

Press Release

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AIT: CIRCULAR ECONOMY THOUGHT THROUGH THE ENTIRE VALUE CHAIN

- AIT bundles its systemic and technological competencies for the implementation of the circular economy
- Research projects cover the entire value chain from raw materials, products and buildings to urban and regional planning

Around 50 percent of global greenhouse gas emissions are attributable to the extraction and processing of resources. The circular economy is a major lever for reducing resource use through sustainable growth and for extending the life cycle of products. The AIT Austrian Institute of Technology is taking a systemic, cross-sector approach here, enabling expertise from multiple centers along the entire value chain from raw materials, products and buildings to urban and regional planning.

"In addition to changing the existing energy infrastructure as well as energy systems, reducing material consumption through circular economy is a crucial step towards climate neutrality. As AIT, we have taken on this important topic and are using our expertise as Austria's largest research institute to also develop solutions in this area across the entire value chain and make them available to the relevant stakeholders," explains Wolfgang Hribernik, Head of Center for Energy at AIT.

AIT bundles its systemic and technological competencies for the implementation of the circular economy

In contrast to linear production methods, circular business models are characterized by closed-loop production. Products are not disposed of at the end of their useful life, but instead reintegrated into new product supply chains. "Returning materials to the production cycle requires an integrated approach across the entire life cycle. AIT experts bring both systemic and technological knowledge to the development of ecological and competitive circular paths," explains Ernst Gebetsroither-Geringer, an expert in circular economy at the AIT Center for Energy. "Recycling-friendly innovative production methods and product designs, alternative utilization concepts and the use of new (digital) technologies are of central importance for the success of the circular economy," Gebetsroither-Geringer continues. AIT is already making an important contribution to this with its integrated approach and will further intensify its research on the topic of circular economy in the coming years.

AIT research projects on the circular economy

AIT research projects in this area cover the entire value chain from raw materials, products and buildings to urban and regional planning. The AIT approach creates an integrated view of

resources and materials (energy, water, waste, raw materials, biogenic resources) and their life cycle, taking rebound effects into account.

Innovative urban agriculture and climate-smart circular economy

The case study "Zukunftshof Rothneusiedl" will be used to explore the possibilities of turning an old farm into a showcase project for innovative urban agriculture and climate-smart circular economy. The AIT project "KLIMUR - Climate-silent urban resource management" is developing the methodology and tools to accompany the planning and decision-making processes for the realization of local resource circular economy (energy, food, water) and integrated district energy concepts. For the case study Zukunftshof, resource flows (biomass, nutrients and water) are determined, analyzed and simulated in addition to energy flows (heating, cooling and electricity). From this, possible development scenarios on a neighborhood scale will be derived for the Zukunftshof demonstration project as well as for the Rothneusiedl district in the south of Vienna. The Zukunftshof itself is to become the starting point for a sustainable energy and resource cycle management system for the Rothneusiedl urban development area.



<https://drc.ait.ac.at/sites/klimur/>

Digital foundations for circular construction

To achieve climate goals in the construction sector, it is crucial to increasingly construct circular buildings that can be deconstructed for high-quality recycling at the end of their service life and thus be reused as secondary raw materials in construction projects. However, many companies still lack knowledge, implementation experience and scalable solutions for the implementation of circular building projects. The project "Digital foundations for circular construction" summarizes the current state of the art, gives an overview of the national and international performance of the D-A-CH market and outlines the requirements of the EU taxonomy. Most importantly, concrete building projects are individually assessed for their recyclability and the requirements of the EU taxonomy (environmental criteria) with the help of a digital, material building passport - both from an economic and technical perspective. Project manager Gundula Weber: "The circular economy in the construction sector requires good planning that focuses on durability from the outset and takes recycling at the end of its service life into account. This already starts with the tendering process. In the project "Digital basics for recyclable construction" we are developing a simple guideline that supports building owners in creating appropriate tenders."

<https://www.digitalfindetstadt.at/innovationsdatenbank/digitale-grundlagen-fuer-kreislauffaehiges-bauen>

Cryogenic recycling of valuable, industrially underutilized materials

When recycling residual materials, the material's varietal purity is a crucial factor. Often, the more the material grades are mixed, the poorer the quality of the recycled material. The same applies to the degree of contamination. A promising and innovative method is the preparation of material composites by cryogenic grinding. In this process, the material properties of the ground material are altered by applying cold. It becomes hard and brittle, enabling ultra-fine grinding of the different materials.

This process is used in the KryoReIF project of the LKR Light Metal Competence Center Ranshofen of the AIT and the partners SYNRON and TCKT. Taking advantage of different coefficients of thermal expansion and varying degrees of embrittlement, materials can be crushed to the desired fineness by the action of friction and pressure in a drum, then separated from one another by the different degrees of grinding using sieves and recycled without any loss of quality. The use of this new cryogenic separation enables the recovery of valuable raw materials and the avoidance of chemical and thermal processes in recycling. Ongoing research in the project is currently focusing on metal chips wetted with cooling lubricants and plastic multilayer films.

<https://www.ait.ac.at/themen/giesstechnologien/projekte/kryoreif>

Roadmap for Upper Austria's path to becoming a model region for plastics recycling management

In the SPS Roadmap project, the AIT Center for Innovation Systems & Policy and Business Upper Austria developed a roadmap to make Upper Austria a model region for plastics recycling. The path to this goal was worked out by around 100 experts from companies along the entire value-added cycle and research institutions in a structured process, from which a joint vision was developed: By 2030, the contents of the yellow bag of local waste disposal should be 100 percent recyclable. "We have formulated numerous options for action and measures for these key issues: Design4Circularity; Collection, Sorting and Recycling; Materials, Technologies and Research and Development." said project manager Beatrix Wepner. https://www.biz-up.at/fileadmin/user_upload/Cluster/KC/2022/Statistische_Seiten/biz_sustainable-plastics-solutions_roadmap2022_220203_final.pdf

Political framework conditions for the circular economy: Green Deal and Austrian climate strategy

One of the key building blocks of the European Commission's Green Deal is the Circular Economy Action Plan. The measures span the entire life cycle of products. The action plan aims to prepare the economy for a green future, strengthen EU competitiveness, protect the environment and introduce new rights for consumers. In its "Circular Strategy - Austria on the Way to a Sustainable and Circular Society," which has now been adopted, Austria sets itself the goal of reducing domestic resource consumption. Specifically, domestic material consumption is to be reduced by 25% by 2030 and a sustainable material footprint of 7 tons per capita and year is to be achieved by 2050. Here, Austria is currently at 19 t/a, around 5 t/a significantly above the EU-28 average of 14 t/a. In the Austrian Climate Long-Term Strategy 2040, the goal of becoming climate neutral by 2040 was defined in line with the requirements of the European Green Deal. This makes it necessary to reduce the predominantly linear production method and thus the primary use of primary raw materials and to increasingly keep resources in the cycle as secondary raw materials.

Further information

Circular Economy at AIT

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