



Circular Economy
Initiative
Deutschland

Circular Economy Roadmap for Germany



#closetheLoop #CEID



www.circular-economy-initiative.de

Who is the Circular Economy Initiative Germany?



<p>Politics</p>  <p>Federal Ministry of Education and Research</p>  <p>Federal Ministry for the Environment, Nature Conservation and Nuclear Safety</p>  <p>Federal Ministry for Economic Affairs and Energy</p>	<p>Office</p>  <p>NATIONAL ACADEMY OF SCIENCE AND ENGINEERING</p> 
<p>Business</p>  <p>Keep Discovering</p> <p>DAIMLER CLARIANT</p>   <p>Open APIs for Open Minds</p>  <p>social & greenIT</p>  <p>Ein Unternehmen der Daimler AG</p>          <p>zero waste solutions</p>   <p>REVERSE LOGISTICS GROUP</p>  <p>strategie + design</p>   <p>Ingeniury for life</p>  <p>Recycling and Energy Solutions</p>   	<p>Academia</p>         <p>University of Applied Sciences</p>       <p>Heinrich Heine Universität Düsseldorf</p>    
<p>Civil society and other institutions</p>           <p>Energy Systems of the Future</p>	

Why is the topic of the Circular Economy so relevant?



Resource Consumption



1,6
Earths

of resources per year are currently consumed by humanity.

3
Earths

would be consumed per year if resource consumption in Germany was equal to the global average.

Planetary Load



50%

of global greenhouse gas emissions

are caused by the extraction and processing of natural resources.

90%

of global biodiversity loss and water stress

Economic Responsibility



7-14%

of global economic output could be lost in 2100 in the absence of an ambitious climate policy.

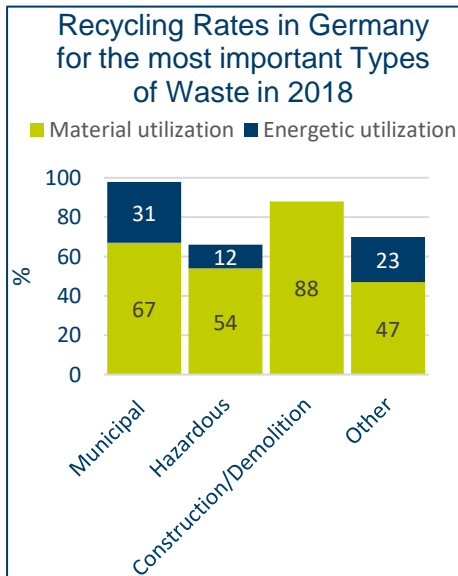
55%

of the total volume of German imports is accounted for by raw materials.

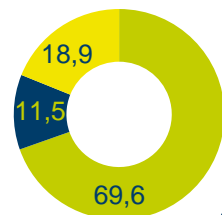
Sources: Earth Overshoot Day 2020a, Earth Overshoot Day 2020b, International Resource Panel 2019, Kalkuhl/Wenz 2020, Lutter et al. 2018

Images: Kateryna Babaieva , Robert Larsson, Eko Pramono

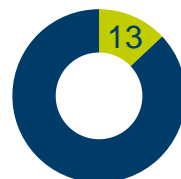
The transformation from a circular waste management to a circular economy is still pending in Germany



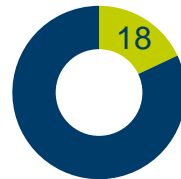
■ Material utilization
■ Energetic utilization
■ Not utilized



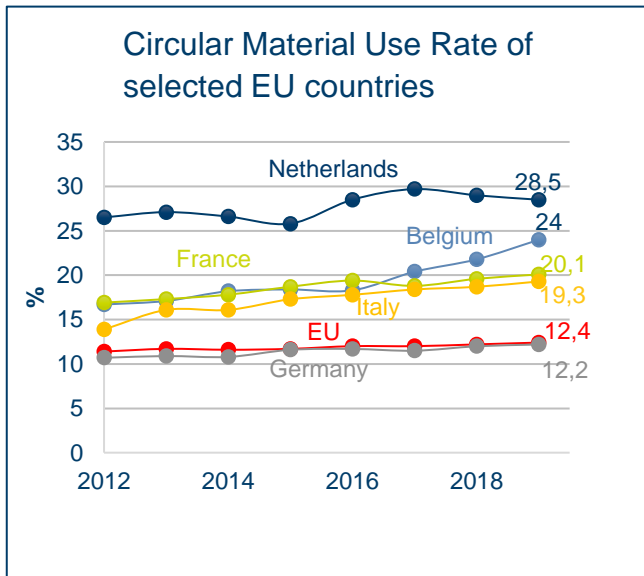
Recycling share of total waste in 2018 (in %)



DERec



DIERec



Overall **high recycling rates**, but (still) based on input quantities; output quality is not taken into account. The **total volume of waste** reached a **new high** in 2018.

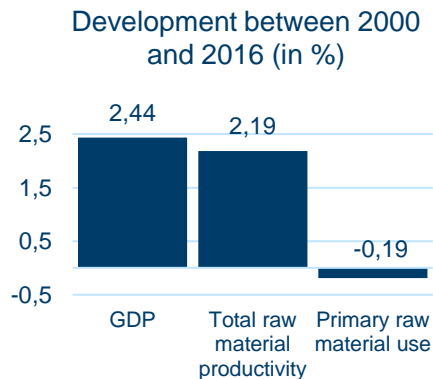
Resource savings through the use of secondary raw materials are around 13% (DERec) and 18% (DIERec, including global upstream chains).

In an **EU comparison**, **Germany is still below the average value** of all EU countries despite a moderate increase in the circular material use rate.

In Germany, resource consumption has yet not decoupled from economic growth



The aim is to increase total raw material productivity by 1.6% per year by 2030.



From 2000 to 2016, growth averaged **2.2%**. The **increase was almost exclusively due to GDP growth**.

Raw material consumption per capita in Germany

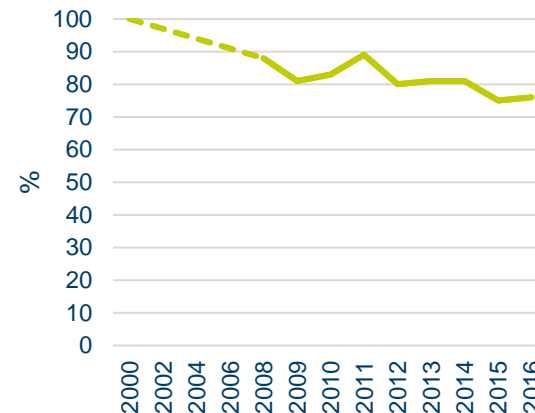


Raw material consumption per capita global



Raw material consumption in Germany is still almost **twice the global average**.

Development of raw material consumption (RMC) in Germany compared with 2000



Since 2009, **no clear development trend** can be discerned.

A Circular Economy is not an end in itself - but what goals should it contribute to?



Absolute decoupling of value creation and human wellbeing from resource consumption

Objectives

Environmental

Social and economic

Goals of a
Circular
Economy

Resource conservation



Improving the
utilisation of physical
resources and
value retention
through circularity



- Reduction of emissions and inputs into the environment (e.g. greenhouse gases, toxic substances, nitrogen, plastics)
- Reduction of overexploitation and damage to ecosystems (water, land, biodiversity, etc.)

Securing and increasing

- Raw materials supply
- Competitiveness
- Value creation
- Quality of life and fair prosperity

Source: Framework based on Koch/Coelho Megale 2020

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Objectives

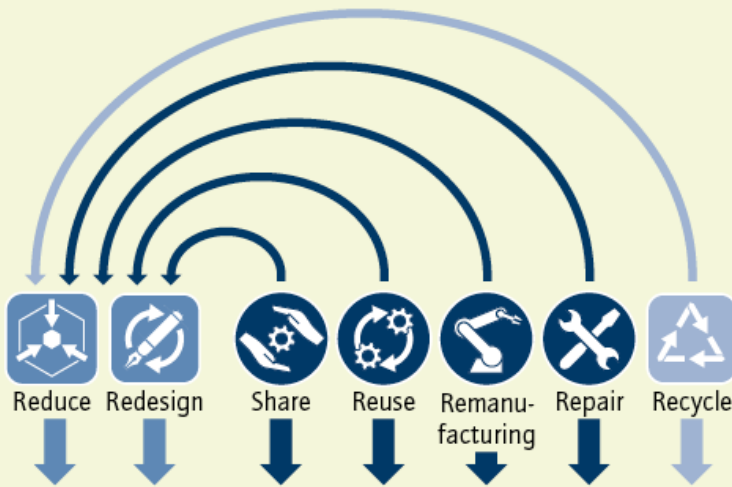
Environmental

Social and economic

Building and strengthening

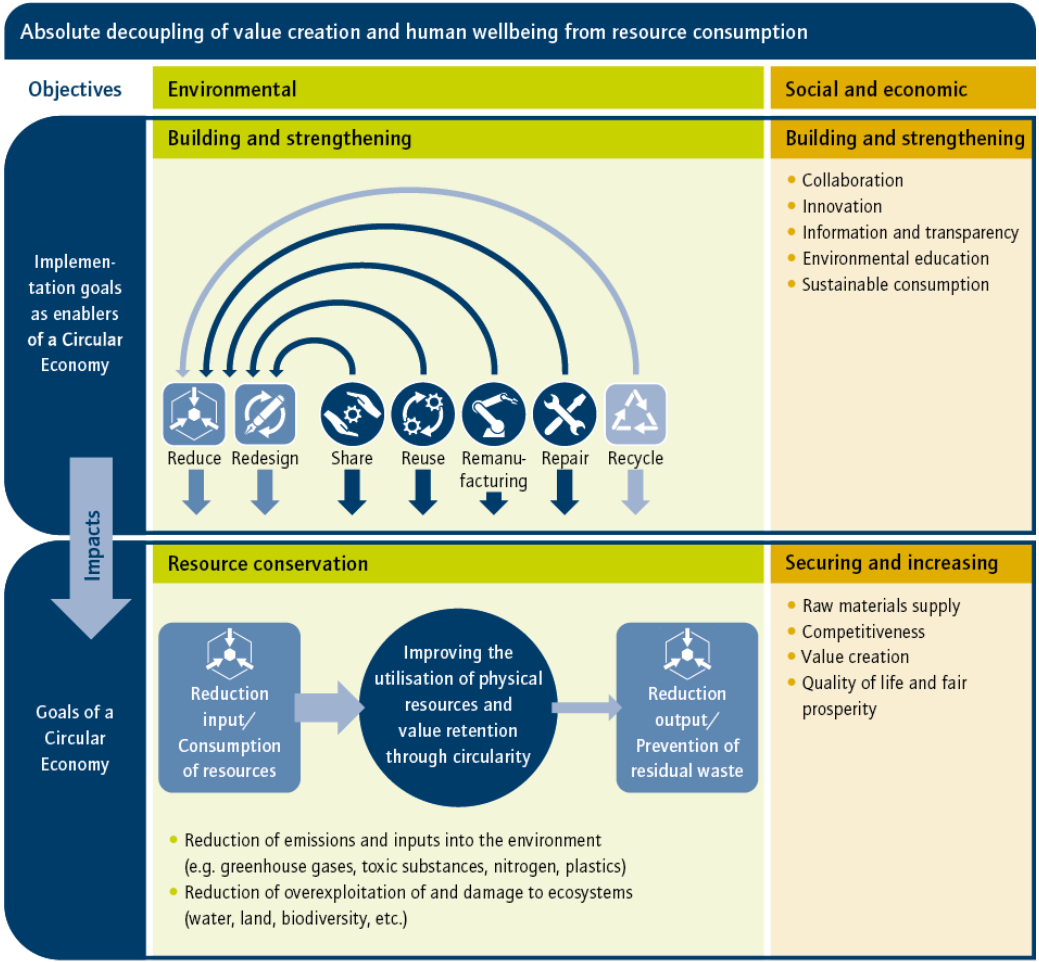
Building and strengthening

Implementation goals as enablers of a Circular Economy



- Collaboration
- Innovation
- Information and transparency
- Environmental education
- Sustainable consumption

Source: Framework based on Koch/Coelho Megale 2020

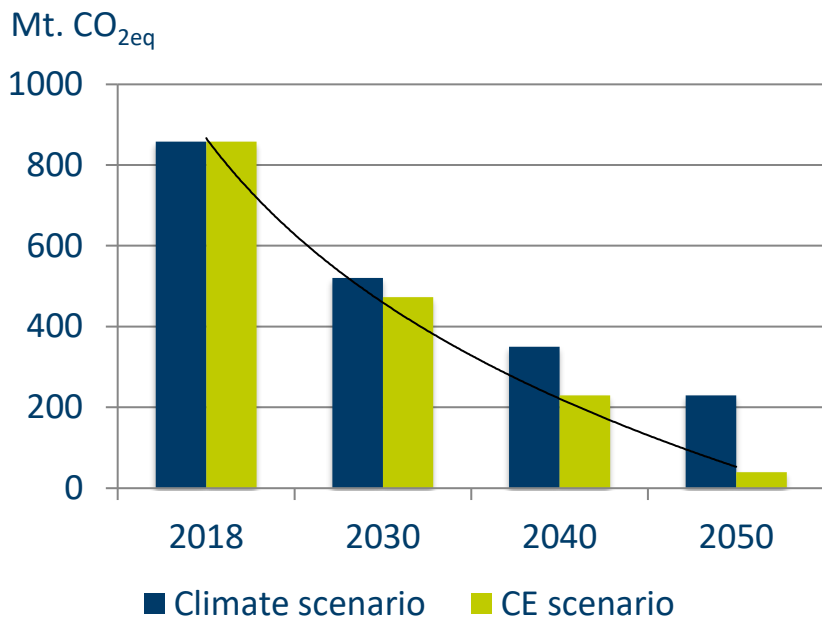


Source: Framework based on Koch/Coelho Megale 2020

Reducing greenhouse gas emissions: Circular economy levers could help close the gap to achieving greenhouse gas neutrality



Development of greenhouse gas emissions in the circular economy scenario (CE) compared with the climate scenario (business-as-usual, BAU)



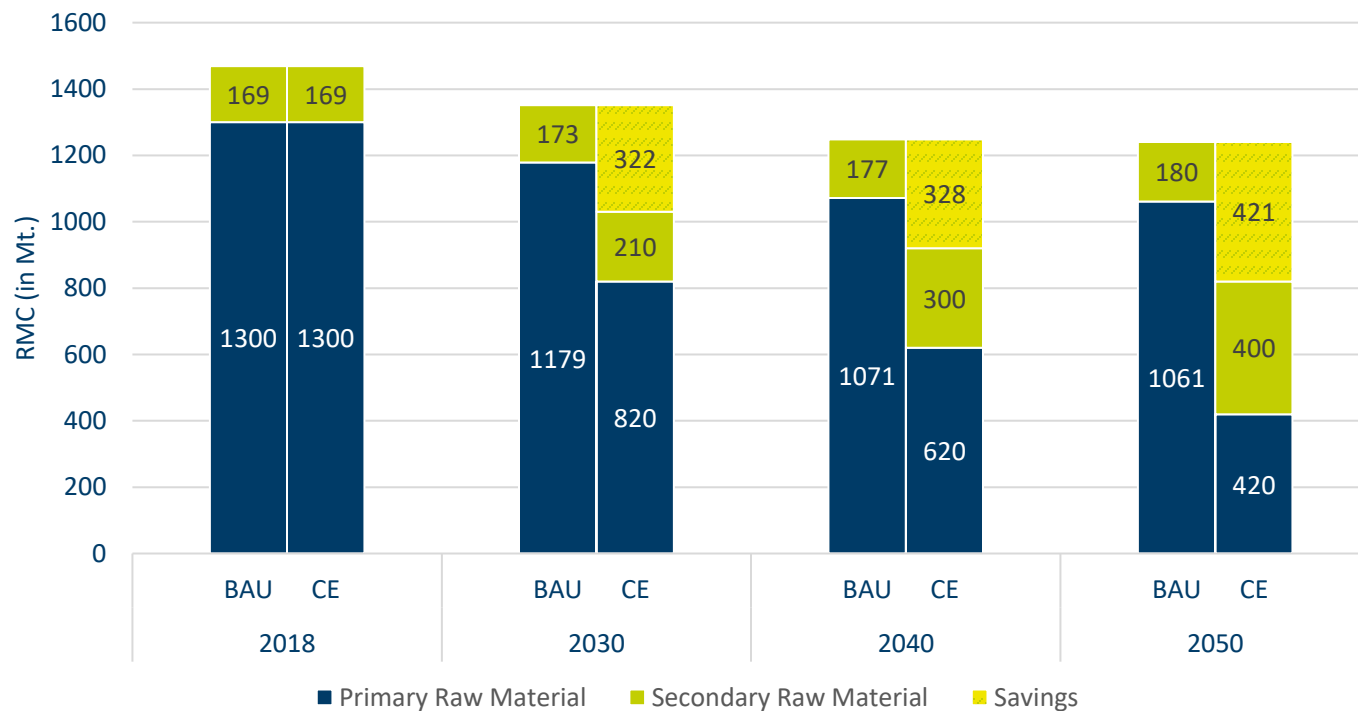
Circular Economy levers:

- Life cycle extension
- Product use intensification
- Increased recycling (incl. increased energy efficiency)

Reducing resource consumption: Circular economy measures could enable resource savings of 68 percent in 2050



Resource consumption in Germany in the Circular Economy (CE) scenario compared to the climate scenario (Business-as-Usual, BAU)



The Circular Economy Roadmap synthesizes the findings and recommendations of the three working groups



Social perspective

Sociotechnical perspective

Business model perspective

Product perspective

- Social and cultural change (e.g. repair culture)
- Political framework conditions
- Technical development
- Value networks
- Circular business models
- Relationships with customers/partners
- Internal awareness of CE
- Hardware
- Software

Perspectives of the Business Models working group



- Implement **design for circularity** to put different R strategies into practice
- Use **digital technologies** for effective practical implementation of design for circularity

Product



Overview of potential solutions from the Business Models working group

See the working group's findings report for complete contents

- Support changes in **stakeholder positioning** (in particular vertical integration and networking)
- Accelerate **embedding of stakeholders in value networks/cycles**
- Combine different **Circular Economy strategies and service levels**
- **Exploit the potential of digital technologies** and create **innovation spaces**

Business model



Socitechnical



- Set **economic incentives** (overhaul of tax regulations, carbon pricing, dismantling of subsidies)
- Introduce **mandatory standards** and strengthen extended producer responsibility
- Increase demand through **public procurement**
- Accelerate material, process, digital and **business model innovations** with environmental benefit
- Support the development of **quality standards**



Society



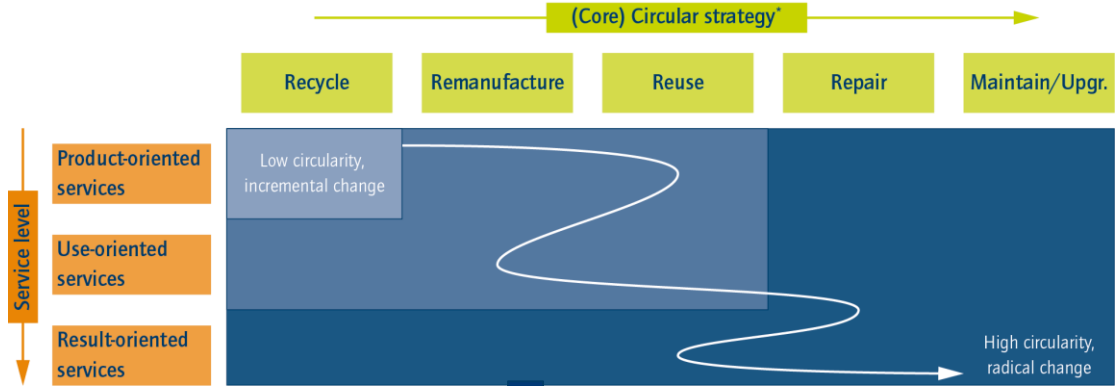
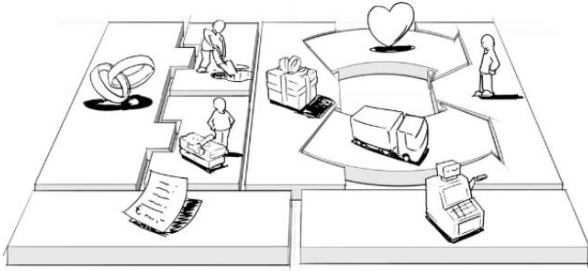
- Establish **new formats for participation** and promote individual initiatives and social innovation
- Ensure **transparency** by product labelling and declarations
- Create **education and training programmes** as a basis for circular awareness
- **Establish an institution to consolidate** scientific insights, industrial practice and societal needs

Perspectives of the Business Models working group



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Business model



Business Model	Service level	Business Model	Business Model	Business Model	Business Model	Business Model	Business Model	Business Model	Business Model
Product-oriented services	Low circularity, incremental change	Product-oriented services	Product-oriented services	Product-oriented services	Product-oriented services	Product-oriented services	Product-oriented services	Product-oriented services	Product-oriented services
Use-oriented services		Use-oriented services	Use-oriented services	Use-oriented services	Use-oriented services	Use-oriented services	Use-oriented services	Use-oriented services	Use-oriented services
Result-oriented services	High circularity, radical change	Result-oriented services	Result-oriented services	Result-oriented services	Result-oriented services	Result-oriented services	Result-oriented services	Result-oriented services	Result-oriented services

Figure.: Ecosystem Perspective on CBM and example, Source: own presentation, based on Konietzko et al. 2020b | Image: Pixabay

Perspectives of the Packaging working group



- Implement **design for circularity** for efficient and effective resource management
- Create a **uniform basis for evaluating** the sustainability of packaging alternatives
- **Invest in sorting and recycling technology** and its further development

Product



Overview of potential solutions proposed by the Packaging working group

See the working group's findings report for complete contents

- Promote the development and implementation of **circular business models** and networks
- Exploit the **potential of mechanical recycling**
- **Fund research** into potential further components of a Circular Economy for packaging (e.g. chemical recycling processes)

Business model



Sociotechnical

- Set **economic incentives**
- Pick up the pace of **packaging material harmonisation**
- Offer **support and incentives for consumers**
- Offer **specialised education** and training (e.g. for industrial designers)



Society

- Provide **education as the basis** for overarching cooperation with a changed value creation philosophy
- Increase **user understanding**



Perspectives of the Packaging working group



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Product

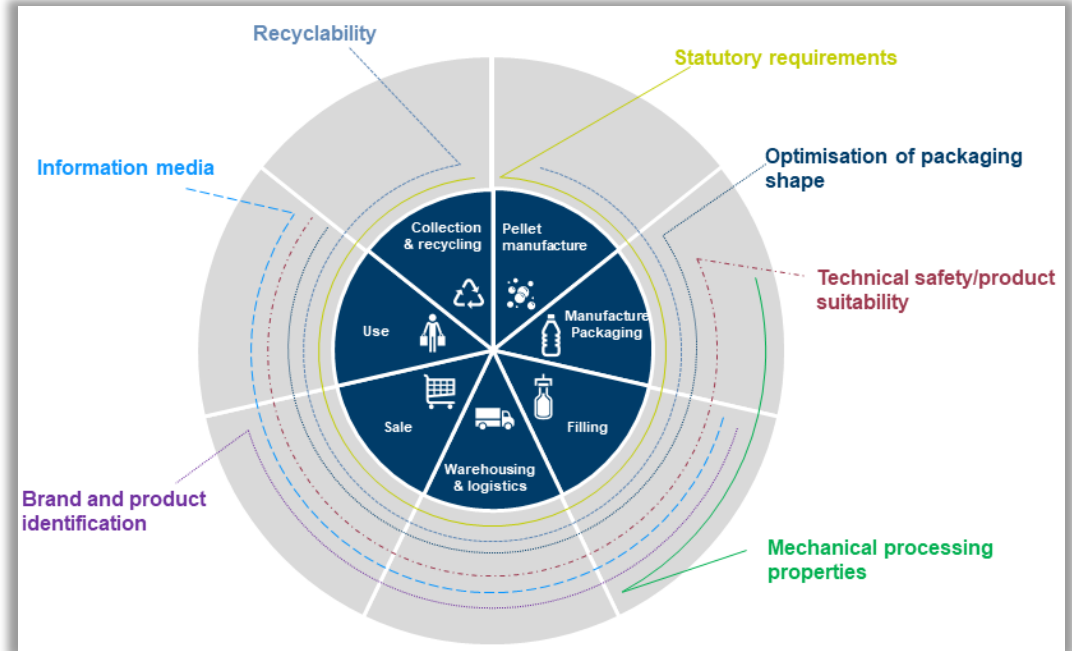
food



non-food



Packaging requirements

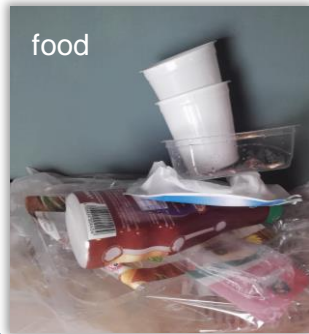


Perspectives of the Packaging working group



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Product



Necessary measures

Recycling technologies

Economic incentives

Smart regulations

Reuse and refill



Design for circularity

Uniform standards for evaluation

Carbon footprint

Perspectives of the Traction Batteries working group



- Implement **design for circularity** to optimise life cycles and take account of the energy balance
- Ensure better **data availability for battery passport, digital twin**, etc.
- Enable EU-wide circular battery management (incl. European Data Spaces)

Product



Overview of potential solutions proposed by the Traction Batteries working group

See the working group's findings report for complete contents

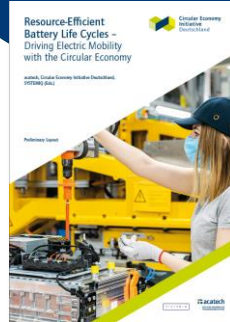
- Promote **high-quality circular business models for B2B and B2C**
- Promote **collaborative exchange of relevant data** for implementing R strategies
- Expand **disassembly & recycling capacity**
- Enable grid integration during (V2G) and after (second life) the first life cycle

Business model



Sociotechnical

- Set **economic incentives**
- Establish key **definitions, (minimum) standards, recovery rates and obligations**
- Create transparency about **ecosocial aspects and product and process quality**
- Initiate the development of standards, **Circular Economy metrics and modelling** and process innovation
- Develop European disassembly network



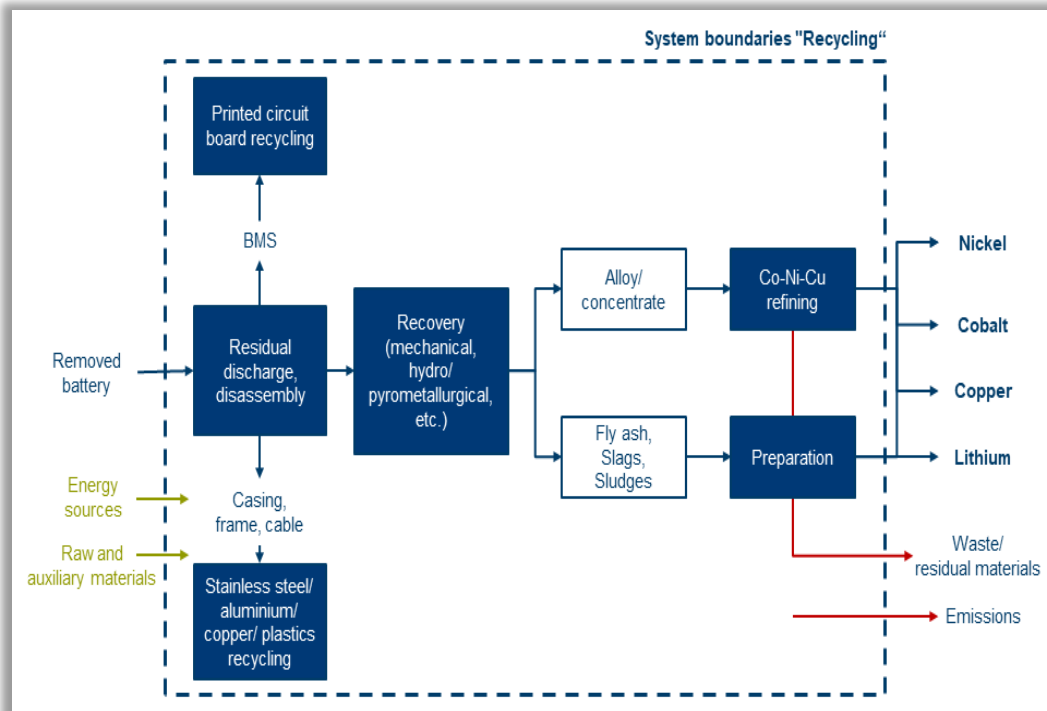
Society

- Establish **practical training** in circular business models
- Expand **basic and applied knowledge** in education and academic training
- Strengthen transdisciplinary basic research
- Establish industry-wide agreements on the rollout and use of relevant **Circular Economy metrics**



Sociotechnical

- Set **economic incentives**
- Establish key **definitions, (minimum) standards, recovery rates and obligations**
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The CEID has formulated ten action points for achieving transformation



1

Circular business models

- Creation of innovation spaces, within and across companies (value networks)
- Data-driven use- and results-oriented service business models
- Circular redesign of products as a business model component



2

Standardisation

- Classification of used and remanufactured products
- Development of quality standards for remanufactured products
- Specifications for recycled material content and quality
- KPIs
- CE-metrics



The CEID has formulated ten action points for achieving transformation



3

Transparency

- Make CE-relevant information (e.g. product passport) commercially available
- Exchange of relevant data and information between (new) actors
- Encourage purchasing decisions in favour of sustainable products and business models via meaningful labelling for consumer



4

Regulatory Instruments

- Unified regulatory framework with CE focus
- Coherent product policy at national and EU level (e.g. Design for CE; Digital Product ID)
- Qualitative recycling rates



The CEID has formulated ten action points for achieving transformation



5

Economic incentives

- Direct financial assistance for pilot projects and research with clear environmental benefits
- Promotion of novel business models
- Overhaul of tax rules(Ex'tax):
 - Levying higher duties on resources and emissions
 - Reduce tax burdens for businesses in relation to the factor "labor" (e.g. personnel, services)



6

Infrastructure for reuse, continued use and recycling

- Expansion and development of infrastructure for reuse, continued use and recycling
- Dissemination of digital technologies for material identification and sorting



The CEID has formulated ten action points for achieving transformation



7

Technical development and research

- Development of relevant material, product and process innovations with an environmental benefit
- Methods & tools for CE implementation, including:
 - Development of metrics
 - Model-based decision-making platforms
 - Digital twins
- Research funding



8

Public procurement

- Setting strategic objectives and binding targets for used, remanufactured and recycled products using a practical, science-based decision-making aid



The CEID has formulated ten action points for achieving transformation



9

Institutional embedding

- Provide a central institutional body with the aim of ensuring Germany's transformation to a Circular Economy
 - Knowledge sharing
 - Create new connections between actors
 - Embedding the CE more widely and set it in a European context



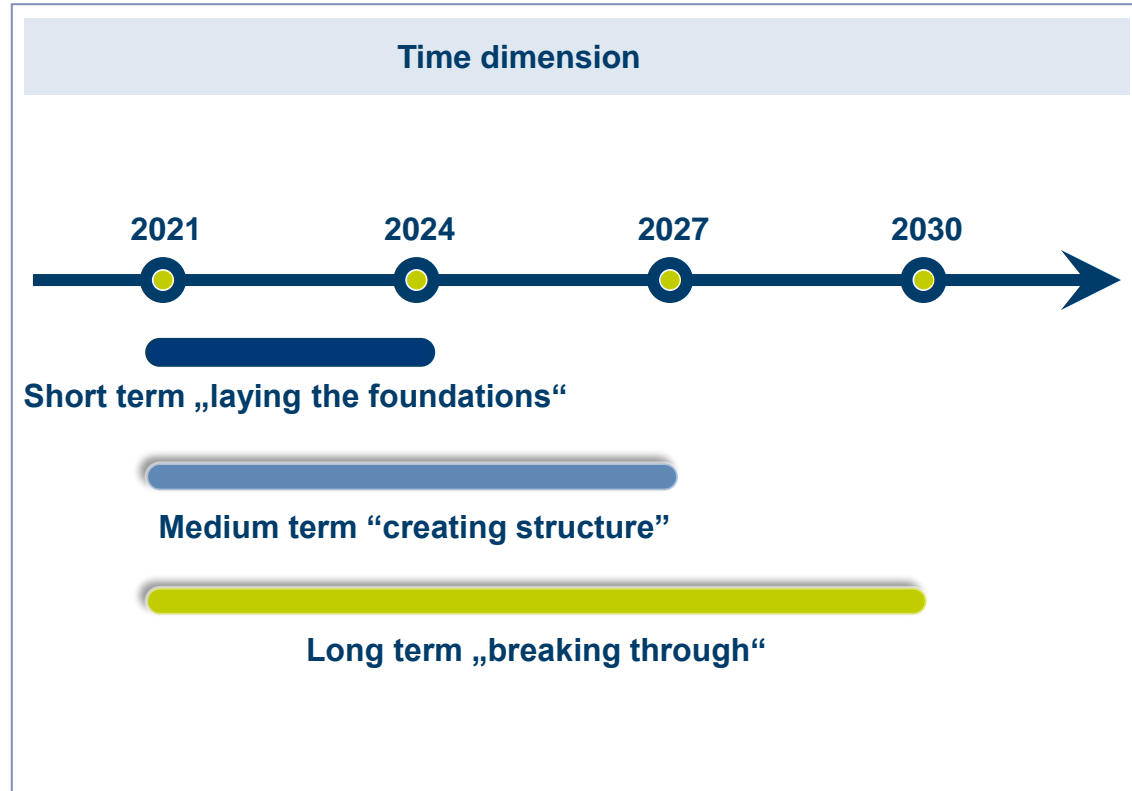
10

Education and knowledge transfer

- Provide CE-relevant education and training, including:
 - Including CE in curricula
 - New courses of study and vocational training
 - Transformative learning
 - Real-world laboratories
- Knowledge transfer to society/population and the world



Concrete recommendations for action for politics, business and science were elaborated into a roadmap with time horizons



- Circular business models
- Standardisation
- Transparency
- Regulatory instruments
- Economic incentives
- Infrastructure for reuse, continued use and recycling
- Technical development and research
- Public procurement
- Institutionalisation Education and knowledge transfer

