



Circular Economy
Initiative
Deutschland

Roadmaps towards Circularity – Experiences from the Netherlands, the Nordics and Germany

2 February 2022, World Circular Economy Forum (WCEF)



#closetheLoop #CEID



www.circular-economy-initiative.de

2 February 2022 09:00 – 10:30 AM

AGENDA



Circular Economy
Initiative
Deutschland

Reinhard von Wittken

Welcome

Susanne Kadner

**Introduction Circular Economy Roadmap
for Germany**

Cathrine Barth

Panel Discussion

Freek van Eijk

Michael Kuhndt

Susanne Kadner

Reinhard von Wittken

Summary and Outlook

 **#CEID**

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Welcome!



Circular Economy
Initiative
Deutschland

From Ambition to Action!

Roadmaps towards Circularity – Experiences from the Netherlands, the Nordics and Germany

📅 Feb. 2nd, 2022 ⌚ 09:00-10:30 AM (UTC+1) 📍 Online Event



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Cathrine Barth
Managing Partner -
Nordic Circular Hotspot



Freek van Eijk
Director -
Holland Circular Hotspot



Michael Kuhndt
Executive Director -
Collaborating Centre on Sustainable
Consumption and Production (CSCP)



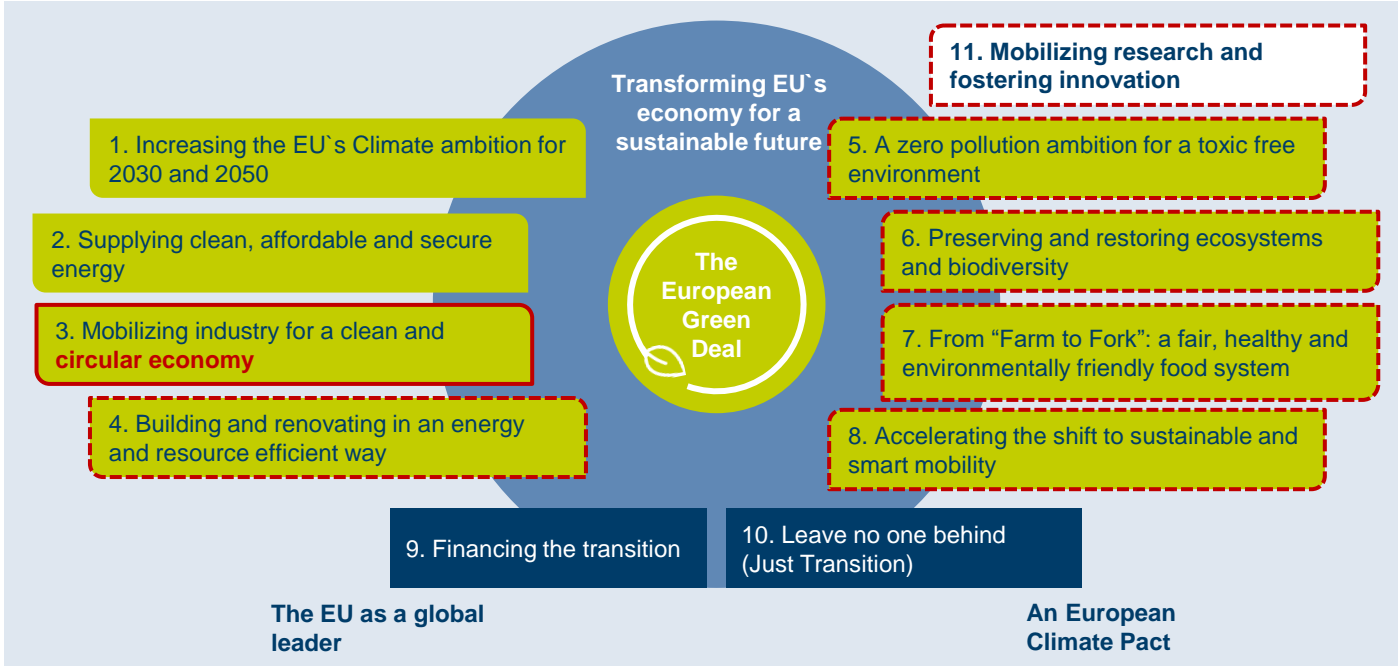
Dr. Susanne Kadner
Head of Circular Economy
Initiative Deutschland -
acatech

In the European Green Deal, the Circular Economy plays a central role in achieving the goal of greenhouse gas neutrality by 2050



Overview of the European Green Deal (EGD)

» Remarks



- "The old growth model based on fossil fuels and pollution has outlived its purpose. What is needed now is a **strategy for growth that gives back more than it takes. The European Green Deal is our new growth strategy**" - Ursula von der Leyen (EU Commission President)
- The circular economy plays a central role in **achieving the goal of greenhouse gas neutrality by 2050**

Source EGD: European Commission

Overview CEID: 3 ministries, 24 companies, 24 scientific institutions and other relevant organizations from civil society



<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> 
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Business

Logos of business partners: BOREALIS (Keep Discovering), ALPLA, cirplus, SCHWARZ (SAB, Koford, pro zero), covestro, Henkel, BMW, Hochland, interseroh (zero waste solutions), TRUMPF, PEM MOTION, RLG (REVERSE LOGISTICS GROUP), pacoon (strategie + design), Stiftung GRS Batterien, SIEMENS (Ingenuity for life), RECENSO (Recycling and Energy Solutions), SAP, SIEGWERK, and umicore.

Academia

Logos of academic institutions: Fraunhofer ICT, Fraunhofer UMSICHT, Fraunhofer IPK, Technische Universität Braunschweig, Öko-Institut e.V. (Institut für angewandte Ökologie), TU Clausthal, Technische Universität München (TUM), TECHNISCHE UNIVERSITÄT KAISERSLAUTERN, JOHANNES KEPLER UNIVERSITÄT LINZ, ESCP EUROPE BUSINESS SCHOOL, FH JOANNEUM (University of Applied Sciences), LEUPHANA UNIVERSITÄT LÜNEBURG, INITZ UNIVERSITY OF TECHNOLOGY, ETH Zürich, UNIVERSITÄT BONN, HiF (HELMHOLTZ-INSTITUT FREIBERG FÜR RESSOURCENTECHNOLOGIE), hhu (Heinrich Heine Universität Düsseldorf), Universität Hamburg (DER FORSCHUNG | DER LEHRE | DER BILDUNG), Technische Universität Dresden, Wuppertal Institut, Technische Universität Berlin, and RWTH AACHEN UNIVERSITY.

Civil society and other institutions

Logos of civil society and other institutions: WWF, European Climate Foundation, Agora Verkehrswende, WORLD ECONOMIC FORUM, Management of KLiB (Kompetenznetzwerk Klima-Ökonomie-Bildung), NPM (NATIONAL PLATFORM FUTURE OF MOBILITY), SUN Institute (Environment & Sustainability), Leopoldina (NATIONAL ACADEMY OF SCIENCES), acatech (NATIONAL ACADEMY OF SCIENCE AND ENGINEERING), and UNION DER OBERSTEN AKADEMIE DER WISSENSCHAFTEN (Energy Systems of the Future).

The CEID is well equipped to drive the transformation towards a Circular Economy in Germany and beyond



50+

Over 50 members:

3 ministries, 20+ companies, 20+ scientific institutions and other relevant organizations from civil society to make the transition to a Circular Economy happen: **Collaboration along the value chain including all relevant stakeholders**

CEID
in
numbers

3

3 content deep dives:

Research questions of high political relevance

I. Circular Business Models: the role of digital technologies and regulatory frameworks as enablers for sustainability

II. Traction Batteries: resource productive scale-up of battery systems for electric mobility

III. Packaging: future-proof solutions for a circular plastic packaging industry

4

4 publications:

Insights are synthesized into actionable measures to support the transition to a Circular Economy:

- **collaboratively:** establishing value creation networks
- **concrete:** case studies provide relevant insights about incentives and barriers
- **innovative:** science-based recommendations on research gaps to support the transition

Topics of the Circular Economy Initiative: Combination of overarching topics with industry deep dives



II. Working Group Traction Batteries

Coordination:
Prof. Dr.-Ing. Arno Kwade/
TU Braunschweig and Dr.-
Ing. Christian Hagelüken/
Umicore

- Vision 2030

Pilot profiles of projects:

- Knowledge of battery life
- Model-based decision platform for EoL use
- Battery disassembly network

I. Working Group

Circular Business Models

Coordination: Prof. Dr. Erik Hansen/ Head of the Institute for Integrated Quality Design (IQD) at Johannes Kepler University (JKU) Linz and Patrick Wiedemann/ Reverse Logistics Group
Business model typology – digital technologies – regulatory framework conditions



Circular Economy Roadmap for Germany

- Policy recommendations on technology development and regulatory framework
- Macroeconomic analysis of contribution to reduced material input and GHG emissions
- Vision 2030/2050



III. Working Group Packaging

Coordination:
Prof. Dr. Peter Elsner/
Fraunhofer ICT and Prof.
Dr. Thomas Müller-
Kirschbaum/Henkel

- Vision 2030

Use cases:

- Non-Food – HDPE bottle
- Food – PET tray



Circular Economy
Initiative
Deutschland

Circular Economy Roadmap for Germany

Insights from acatech's Circular Economy Initiative Deutschland

Dr. Susanne Kadner

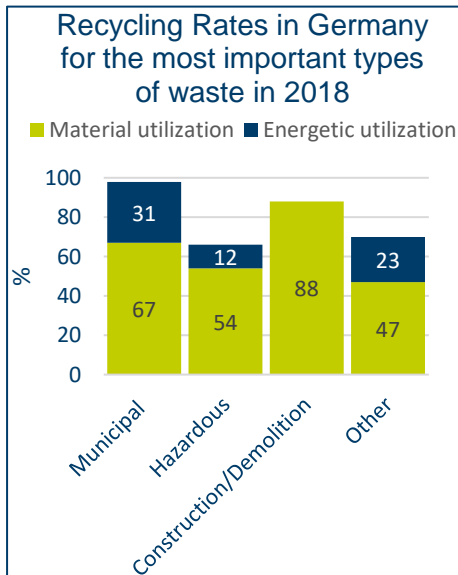
*Head of Circular Economy Initiative Deutschland
Co-Lead Energy, Resources and Sustainability*

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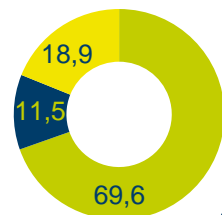
www.circular-economy-initiative.de



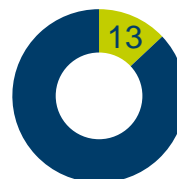
The transformation from circular waste management to a circular economy is still pending in Germany



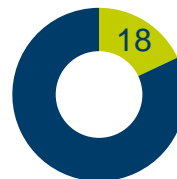
■ Material utilization
■ Energetic utilization
■ Not utilized



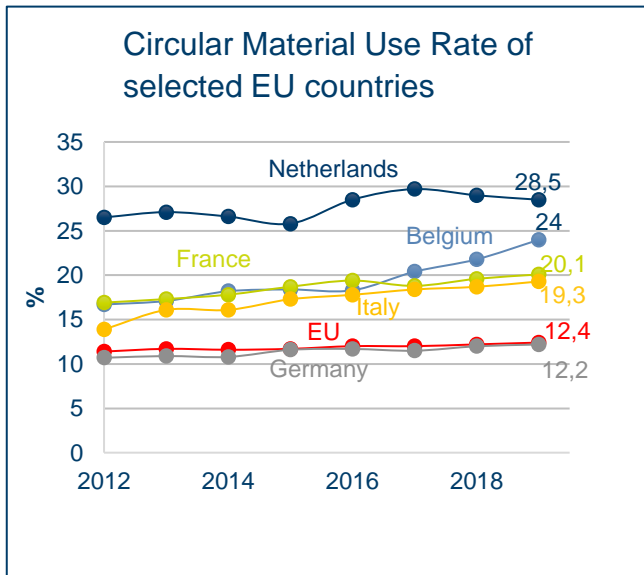
Recycling share of total waste in 2018 (in %)



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.

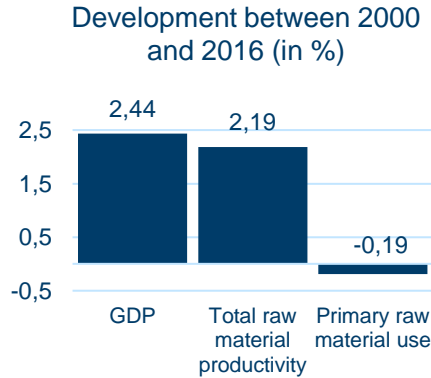
Resource savings through the use of secondary raw materials are around 13% (DERec) and 18% (DIERec, including global upstream chains).

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

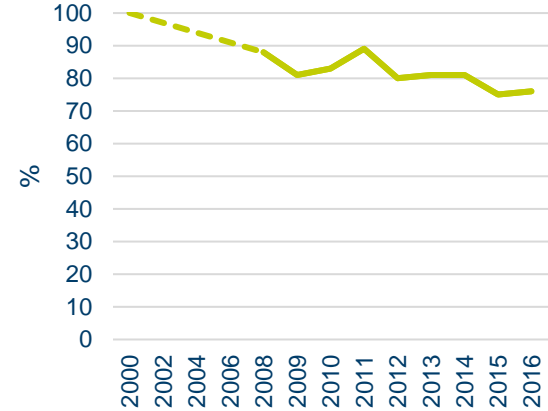


Raw material consumption per capita global



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



- 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

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

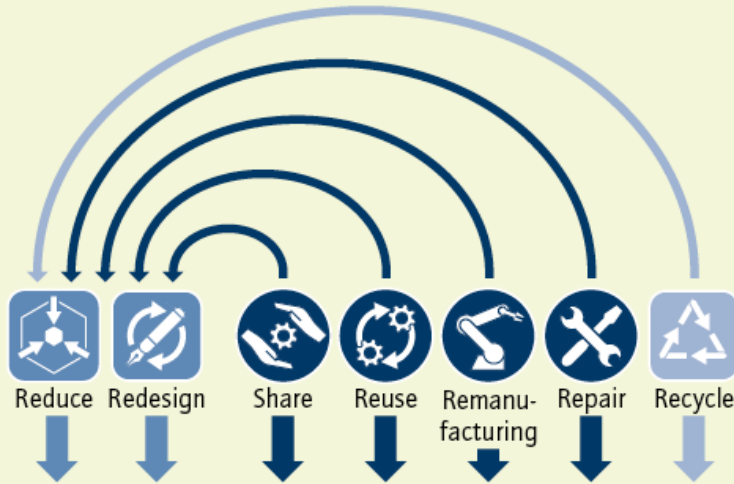
Environmental

Social and economic

Building and strengthening

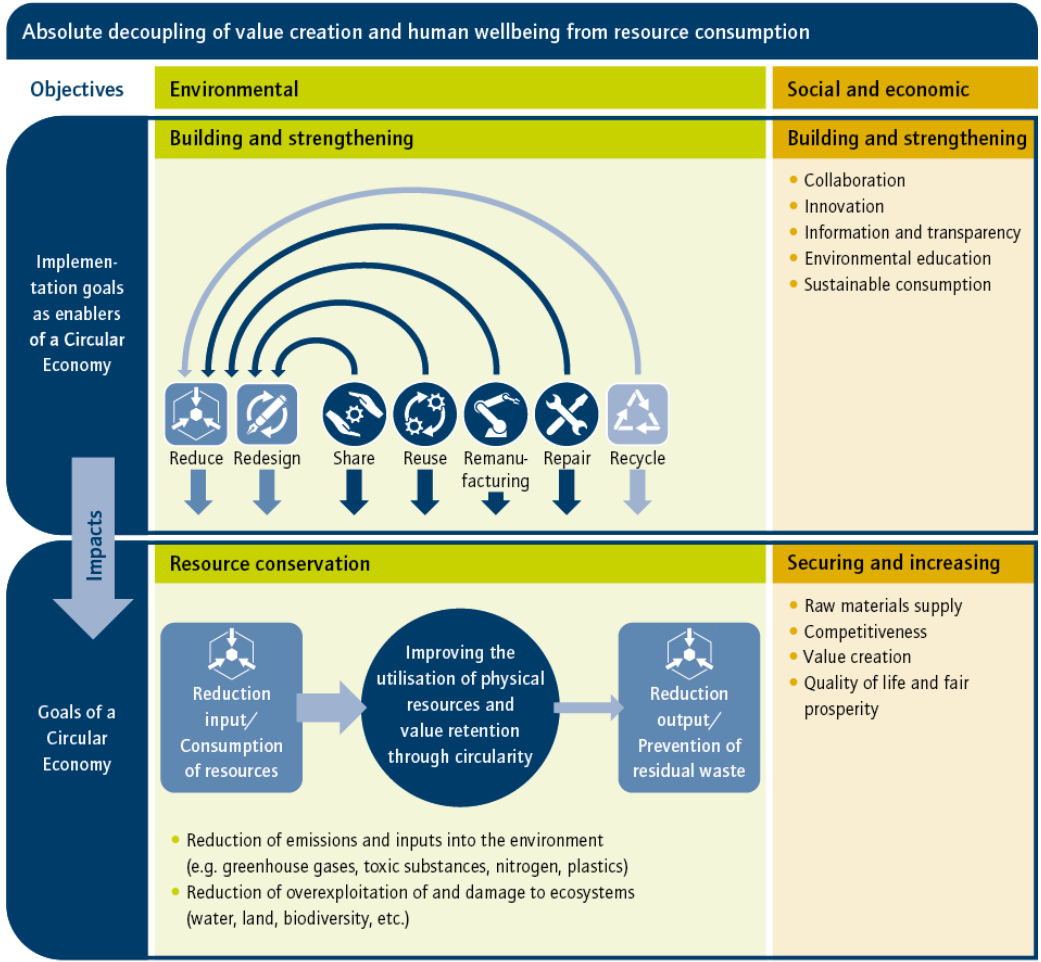
Building and strengthening

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

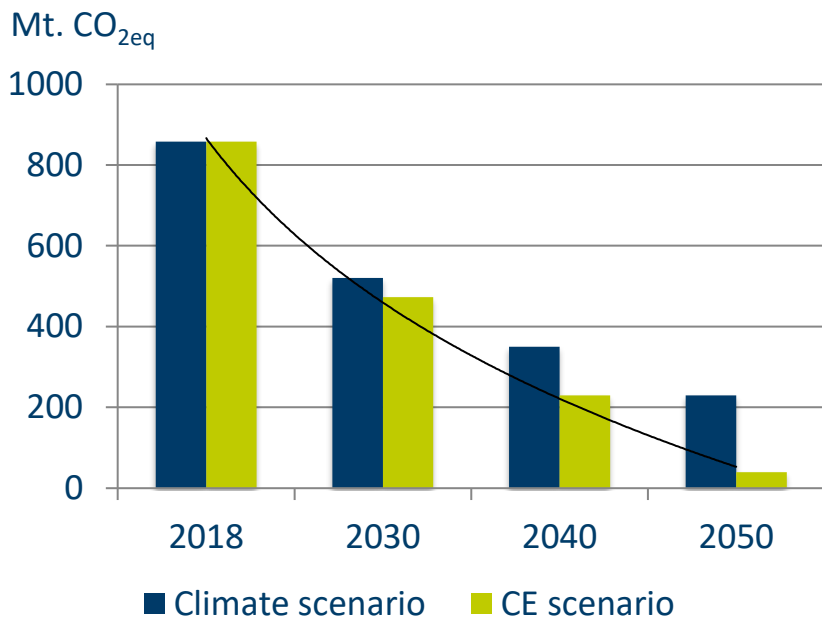


Source: Framework based on Koch/Coelho Megale 2020

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)



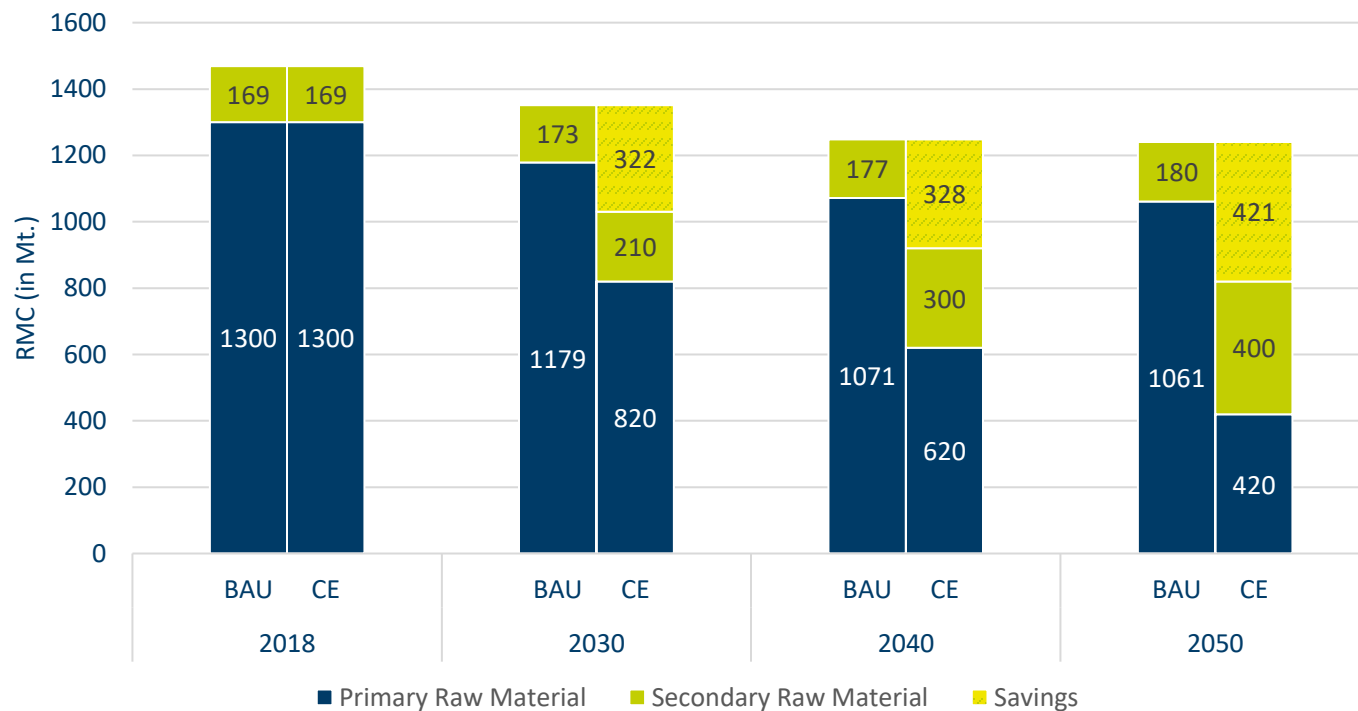
Circular Economy levers:

- 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**

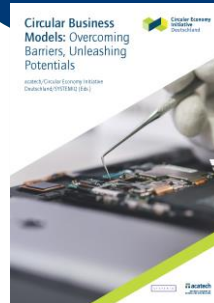
Business model



Sociotechnical



- Set **economic incentives** (overhaul of tax regulations, carbon pricing, phase-out of harmful 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



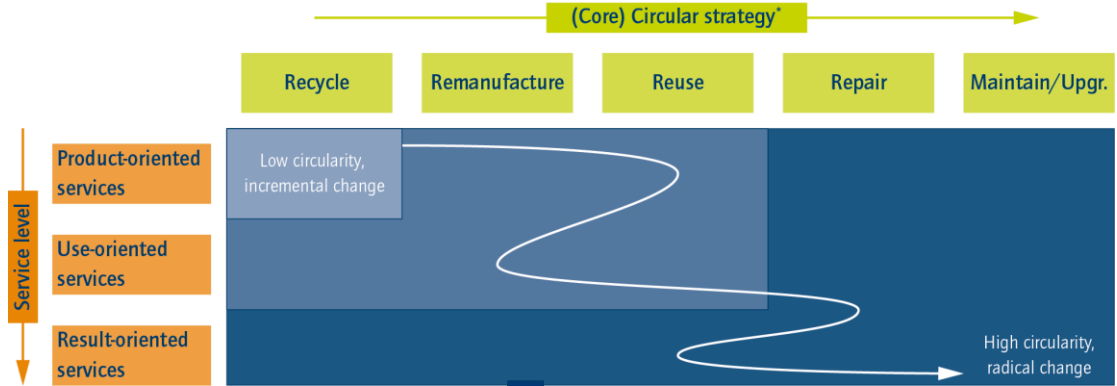
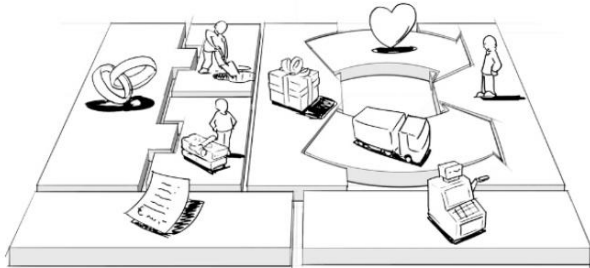
- Establish **new formats for participation** and promote individual initiatives and social innovation
- Ensure **transparency** by product labelling and declarations
- Create **education and training programmes** as a basis for circular awareness
- **Establish an institution to consolidate** scientific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

Perspectives of the Business Models working group



- 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**
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Business model



Area	Current status	Business Model process	Business Model process	Business Model process	Business Model process
Product-oriented services	Low circularity, incremental change	Recycle	Remanufacture	Reuse	Repair
Use-oriented services					
Result-oriented services	High circularity, radical change				

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



- 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

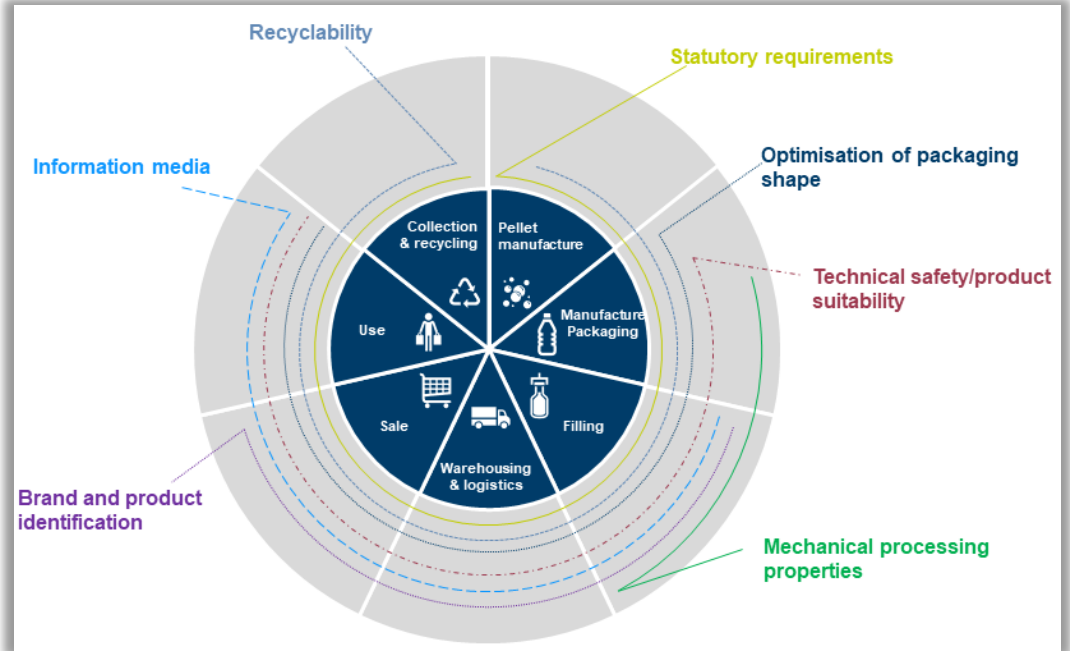
food



non-food



Packaging requirements



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

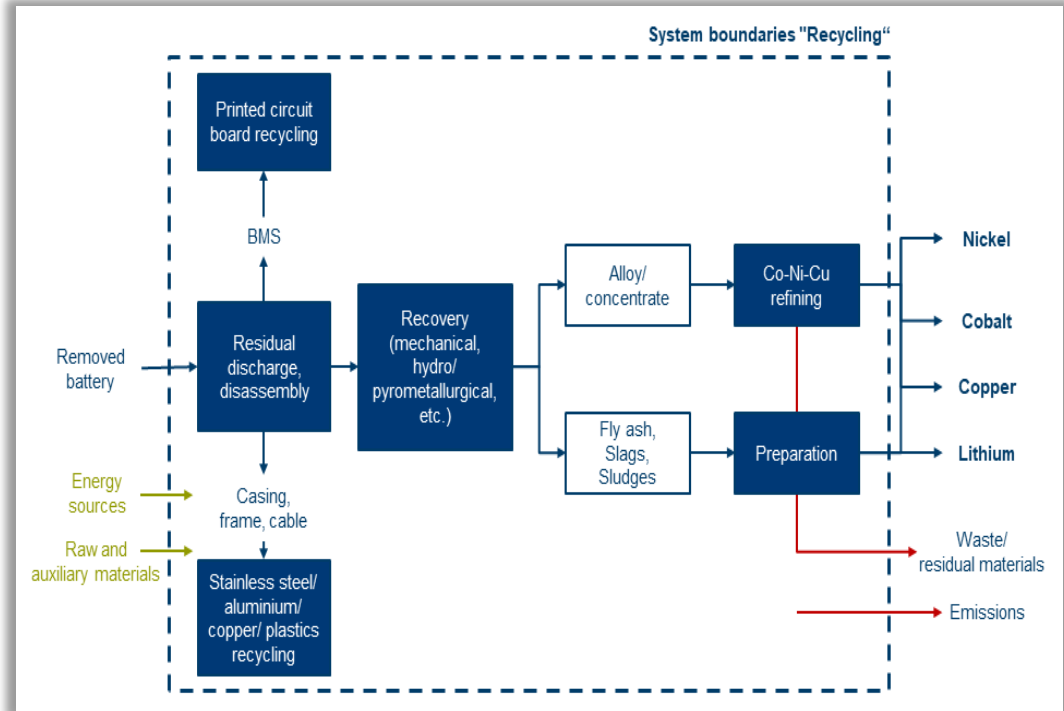
- Establish **practical training** in circular business models
- Expand **basic and applied knowledge** in education and academic training
- Strengthen transdisciplinary basic research
- Establish industry-wide agreements on the rollout and use of relevant **Circular Economy metrics**





Sociotechnical

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





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



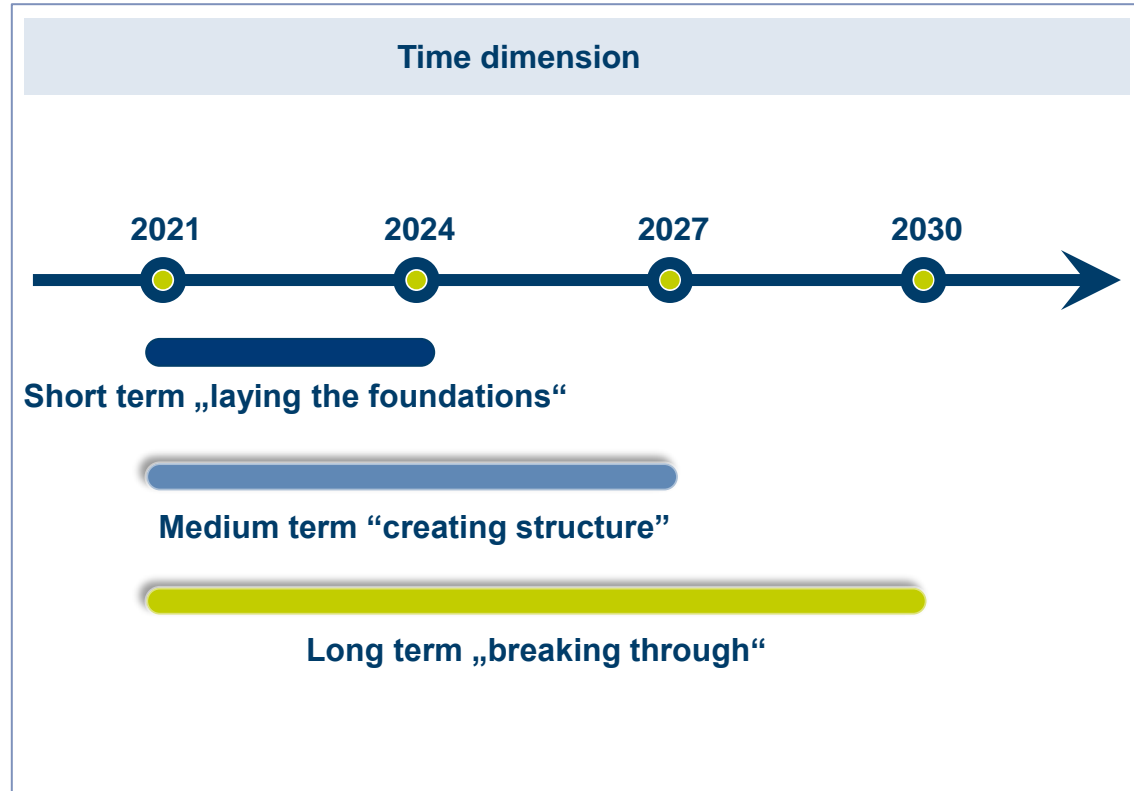
10

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

