



# Fraunhofer

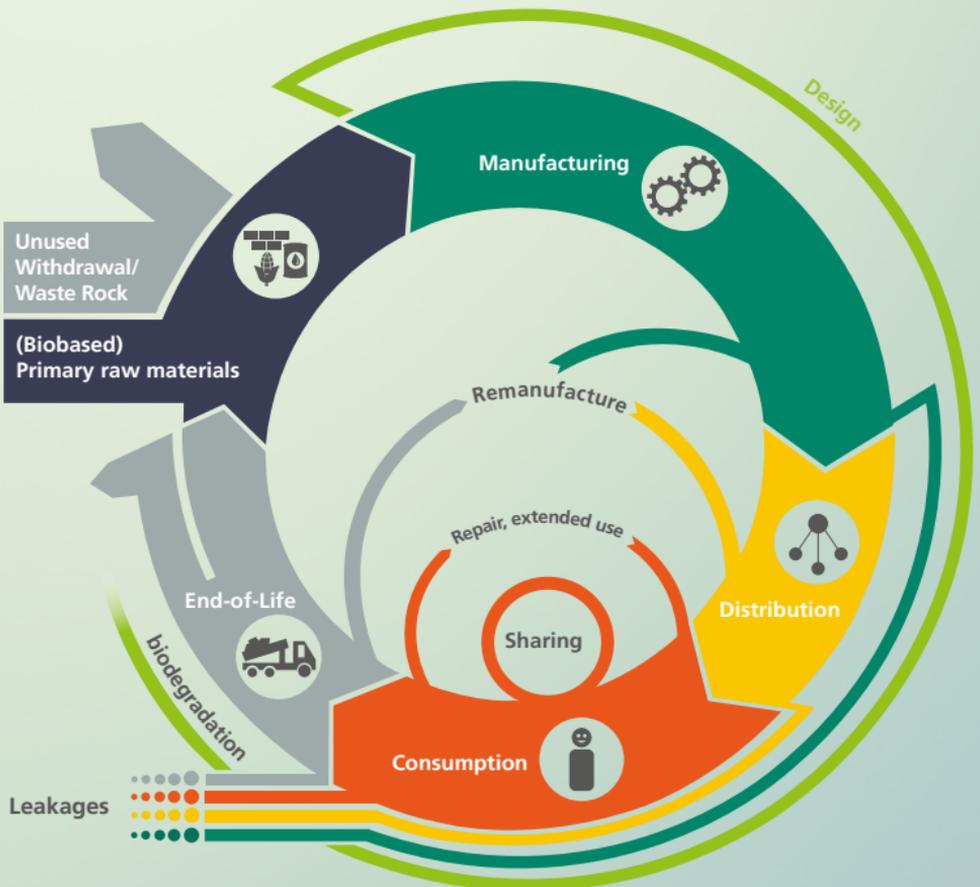
## UMSICHT

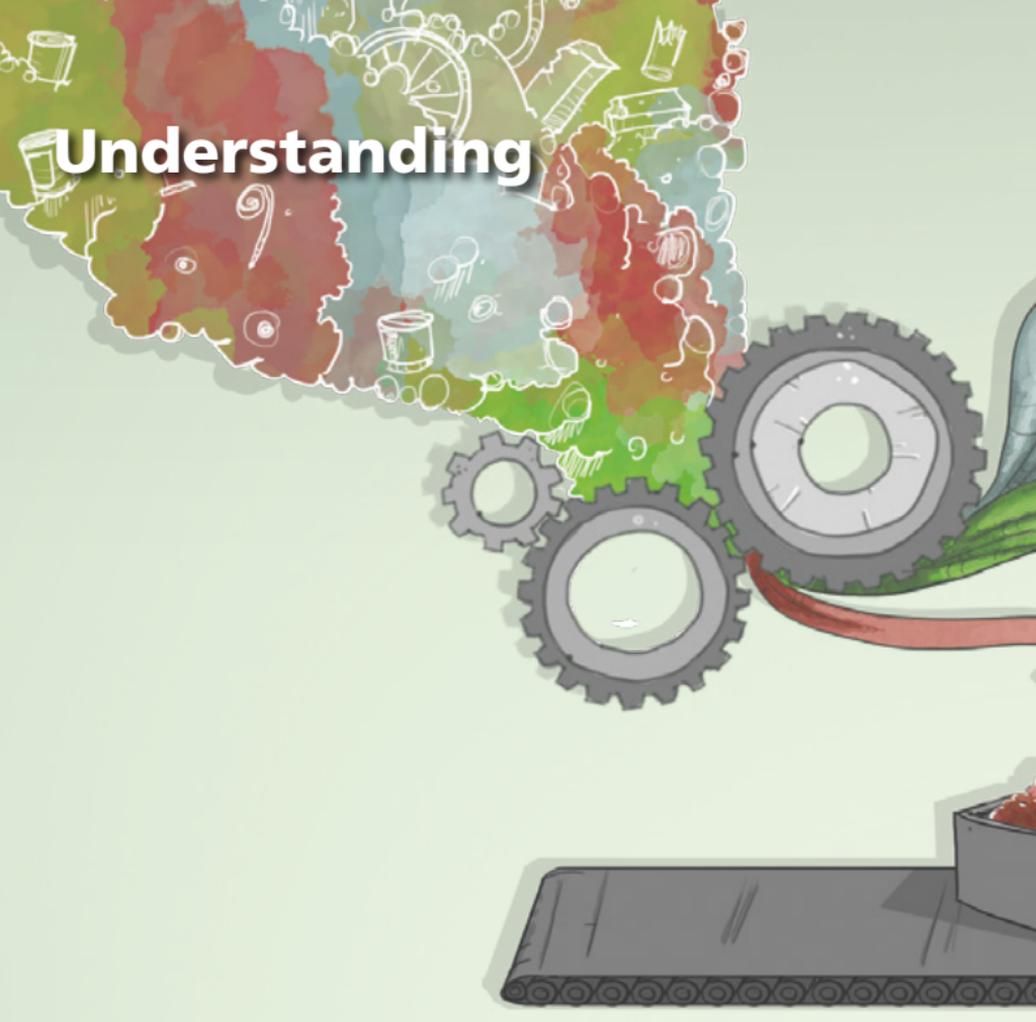
FRAUNHOFER INSTITUTE FOR ENVIRONMENTAL,  
SAFETY, AND ENERGY TECHNOLOGY UMSICHT

SUSTAINABILITY AND RESOURCES MANAGEMENT

# CIRCULAR SYSTEMS

UNDERSTANDING – DETECTING –  
OPTIMIZING – MANAGING



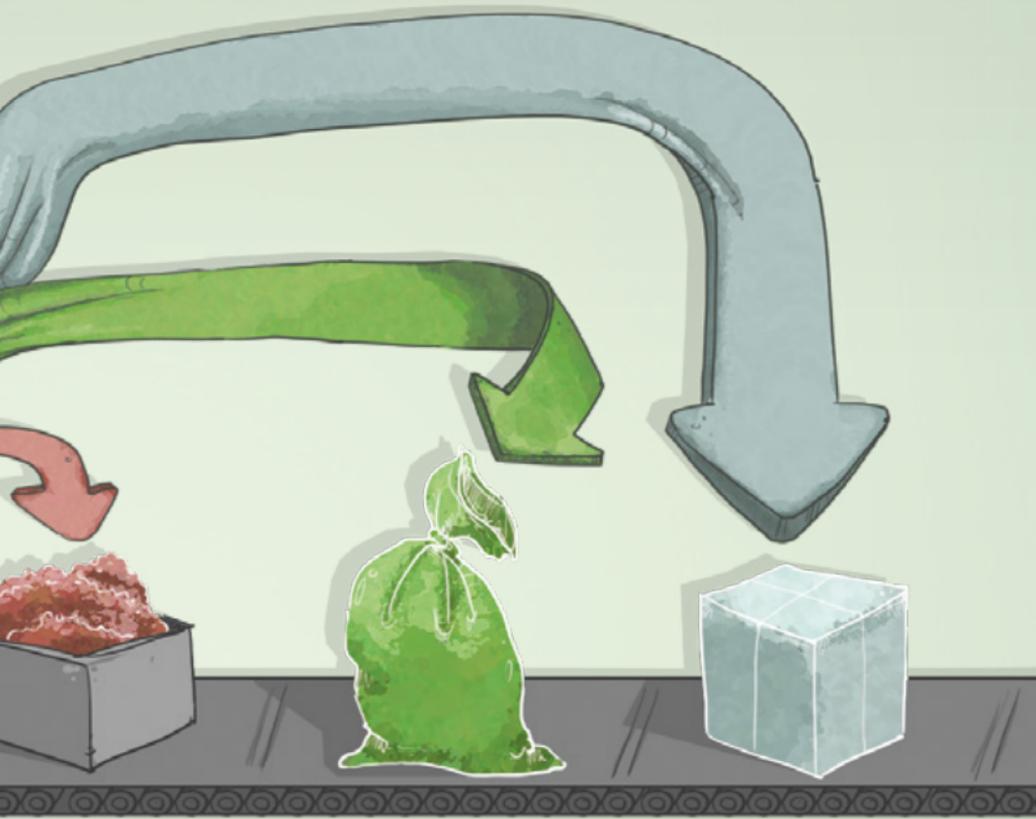


# Understanding

In times of increasingly scarce raw material deposits and high raw material prices, companies increasingly have to concern themselves with a secure and continuous supply of raw materials and assume their responsibility towards the environment and society in order to achieve long-term success.

Efficient and intelligent resource management is based on knowledge of material flows, materials and applications and forms the basis for economic development.

The Sustainability and Resource Management department at Fraunhofer UMSICHT develops strategic decision bases and planning aids for sustainable action together with companies and institutions



We support companies in the development of recycling and innovation strategies. We identify strengths and weaknesses, identify opportunities for improvement and help to reduce the need for primary raw materials by replacing them with secondary raw materials.

We acquire knowledge in order to be able to make quantitative and qualitative statements about the raw materials used, their current and future use and possible uses as high-quality secondary raw materials, applications and products.

Process optimization, secondary raw materials and efficient recycling of residual materials are our topics. We carry out material flow analyses, plan the intelligent use of raw materials and develop recycling strategies for sustainable resource management.

## DETECTING - OPTIMIZING - MANAGING

### **Detecting**

We locate potential anthropogenic raw material stocks and valuable residual material flows and analyze the associated material flows in terms of space, time, quantity and quality. Together with companies, we take a look at internal and external material flows and evaluate them with regard to more efficient use.

### **Optimizing**

We analyze the interface between material and application.

Among other things, we answer the questions:

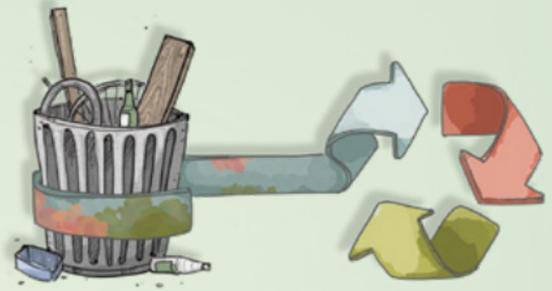
- What does a secondary raw material have to fulfill for successful use in industrial applications?
- Which processing and assembly steps are necessary so that a secondary raw material can be used?
- How can existing processes be optimized in a targeted manner?
- Which products are possible and how do they have to be structured?
- How can circular systems look like with these products?

### **Managing**

Material flows must be actively managed to ensure resource and cost efficiency. Especially in our dynamic industrial and service society, resources and products in different value creation chains must be recycled and used efficiently.

In many cases, however, there is a lack of knowledge about alternative areas of application for materials, and possible potential is lost through static approaches. The right resources or services must be deployed in the right place at the right time – this means competitive advantages and increases resource efficiency.

## OUR SERVICE



### **System analyses**

We analyze economic sectors, industries and companies and evaluate regulatory, technological, organizational and socio-economic trends with regard to the sustainable use of raw materials.

### **Material flow analyses**

We systematically examine and evaluate systems that use raw materials in technology, customer group and product-oriented material flow analyses for suitable fields of action and business.

### **Recycling technologies**

We support the evaluation of possible processing routes for materials into high-quality secondary raw materials and support companies in resource management.

### **Secondary raw materials management**

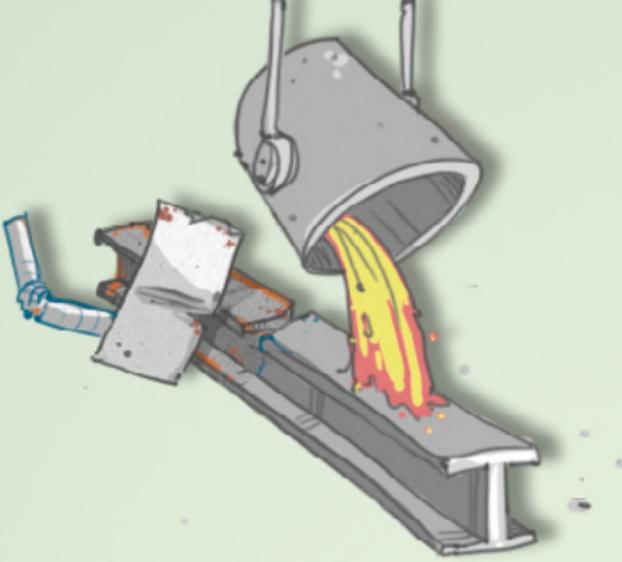
We accompany the use of secondary raw materials and optimize the interface between secondary raw material and application.

### **Circular systems and products**

Together with our customers, we evaluate and develop technical approaches for the recycling of products. We examine the market situation and provide support in developing business models for circular products.

### **Feasibility studies**

In addition to our services, we carry out economic feasibility studies and check the framework conditions for successful implementation.



## INDUSTRIES AND CUSTOMERS

- Waste and recycling management
- Raw materials industry
- Energy supply
- Water and wastewater management
- Building materials industry
- Metal industry
- Manufacturing and consumer goods production
- Authorities and ministries
- Banks, investors, insurance companies

## MERITS AND ADVANTAGES

- Strategic decision-making basis and planning aid for future questions in resource management
- Improvement in competitiveness by optimizing processes and reducing the use of primary raw materials
- Economic efficiency through cost reduction
- Securing the future viability of the company
- One contact person and clear communication channels:  
Expertise of the Fraunhofer Institute in the areas of material flow management, sustainability assessment, process optimization and sustainable technology development
- Renowned and independent research institution: Fraunhofer UMSICHT as a strong and reliable partner

## SELECTED REFERENCES

### **Plastics industry**

Management of the Fraunhofer Cluster of Excellence "Circular Plastics Economy". As a research, development and transformation partner, the cluster develops solutions for the circular plastics industry (Fraunhofer, in-house research)

### **VAFLOW**

Processing of industrial residues and by-products into a qualitatively equivalent and quality-assured product for redox flow battery storage (German Federal Ministry of Education and Research [BMBWF] r<sup>4</sup>)

### **BauCycle**

Production of functional building products from fine-grained building demolition material and development of a circular market design for the building industry (Fraunhofer, in-house research)

### **Mining dump resource register**

Development of a Germany-wide Mining dump resource register based on geoinformation systems with the focus on metal-containing mineral residues from former mining activities (Federal Institute for Geosciences and Natural Resources BGR)

### **Circular economy**

Identification of the influence of the circular economy with regard to the chemical industry (Regional Association North Rhine-Westphalia (NRW) of the German Chemical Industry Association (VCI))  
Analysis of the role of thermal waste treatment in the circular economy (AGR mbH)



## **FRAUNHOFER UMSICHT**

Fraunhofer UMSICHT is a pioneer for sustainable energy and raw materials management by supplying and transferring scientific results into companies, society and politics. The dedicated UMSICHT team researches and develops, together with partners, sustainable products, processes and services, which inspire. This is our mission.

### **Please find information about the Sustainability and Resource Management department**

via the QR code or the following link:  
[s.fhg.de/zYv](https://s.fhg.de/zYv)



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