, to the highly complex or large-scale, such as designing a new product or developing a sustainable business strategy. When we adopt circular approaches, we look at our actions through the lens of the circular economy, in addition to other considerations. This can be simplified to the question of "How can I reduce resource consumption and waste generation through this action?"

Circular approaches are inseparable part of circular behaviour (more about it on Topic 3 – Circular value chains, ecosystems, and people) which utilizes the rationale of responsible resource consumption. A more systemic viewpoint to circular consumption, introduced by Circle Economy Foundation, refers to 4 resource use strategies: slowing flows, closing flows, narrowing flows, and regenerating flows (more about it on Topic 1 – Circular economy and sustainability).



## Examples of consumer's or user's actions to...

**...slow resource flows:**  
careful treatment, regular cleaning, and necessary repairing of products

**...narrow resource flows:**  
participation in sharing and rental models, and avoidance of unnecessary purchases

**...close resource flows:**  
passing on of pre-owned products to others, separation of waste materials

**...regenerate resource flows:**  
use of renewable energy, selection of organic food and toxic-free products

## Discussion



Usually, when we consider buying a new phone, our decision is based on economic (e.g., price) and technical factors (e.g., battery life, camera resolution). With the adoption of circular approach, we would also question the overall need for a „new“ phone and evaluate the option of buying a refurbished one.

*What other aspects, based on your current knowledge about circular economy, could be included into the decision-making of buying a phone?*

<sup>1</sup><https://www.circle-economy.com/blogs/circular-consumption-in-the-linear-economy-only-a-drop-in-the-ocean>

Circular approaches can be adopted not only on an individual level but also on the organisational. This usually happens when a group of managing staff agrees on common circular economy-oriented actions, contribute to them with allocated resources, and advocate them to others. In organisations, circular approaches can be integrated into almost all activities. The following examples reflect only a fraction of the variety of such possibilities.

## Procurement

- ✓ Implementation of **green** and **circular** procurement by incorporating sustainability criteria into the technical requirements of procured goods, services, or works.
- ✓ Identification of more sustainable and circular product alternatives to be procured by implementing corresponding market analysis.
- ✓ Reinforcement of effective green and circular procurement implementation by strengthening procurement staff competences.
- ✓ Reinforcement of the procurement role for contributing to circular economy objectives by aligning it with other organisational agendas, regulations, or strategies.

## Events

- ✓ Implementation of **zero-waste events** by eliminating single use items, such as packaging, printed agendas, name cards, etc.
- ✓ Compliance with proper waste sorting by allocating separate recycling bins for different types of waste and by displaying correct sorting information.
- ✓ Avoidance of event-specific item production, e.g., stationery, banners, souvenirs, etc., by utilizing multiple use alternatives.

## Staff mobility

- ✓ Promotion of shared mobility (e.g., carpooling) by identifying such possibilities among the staff.
- ✓ Promotion of use of public transportation by creating motivational incentives.
- ✓ Encouraging cycling through the provision of bicycle parking spaces.
- ✓ Awareness creation regarding environmental impacts of mobility by mainstreaming GHG calculations (**example of GHG calculation tool**) and setting related reduction goals in the organization.
- ✓ Promotion of sustainable mobility options for staff travelling to external events by creating corresponding guidelines and recommendations.

It is evident that some of these examples are not only related to the circular economy, but also to other concepts such as sustainability or zero-waste (more on this in Topic 1 – Circular economy and sustainability). Nevertheless, they all share the objective of using available resources more efficiently, reducing waste and contributing to reducing pollution.

Makerspaces, in this respect, can integrate circular approaches not only in common organisational activities (e.g., procurement, facilities management, etc.) but also into their other typical activities (e.g., production of prototypes, education, etc.). The more of the makerspace community is involved in the application of circular economy-oriented practices, the greater environmental impact can be achieved.

## Case analysis



*“CircularSpaces” makerspace is a dynamic hub for innovators and creators committed to integrating sustainable practices into their projects. The makerspace is planning to initiate a challenge to encourage its community members to apply circular economy thinking to their projects. The challenge will include the creation of furniture design and participants will be tasked to design innovative and functional pieces.*

*Imagine that you are one of the organisers who have to set the evaluation criteria for the presented projects and choose the winner for the most well thought circular furniture. Define these evaluation criteria both from the design and production, as well as the end user perspectives. Use references or examples from different training Topics, circular consumption framework provided on page **133**, and apply your overall knowledge of circular economy.*

# Workshop “Application of circular approaches in makerspaces”

This workshop is aimed at strengthening practical application of theoretical knowledge about circular economy. Workshop participants are invited to design an action plan for the local makerspace which would define key activities to support its circular transformation. When developing an action plan, workshop participants are invited to come up with ideas on how circular approaches can be applied to the everyday activities of the makerspace.



## Instructions:

1. Training participants form smaller groups of 4-7 people. *(5 min)*
2. Each group discusses different makerspace activity areas in which circular approaches could be integrated and chooses 2-3 of them for further investigation (activity areas can be chosen from the indicative list or be additionally set by the participants themselves). *(5 min)*
3. Each group brainstorms the ideas and practical actions that are needed to be implemented in the makerspace in order to integrate circular economy principles in selected activity areas and creates corresponding action plan (action plans can be created by using attached template). *(45 min)*
4. Each group presents their action plan to other groups. *(10 min each group)*
5. All participants discuss most feasible/achievable actions and merge them into one action plan. *(30 min)*
6. All participants share their impressions on the activity and achieved results in an open discussion format *(15 min)*.

## Template for the action plan

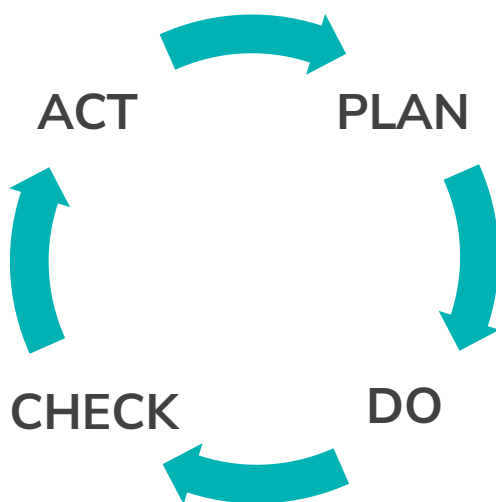
Activity area	Suggested action	Required resources for action implementation	Action implementation timeline	Action objective and measurable result (impact)	Procedures to evaluate achieved impact
E.g., Education and training	Creation of a brief circular design guideline to be used by makers	Human resources (1-2 people) for guideline creation + printing or digital display of prepared material	Guideline creation and selection of its display locations: 2 months Guideline disclosure for makers: perpetually after 2 months	To raise awareness of makers about circular design concept and to promote its application in product design (after 6 months of guideline display at least 80% of makers will know about this concept and at least 50% of makers will have been tried to apply it to their product design)	Survey of makers

## Indicative lists of makerspace’s areas of activities

- ✓ Prototyping and fabrication (can be narrowed down to different materials/technologies, e.g., electronics and robotics, metalworking, woodworking, audio and video production, etc.);
- ✓ Education and training;
- ✓ Sourcing of materials, tools, and equipment;
- ✓ Community events;
- ✓ Cooperation with other organisations;
- ✓ Administration and communication;
- ✓ Facility and equipment management.

# Continuous improvement

Incorporating circular approaches into makerspaces can be effectively implemented through the Plan-Do-Check-Act (PDCA) approach, fostering a continuous cycle of improvement. In the "Plan" phase, makerspace communities should establish clear goals and objectives for integrating circular principles, such as waste reduction, sustainable material usage, and product life extension. This involves designing projects with circularity in mind, setting guidelines for responsible material sourcing, and defining key performance indicators (KPIs). Moving to the "Do" phase, makerspaces implement these plans by actively engaging community members in circular projects, providing access to tools and resources that facilitate sustainable making, and promoting collaboration. In the "Check" phase, regular assessments and evaluations are conducted to measure the effectiveness of circular initiatives. This involves monitoring project outcomes, assessing adherence to circular design principles, and gathering feedback from participants. Finally, in the "Act" phase, makerspaces use the insights gained to make informed adjustments, refine existing practices, and scale successful circular projects. Embracing the PDCA approach ensures a dynamic and iterative process, fostering a culture of continuous improvement and sustainability within makerspaces.



## Discussion and self-reflection

1. How the action plan developed during the workshop reflects the PDCA approach?
2. How would you assess your abilities to apply circular approaches (before and after this topic)?



# Additional reading

As the training on circular approaches in everyday work life draws to an end, we encourage you to delve deeper into the diverse landscape of sustainable practices and circular thinking. Investigate more information and gain new perspectives by reading through the recommended articles, resources, and publications provided.

- ✓ A Guide to implement circular economy in your everyday life: [https://ec.europa.eu/programmes/erasmus-plus/project-result-content/c76c3906-0812-458c-8566-b02e81a487c3/Guide\\_Circular\\_economy\\_DE-2.pdf](https://ec.europa.eu/programmes/erasmus-plus/project-result-content/c76c3906-0812-458c-8566-b02e81a487c3/Guide_Circular_economy_DE-2.pdf)
- ✓ Behavioural change for the circular economy: A review with focus on electronic waste management in the EU: <https://www.sciencedirect.com/science/article/pii/S2590289X20300062>
- ✓ Behaviour change for a circular economy - How it works and why it pays off: <https://www.youtube.com/watch?v=DjyX12Sway0>
- ✓ Circular consumption in the linear economy: only a drop in the ocean?: <https://www.circle-economy.com/blogs/circular-consumption-in-the-linear-economy-only-a-drop-in-the-ocean>
- ✓ How to Build a Circular Economy: <https://www.wri.org/insights/how-build-circular-economy>
- ✓ 21 circular economy solutions: changing how we eat, live and travel for a more sustainable world: <https://www.weforum.org/agenda/2022/03/21-circular-economy-solutions/>