

Individual, dependable, mission-oriented

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# Fraunhofer CIRCONOMY® Hub “Material Cycles in the Construction Sector”

## Concept of the CIRCONOMY® Hubs

The transition to a sustainable economy can only be accomplished by connecting the current action and stakeholder levels, who up until now have operated independently from one another.

The Fraunhofer-Gesellschaft is meeting this challenge by introducing Fraunhofer CIRCONOMY® Hubs. The hubs bundle R&D capacities, are oriented towards the needs of industry and society, link aspects of circular economy and bioeconomy, create a common data space with a digitized, cycle, and initiate networks and industrial symbioses.

Fraunhofer institutes form the organizational core of the CIRCONOMY® Hubs, cooperating with partners from industry, society and science.

## Fraunhofer CIRCONOMY® Hub “Material Cycles in the Construction Sector”

The Fraunhofer Institute for Building Physics IBP in Holzkirchen and the Fraunhofer Center for International Management and Knowledge Economy IMW in Leipzig are founding and establishing the CIRCONOMY® Hub “Material Cycles in the Construction Sector” as a network of physical development centers for recycling of building materials. The aim of the hub is to develop tools and methods which enable construction waste to be transferred to equivalent or higher-value usage.

### Motivation

In view of the global scarcity of resources, recycling processes are important levers for the sustainable usage of raw materials. However, only small proportions are currently left in the resource cycle and re-used. Increasing cost pressure due to problems concerning the availability of resources in the construction industry combined with the sustainable finance concept, as well as current changes in the legal framework with regard to sustainability, act as fundamental drivers.

### Mission

Up until now, networking initiatives mostly have a regional or technological focus. What is lacking is the practical implementation of the mission-based approach called for by the Expert Commission for Research and Innovation (EFI) in its 2021 report. The Fraunhofer CIRCONOMY® initiative has responded to this demand by creating CIRCONOMY® Hubs focused on specific topics and industries. These are a new, agile tool for collaboration based on a shared mission and a common, secure data space with the goal to create regional and cross-regional value.

Your path to sovereign  
value cycles

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1. Jointly shaping the transformation in the construction sector
2. Industry-wide, cross-regional networking
3. Mission oriented cooperation
4. Collaboration in a secure data space
5. Individual solutions

Recycling must become not only more environmentally sustainable, but also economically advantageous over the disposal of building materials in landfills. This could be achieved by establishing legal requirements and/or using innovative efficient technologies. By developing and testing appropriate processes for the construction industry, the foundations will be laid for the improved separation, processing and recycling of building waste, thus closing gaps in the various material cycles.

## Goals

The transformation of value chains to value cycles is a key instrument for relieving the pressure on natural resources and on reducing greenhouse gas emissions. In the construction sector, closed-loop recycling faces a series of technical and economic obstacles, as well as methodological and regulatory hurdles. Particularly when it comes to concrete – the most commonly-used building material of all – regulatory requirements prevent the systematic use of recycled building materials. The long usage cycles of building materials and the lack of reliable data on used materials make recycling building materials a challenging task. Furthermore, conventional processing methods cannot currently tap the anthropogenic raw material deposit for inorganic secondary raw materials that exists with waste concrete.

The shift to a circular economy requires both systemic innovations and a value system that takes not only monetary aspects into account, but also the ecological and social added value of value creation cycles. The CIRCONOMY® initiative meets these challenges by combining diverse research areas. In this way, robust solutions in the construction industry, such as concrete recycling and appropriate methods for assessing sustainability, can be put into practice.

The overall goal of the CIRCONOMY® Hub "Material Cycles in the Construction Sector" is to strengthen the concept of sustainability in the construction industry. This calls for closely linked technological and socioeconomic research, combined with networking as well as activities and initiatives to promote knowledge transfer. In the CIRCONOMY® Hub, common value cycles are identified and researched across corporate boundaries. Based on this, corresponding processes, materials and solutions are developed to market maturity on a pilot plant scale in prototype labs.

## The Fraunhofer-Gesellschaft as a key partner for the construction industry

From detailed sector-specific questions to cross-technology construction systems, our experts at the respective institutes address the most diverse concerns of the construction industry through internal networking.

The CIRCONOMY® Hub "Material Cycles in the Construction Sector" focuses on developing technologies and on anticipating changing general conditions in order to close various building material cycles. Specifically, this includes the following areas:

- Physical, chemical and other separation processes for compound and composite materials
- Recyclable building materials including development of new, bio-based materials (e.g. alternatives to existing thermal insulation composite systems)
- Sorting and detection systems (e.g. for asbestos) for recycling companies
- Incorporation of recycling strategies in the design and construction process
- Integration of platforms and data-driven solutions into building and material cycle processes

In addition, tools and methods will be developed to ensure end-to-end, optimized material flows in the construction sector.

Another important goal of the CIRCONOMY® Hub is to transfer knowledge and innovation to the technology areas addressed and to develop sustainable, feasible business models for market actors. The "Material Cycles in the Construction Sector" hub forms a link between industry, society and science and organizes an ongoing dialogue between stakeholder groups. Externally, the hub strives to position itself internationally as a network of excellence and innovation for circular economy and bioeconomy.

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