Federal Ministry
of Education
and Research

eureka
Germany | Canada
CHAIR 2024-2025

Circular Value Creation

An International Innovation Initiative

Scope – Overview of innovation areas and perspectives

Scope

Circular Economy is an economic system which aims to minimise waste and promote a sustainable use of natural resources, through smarter product design, longer use and recycling in order to reduce the depletion of natural resources[i]. It is a departure from the traditional, *linear* economic model, which relies on large quantities of cheap, easily accessible materials and energy.

As a model of production and consumption Circular Economy involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible[ii]. When a product reaches the end of its life, its materials are kept within the economy wherever possible thanks to recycling. Its productively reuse creates further value.

Circular Value Creation goes well beyond the idea of recycling and waste management. It requires novel strategies for product design, cross-sectoral partnerships, new materials and technologies as well as business models that are guided by the principles of longevity, reuse and recycling. Circular value creation is expected to lay the basis for flexibility, change and resilience in value creation systems and thereby open up new opportunities for sustainable economic development, for prosperity and for the creation of jobs

This call aims to enable the development of circular value creation systems in which methods of ecologically meaningful, value-retaining use (reuse and recycling) or utilization are known and intended for the entirety of its materials, components and products.

Innovation areas

Therefore, this call is prioritising R&D projects which

- enable the development of a circular value creation
- show the potential to research or develop circular products, processes or services that can be commercialised

and address one (or more) of the following **innovation areas**

I. Data technologies, data ecosystems and cross-linking

1. Data ecosystems for the realisation of circular value creation exploiting the full potential of digitalisation – e.g., harnessing existing, purpose-built platform solutions.
2. (AI based) process and system control technologies
3. Assistance and Expert systems
4. Simulation models and predictive analytics to assess the scalability of circular processes across industries
5. …

II. Key technologies (non-excluding list)

1. Innovative technologies which enable manufacturing products that are more reusable, repairable, durable and recyclable, e.g., additive manufacturing
2. Manufacturing and machine learning, e.g. increasing the flexibility of industrial processes, modular approaches
3. AI-driven diagnostic systems for assessing the viability of reused, remanufactured, and recycled components
4. Industry 4.0 technologies (IoT, big data analytics) for monitoring and managing circular value chains
5. (Advanced/smart) Sensors, e.g. the ability to measure materials, components and product flows
6. Robotic / handling - and assistance systems
7. (AI based) Material and Product Design, Decomposition and Separation
8. (Advanced) Materials and additive manufacturing
9. Life cycle assessment / Product life cycle management – e.g. Digital Twin / Digital Product Passport
10. Tools and solutions addressing challenges emerging from product focused regulations (such as the ESPR)
11. Network design of reverse supply chains
12. Algorithm that shows the (positive) impact of a CE-process or CE-product
13. …

(Projects which are strictly focused on Recycling are excluded.)

Perspectives

From the outset, it is necessary to consider the impact of technological developments on companies and people and what new business models they enable. Therefore, the projects must address the selected innovation area(s) from at least two of the following **perspectives**:

a. Systemic aspects and questions of circular value creation

- How can we establish new value chains and products?
- How can transparency be increased for every stakeholder throughout the whole life cycle of the product?
- How can we increase efficiency in circular approaches?
- How can we extend circular approaches across national boarders?
- …

b. Business models and smart services.

- How can R&D strategies be linked to business objectives?
- How can innovative business model facilitate the transformation to a circular economy?
- How can the economic benefit of circular products be increased?
- How can we design product-service systems that extend product life cycles through maintenance and upgrading services?
- How can we identify bottlenecks and optimize workflows in circular production systems?
- …

c. People in circular value creation processes

Companies' workforces must be empowered to build and develop a circular mindset and the corresponding skills and knowledge. At the same time structures must be in place both within the company and across organizations to enable employees to make these skills effective.

- How can people working in circular value creation processes be supported to shape those processes?
- How can new (transdisciplinary) skills and knowledge regarding circular value creation be acquired, e.g. focusing on circular economy principles, remanufacturing skills, sustainability practices, data competence and transfer competence? Which elements can be addressed on-the-job?
- How can we explore new learning formats and how can these be developed or adapted?
- How can people in the working world be encouraged to experiment with circular approaches? How can transdisciplinary exchange in/among organisations be supported?
- How can AI-based decision support for complex remanufacturing tasks be integrated?

Applications are welcome from all sectors, including both industry and services.