Online Training Series

Resource Efficiency for Businesses

VDI Zentrum Ressourceneffizienz

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

GREEN GROWTH Knowledge Partnership

GREEN GROWTH
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Green Growth Knowledge Platform

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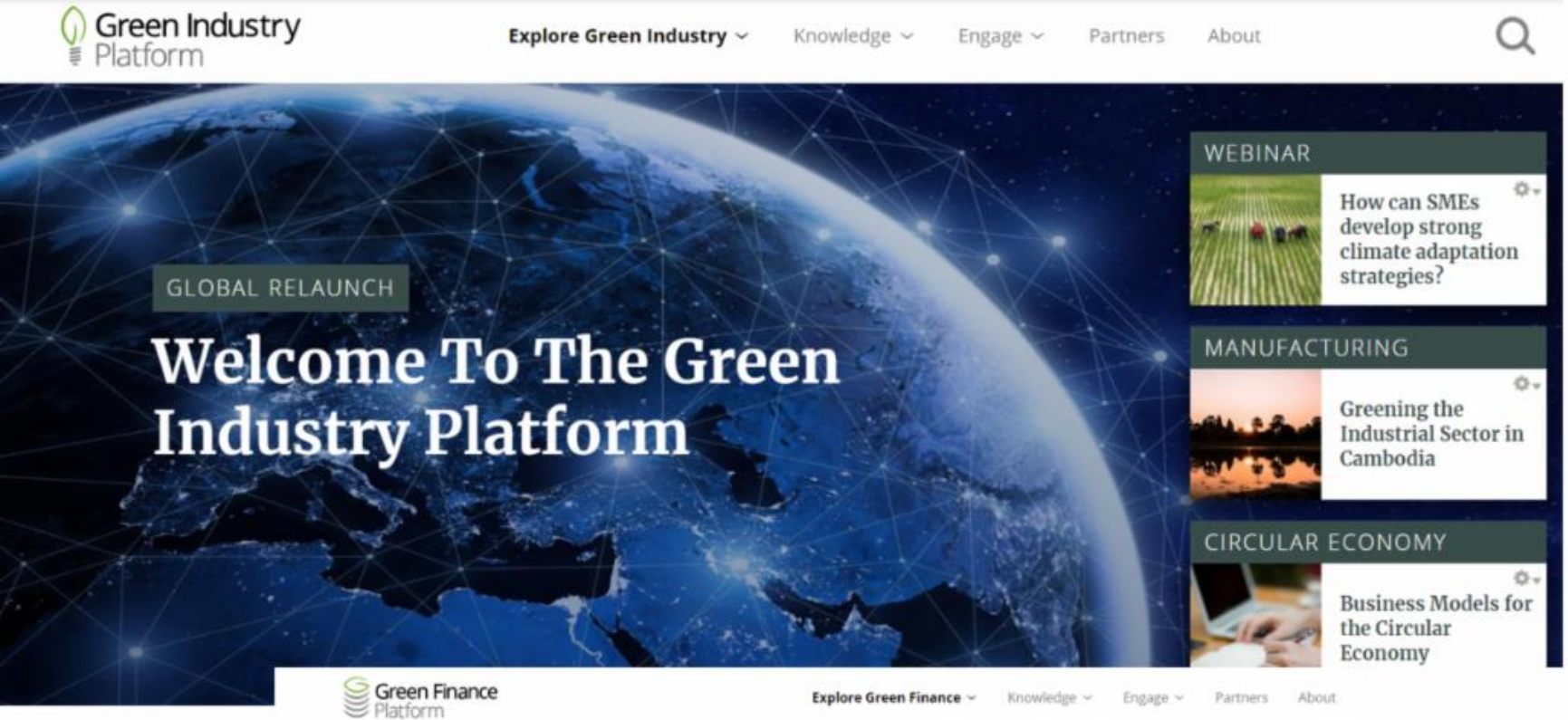

Green Industry Platform

greenindustryplatform.org

Green Finance Platform

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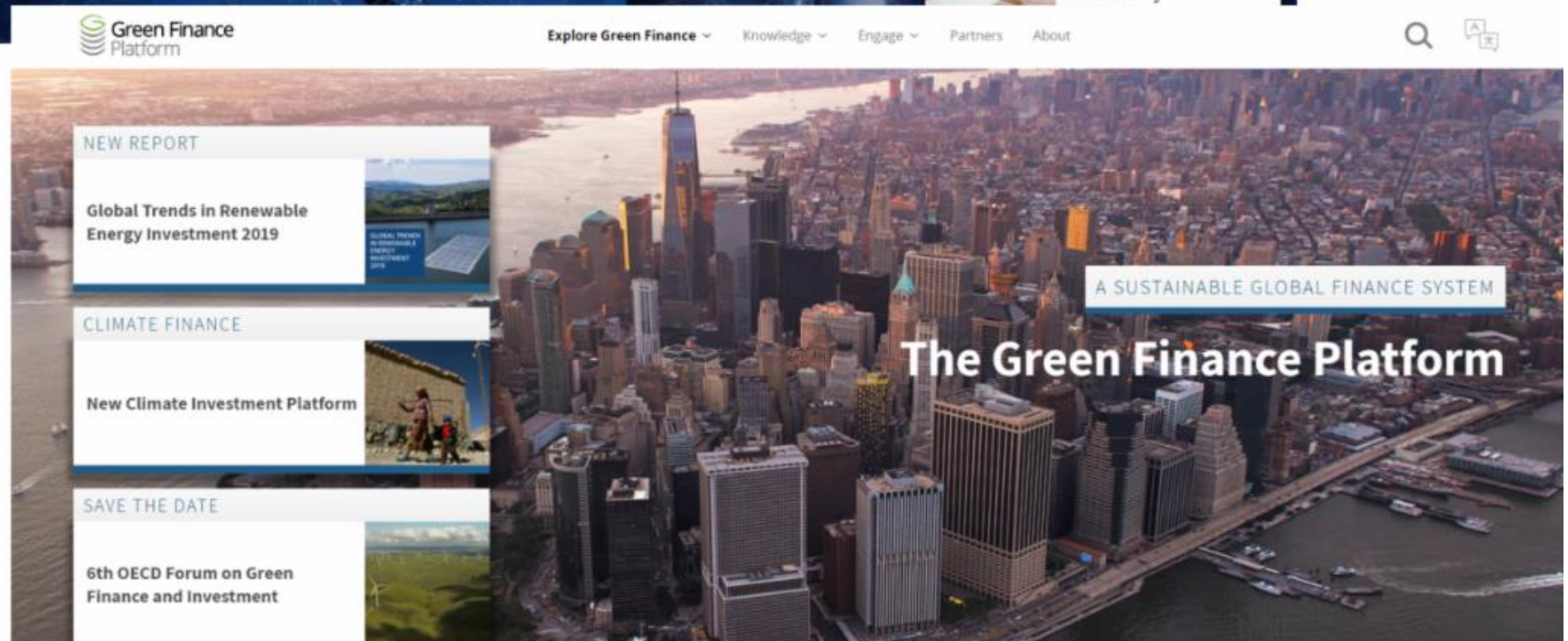

Manuel Weber

Scientific Officer

VDI Centre for Resource Efficiency (VDI ZRE)

The Business Case for Resource Efficiency

What is resource efficiency and why does it matter for climate change?

What motivates companies to become more resource efficient?

What are the benefits of resource efficiency for companies?

Resource Efficiency Online Training Series

The Business Case for Resource Efficiency

VDI Centre for Resource Efficiency (VDI ZRE)

- Focuses on Resource Efficiency in operational practice through connection to VDI
- Competence Centre for demand-driven technical knowledge on Resource Efficiency in SMEs
- Development of standards through VDI guidelines for Resource Efficiency in cooperation with VDI

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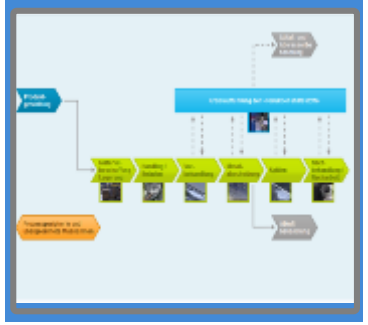
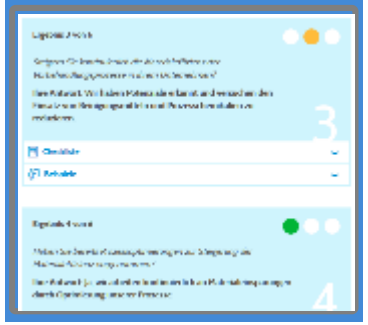
Tools & Services of VDI ZRE

Process chains

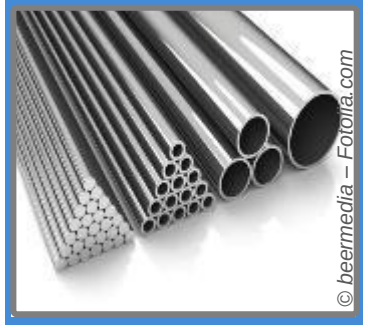


Resource checks

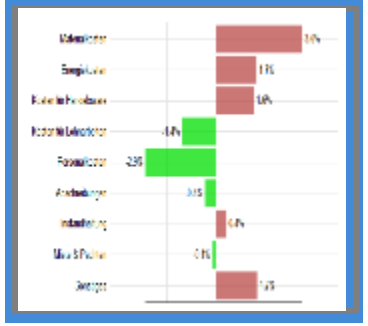


Innovation radar

Studies



Cost calculator

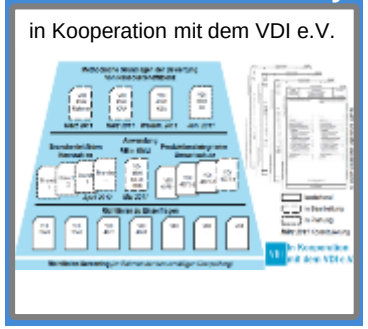


Videos

Training courses

VDI guidelines on Resource Efficiency

in Kooperation mit dem VDI e.V.



Initiative for Resource Efficiency and Climate Action

- Contributes to a more sustainable management of resources and, through that, to the reduction in GHG emissions related to resource use
  - Raising awareness about existing potentials and strengthening national and international dialogues
  - Supporting international networking and cooperation and contributing to its operationalization
  - Strengthening capacities of key stakeholders
  - Providing consultancy for identifying and tapping of potentials for enhanced resource efficiency and climate protection
- Focus: Emerging Economies within G20

Resource Efficiency Online Training Series

Webinar 1: The Business Case for Resource Efficiency - 19 February (3pm CET)

- Methodical principles and motivations for introducing resource efficiency in SMEs
- Interactive discussion: Drivers and barriers for resource efficiency

Webinar 2: The Resource Efficiency Roadmap for Businesses - 26 February (3pm CET)

- A roadmap for implementation of resource efficiency strategies
- Interactive discussion: The role of employees before and during implementing resource efficiency

Webinar 3: Strategies, Measures and Real-World Experience - 4 March (3pm CET)

- Product- and process-related strategies for improved resource efficiency and examples of good practice
- Interactive discussion: Digitisation and “Industry 4.0” technologies for increasing resource efficiency

AGENDA

- Definition of resource efficiency and natural resources
- Business motivations for becoming more resource efficient
- Interactive discussion on the challenges of implementing resource efficiency in business and how they can be overcome

Definition of Resource Efficiency and natural resources

What are natural resources?

How is resource efficiency defined?

How does the exploitation of natural resources affect climate change?

What are Natural Resources?

Raw materials

© VDI ZRE

Energy

© VDI ZRE – Drechsler

Water

© VDI ZRE

Air

© VDI ZRE – Oberender

Surface/Soil

© VDI ZRE

Ecosystem services

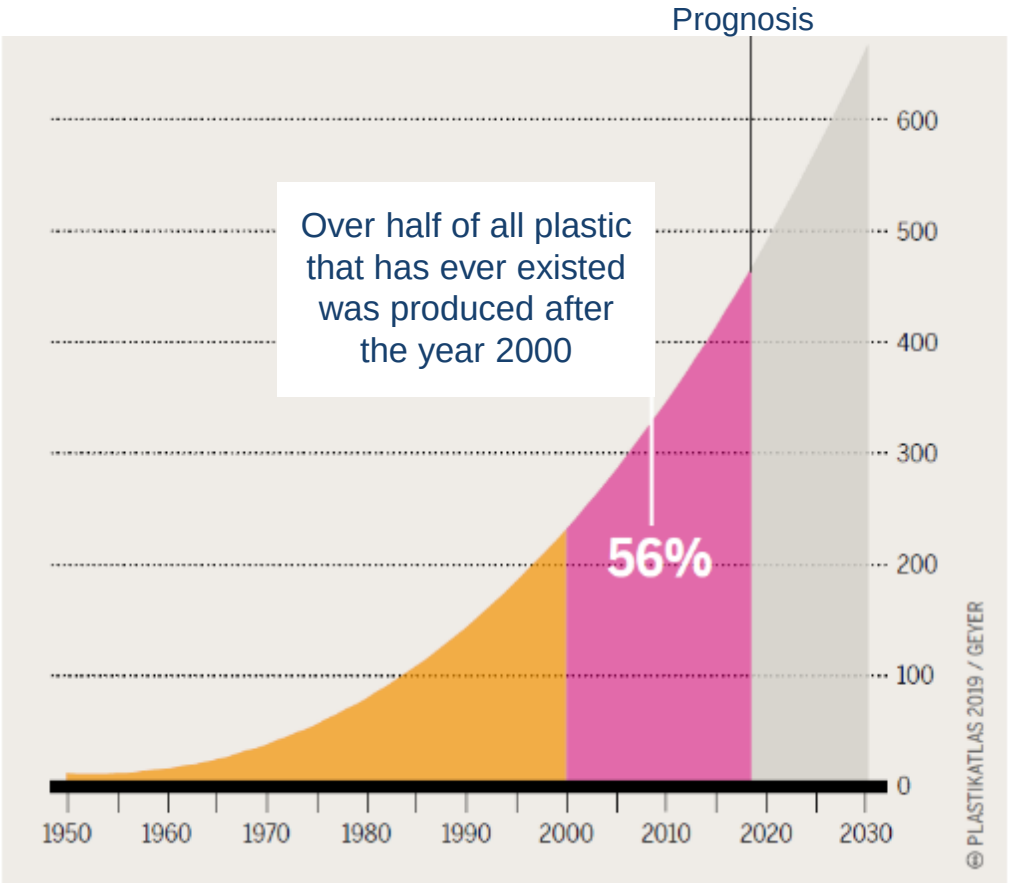
© VDI ZRE

Definition nach VDI 4800 Blatt 1 (2016) und in Anlehnung an: Europäische Kommission (2005)

Global drivers of natural resource demand

- Population growth
- Urbanization
- Expansion of industrial and service-related production
- Rising (average) income

Example of resource consumption over time: Plastics

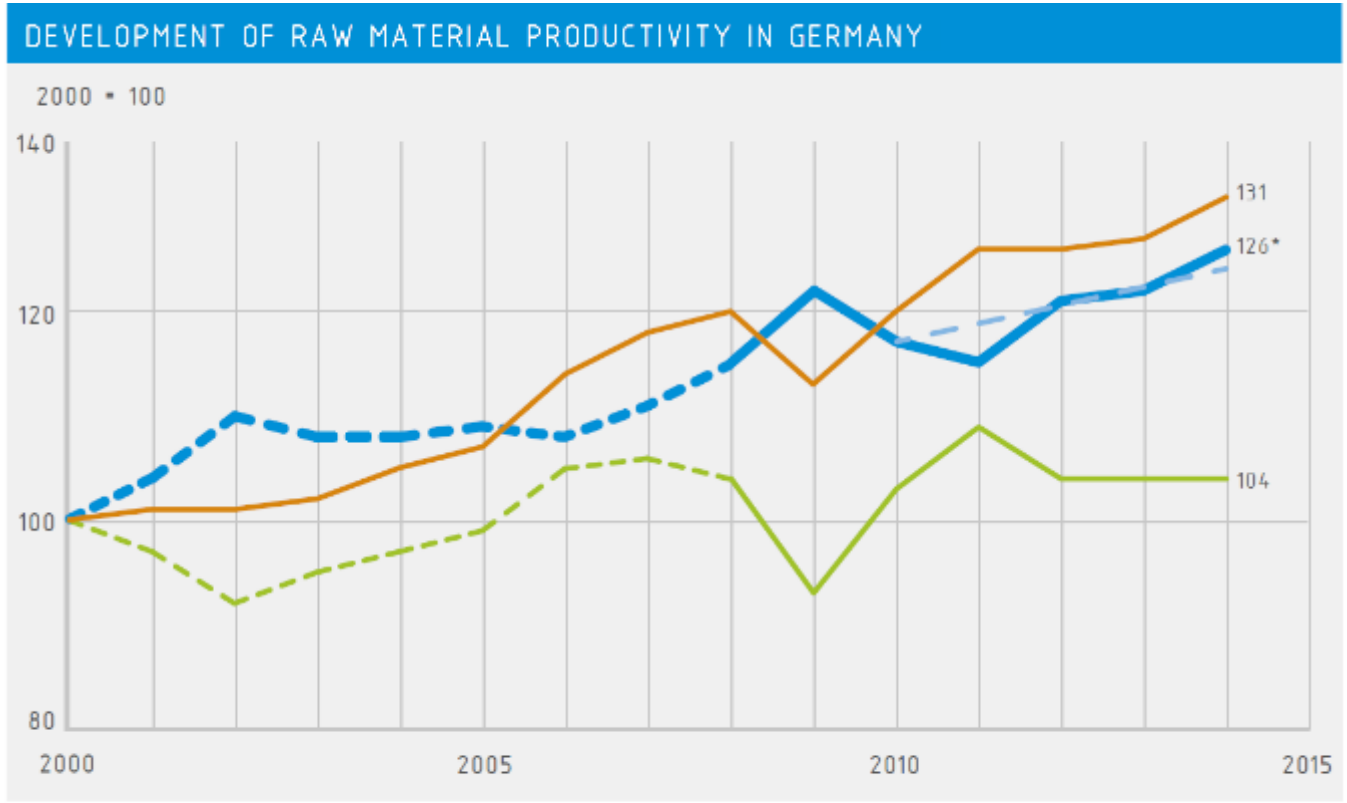


sources: Heinrich-Böll-Stiftung, Plastikatlas,
https://www.boell.de/sites/default/files/plastikatlas_2019_3_auflage.pdf?dimension1=ds_plastikatlas

How can we meet the growing demand for raw materials?

- Option A: Increased exploitation of domestic sources of raw materials ☹
- Option B: Increased imports ☹
- Option C: Increased resource efficiency ☺

Decoupling economic growth from resource use



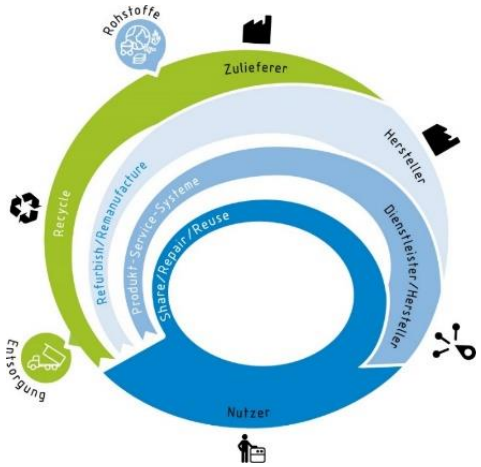
Source: VDI Centre for Resource Efficiency (VDI ZRE), 2018: Wettbewerbsvorteil Ressourceneffizienz; https://www.ressource-deutschland.de/fileadmin/user_upload/downloads/Broschueren/Wettbewerbsvorteil_Ressourceneffizienz_4._Auflage_bf.pdf

- Raw material productivity
- Gross domestic product + imports (adjusted for price)
- Usage of primary raw materials
- Target according to German Sustainability Strategy

Resource Efficiency: Definition

"Resource efficiency is defined as the ratio between a certain benefit and the resource use required for it. An increase in resource efficiency will be obtained if a certain benefit in goods (products) can be achieved with less use of natural resources."

source: VDI guideline 4800 part 1, S. 12



"The less energy and material used, the better!"

Resource Efficiency: Definition

$$\text{Resource efficiency} = \frac{\text{benefit (product, functional unit)}}{\text{need/effort (use of natural resources)}}$$

product

raw materials

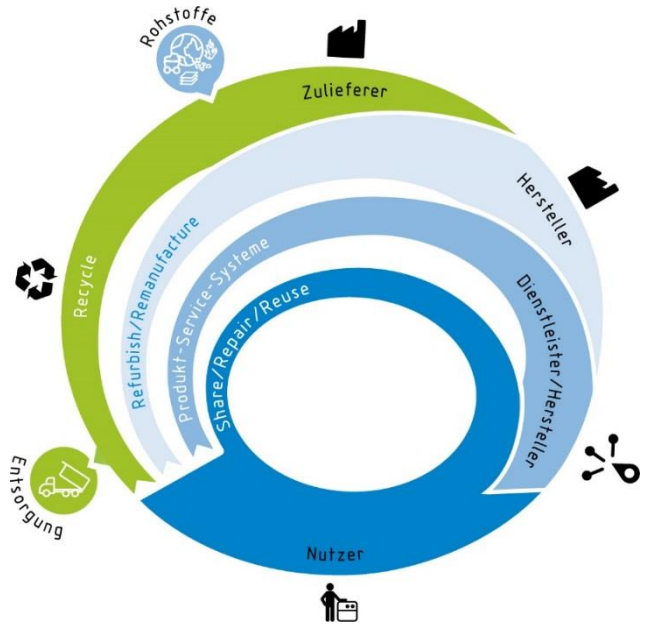
water

energy resources

Source: VDI 4800 Part 1 - Resource efficiency; methodological principles and strategies

Resource Efficiency and Circular Economy

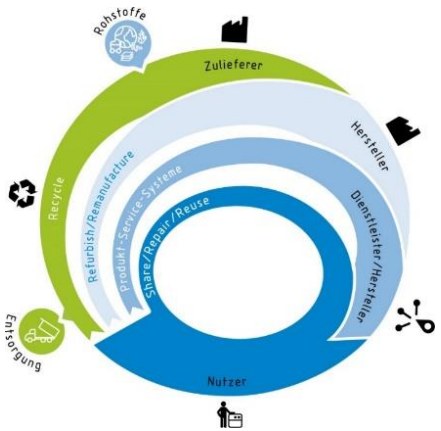
"The less energy and material used, the better!"



“Don’t use and throw away! Keep materials in the loop so they can stay in use for as long as possible!”

Resource efficiency and circular economy are based on the same basic idea:
THE ENTIRE LIFE CYCLE OF A PRODUCT MUST BE CONSIDERED!

Definition: Circular Economy



"Don't use and throw away! Keep materials in the loop so they can stay in use for as long as possible!

"A circular economy is an economic system of closed loops in which raw materials, components and products lose their value as little as possible, renewable energy sources are used and systems thinking is at the core."

Source: https://kenniskaarten.hetgroenebrein.nl/en/knowledge-map-circular-economy/what-is-the-definition-a-circular-economy/

Questions? …

Wissen
Qualifizierung
KMU
MATERIAL
Ressourcenchecks
WebVideomagazin
VDI ZRE
TECHNOLOGIE
RESSOURCEN
EFFIZIENZ
Einsparpotenziale
STUDIEN
Netzwerk
Klima
UMWELT
Innovationsradar
ENERGIE
Nachhaltigkeit

AGENDA

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Motivation for Resource Efficiency

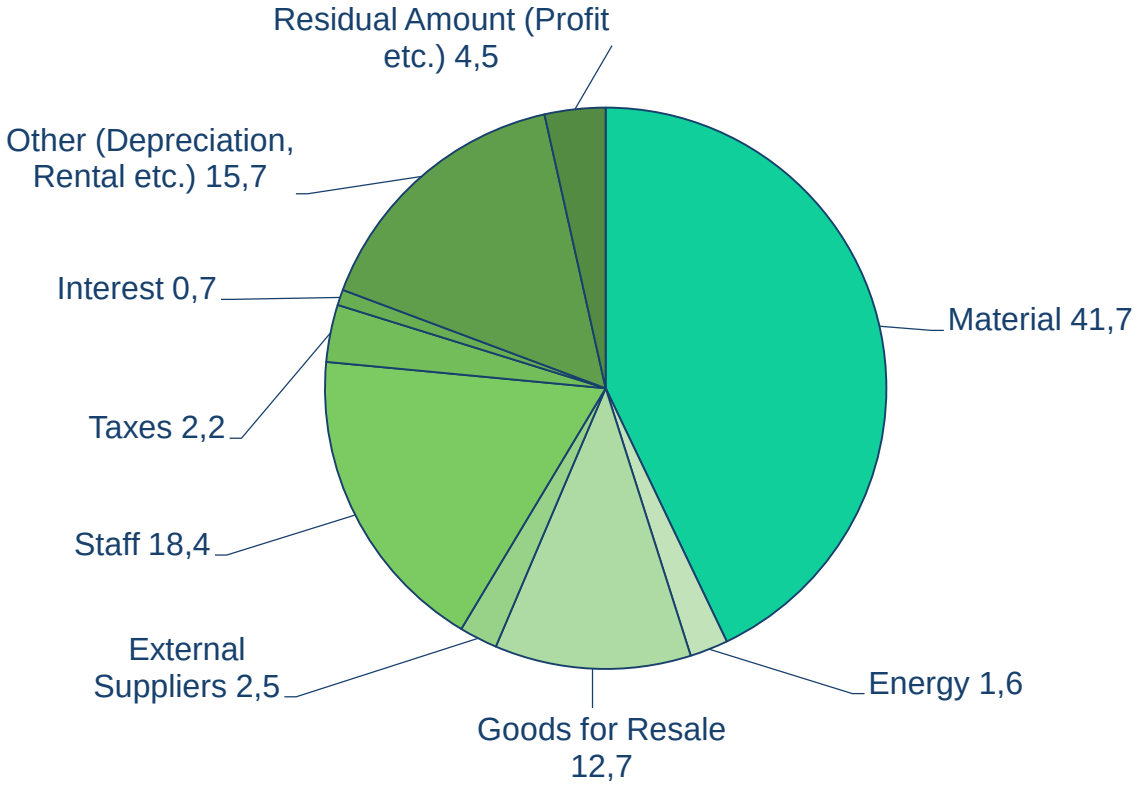
Why increase resource efficiency?

What are the business advantages of resource efficiency?

What do German SME's think about resource efficiency?

How do companies put resource efficiency into practice?

Cost Structure Manufacturing Sector – Germany (2017)

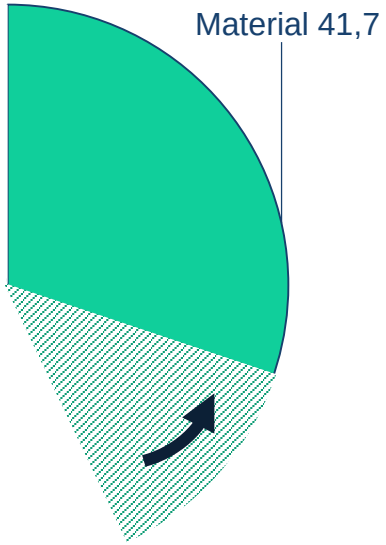


Materials
Semi-finished products
Components
Assemblies

Source: Federal Statistical Office, Germany, 2019

Why increase resource efficiency?

In very simple terms…



LESS MATERIAL & ENERGY IN PRODUCTION
=
LESS COSTS
=
HIGHER COMPETITIVE ADAVANTAGES

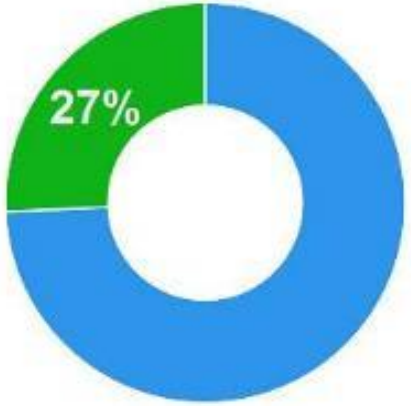
Why increase resource efficiency?

Benefits for the company by increasing resource efficiency

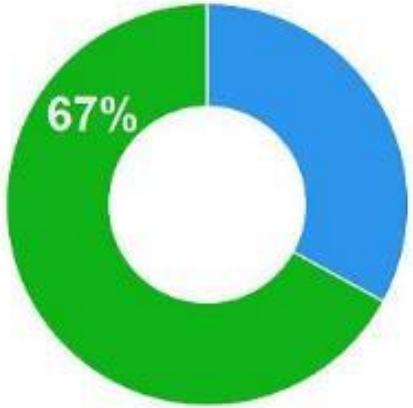
- Reduced dependence on the raw material market (price fluctuations and availability)
- Lower manufacturing costs
- Improved competitiveness
- Better corporate image
- Lower usage costs for consumers (in some cases)

What do SME think in Germany?

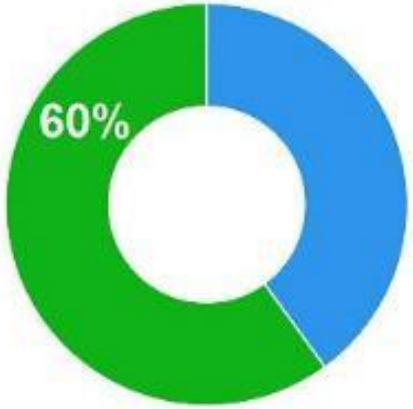
Our industry is already resource efficient.



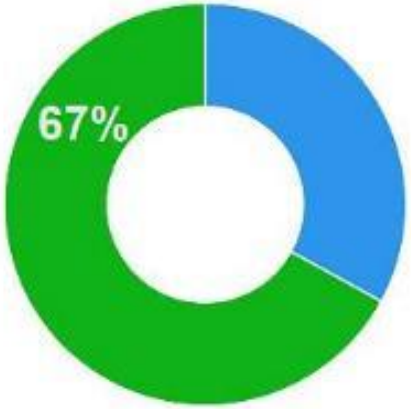
Resource efficiency is part of our business strategy.



Resource efficiency is of great importance to our customers.



Resource efficiency is being discussed in my industry/by my competitors.



Answers in percentage of total; n_{ug} = 1.007

Source: VDI Centre for Resource Efficiency (VDI ZRE), 2015: Study Status quo Ressourceneffizienz; www.ressource-deutschland.de/publikationen/studien

Reduction of GHG emissions through resource efficiency

Material savings [t] → spec. GWP [tCO_{2eq}/t] → Reduction of CO_{2eq}

Energy savings [MWh, t] → spec. GWP [tCO_{2eq}/t] → Reduction of CO_{2eq}

Theoretical savings potential of German funding program "**r^2 - Innovative technologies for resource efficiency in resource-intensive production processes**", if these technologies would be implemented across Germany

TOTAL SAVING POTENTIAL:

80 million tons of material PER YEAR

75 terawatt hours of energy PER YEAR

60 million tons CO2-eq PER YEAR

Efficient packaging machines

Case example: Automation & Engineering GmbH

Situation

- +1 million tons of shrink film per year used worldwide to package PET bottles

Problem

- High material consumption for easier transport

PET bottles shrink-wrapped

VDI ZRE WebVideoMagazine: Less is more - packaging machines that conserve packaging materials

Efficient Packaging machines

Case example: Automation & Engineering GmbH

Solution: Resource-efficient packaging

- Plastic sleeve sticks the bottles together

PET bottles with plastic sleeve

VDI ZRE WebVideoMagazine: Less is more - packaging machines that conserve packaging materials

RE-Potential

- 75 % material savings
- 95 % energy savings

Additional value

- Economic efficiency
- Fast production
- Principle transferable to other products

Product Service Systems – Example of chemical leasing

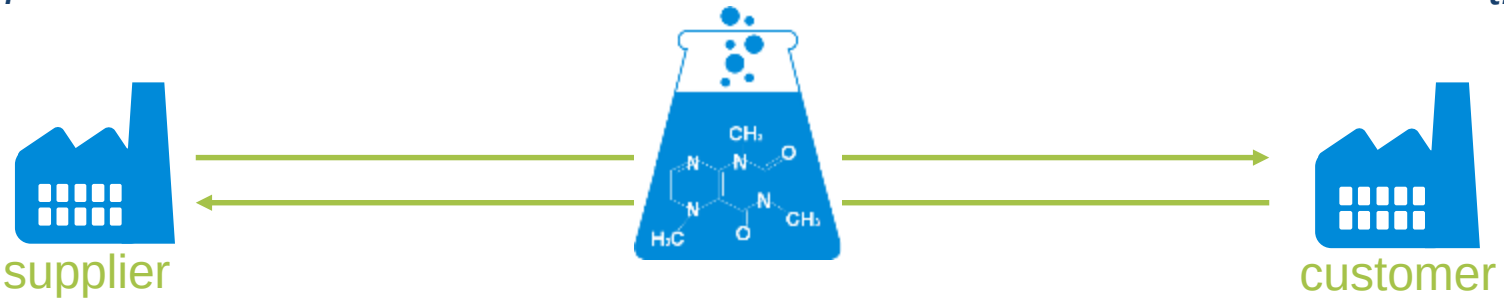
Traditional:

„ the more material (quantity, volume) the better“

Traditional:

„the less material (quantity, volume) the better “

conflicting interests



Leasing:

„the less material (quantity, volume) the better “

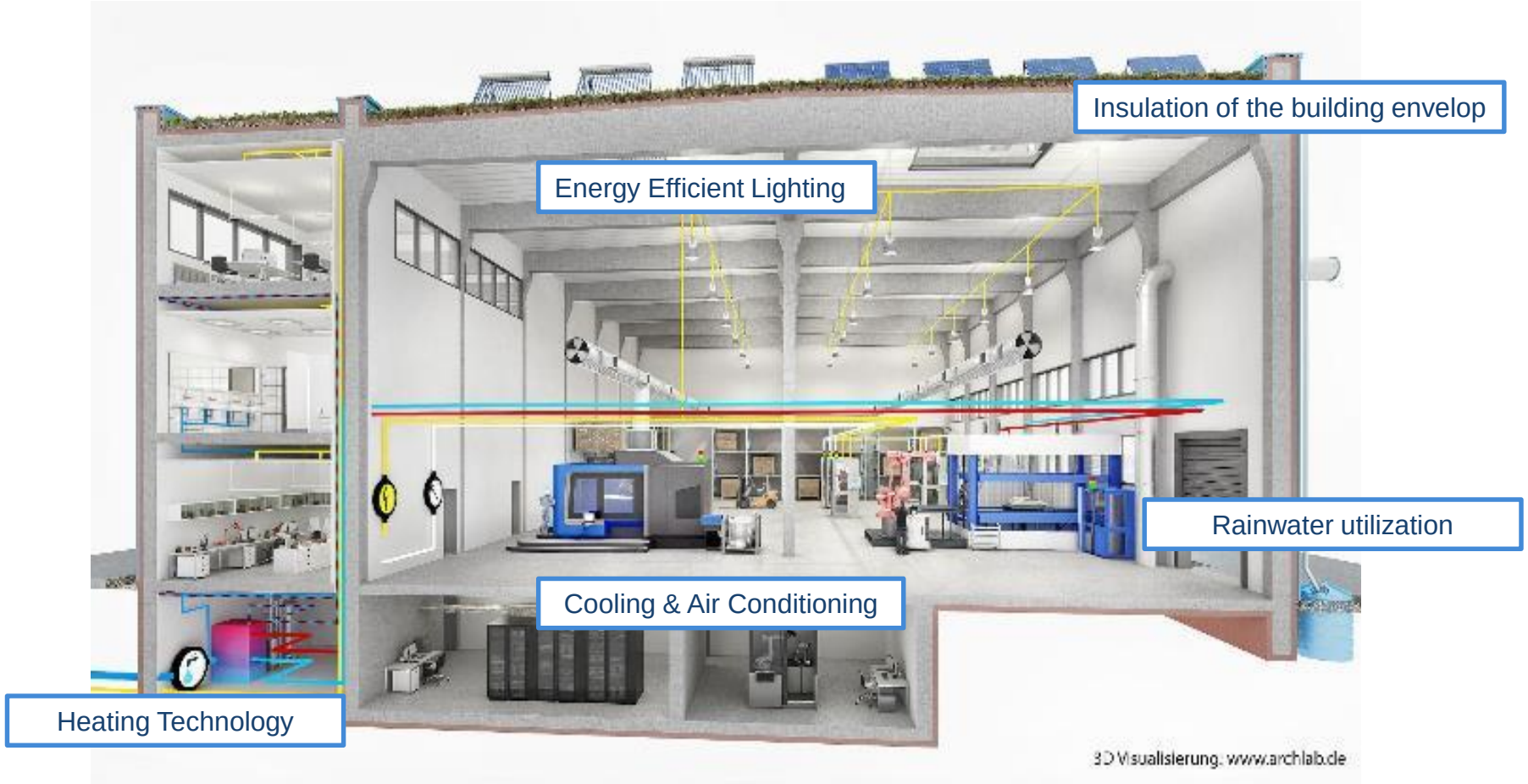
Leasing:

„ the less material (quantity, volume) the better “

same interests

[Leismann et al. (2012)]

Material efficient building infrastructure & energy efficient buildings



Use of solar energy

Case example: Coating and drying process

- Solar energy generation using vacuum tube collectors
- Intelligent heat distributor regulates the efficient distribution to two storage tanks
- Heating of the air for coating and drying processes by means of a water-air heat exchanger
- Obtaining additional heat from exhaust air by rotary heat exchangers (heat recovery)

VDI ZRE WebVideoMagazine: Producing with sunlight – process heat

Realised savings

- 32 % savings due to solar thermal system
- 20 % savings due to heat recovery

Questions? …

Wissen
Recycling Qualifizierung
KMU MATERIAL
Gute Praxis-Beispiele
Ressourcenchecks
WebVideomagazin VDI ZRE
TECHNOLOGIE Prozessoptimierungen
RESSOURCEN
EFFIZIENZ INNOVATION Klimaschutz
KostenrechnerEinsparpotenziale
STUDIEN KOMPETENZZENTRUM
Wissenstransfer Netzwerk
Klima UMWELT
Innovationsradar
ENERGIE
PROZESSKETTE
Nachhaltigkeit

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Drivers and barriers for Resource Efficiency

Interactive session

What **motivates** businesses to implement resource efficiency strategies?

What are **barriers** to the implementation of resource efficiency strategies?

Please share **your experience** with us…

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Examples of resource efficiency drivers and barriers

Drivers

+ Cost savings
+ Increasing business competitiveness
+ Reputation as an ecologically responsible company
+ Preparing for resource scarcity
+ Reduced dependency on commodity markets
+ Complying with current and future regulation
+ Responsing to consumer demand for ESG
+ Adequate public funding

Barriers

- Up-front investment
- Uncertain success
- Long payback period on investments
- Lack of support from suppliers and/or clients
- Potential threat to process reliability/product quality
- Day-to-day business activities take priority over new resource efficiency initiatives
- Burden to staff during implementation of RE project
- Insufficient public funding

Drivers for Resource Efficiency

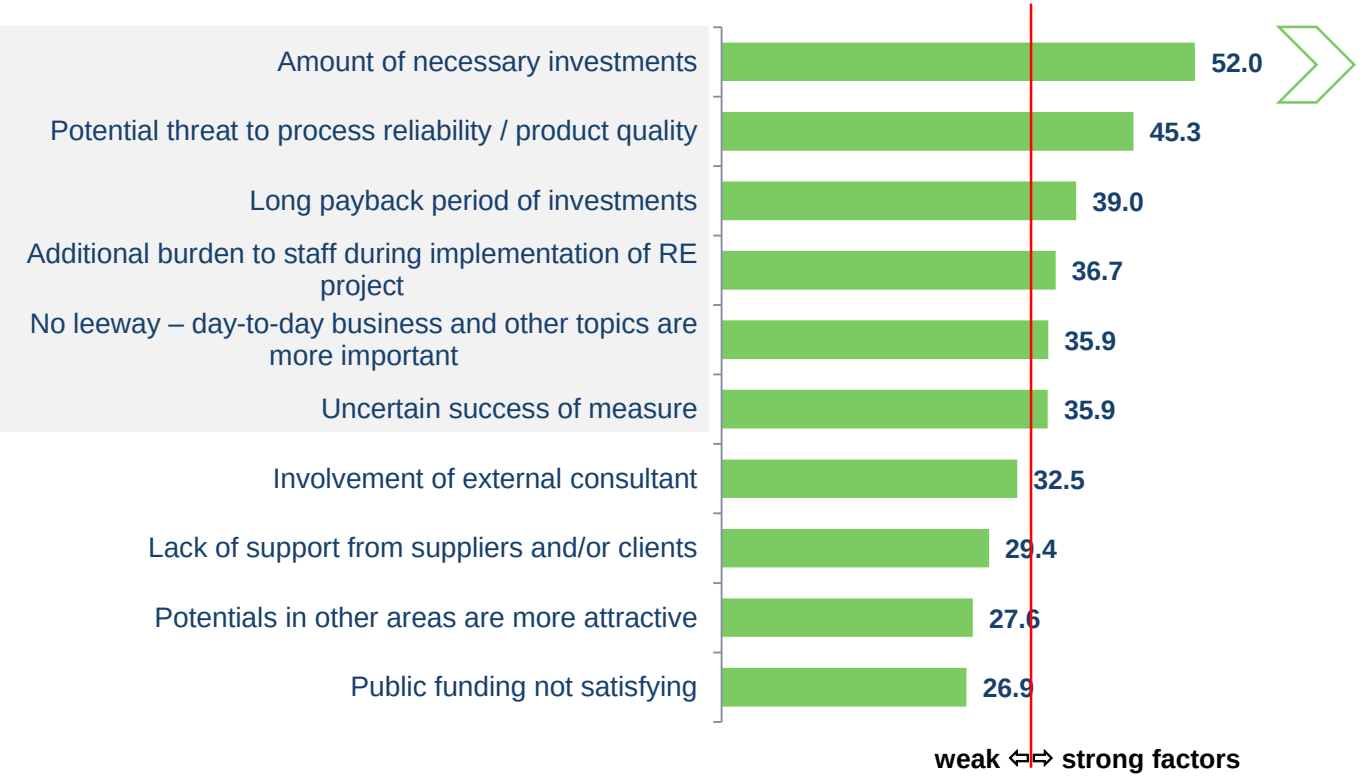
4 out of 8 driving factors can be identified as strong.

Both top ranking driving factors refer directly to business-oriented thinking and decision making.

Answers in relevance points from 1 to 100; multiple answers possible; n_{ug} = 1.007

Source: VDI Centre for Resource Efficiency (VDI ZRE), 2015: Studie Status quo Ressourceneffizienz; www.ressource-deutschland.de/publikationen/studien

Barriers for Resource Efficiency



6 of 10 aspects can be identified as strong barriers.

Economic aspects are dominating barriers.

Investment level can be seen as very strong barrier.

Answers in relevance points from 1 to 100; multiple answers possible; n_{ug} = 1.007

Source: VDI Centre for Resource Efficiency (VDI ZRE), 2015: Studie Status quo Ressourceneffizienz; www.ressource-deutschland.de/publikationen/studien

Characteristics of barriers

Barriers can be structured and…

… are dependent on the **behaviour of employees** (incl. CEO!!)

- Influence: Leadership styles, adherence to the "traditional“

… depending on the (objective/subjective) possibilities for **optimizing product design**

- Material → dimensioning

… depending on the (objective/subjective) possibilities for **optimizing the production process design**

- Processing methods, Level of material, energy, information and qualification

Reduction of barriers

Evidence of success

- RE project manager or external RE consultant = competence/know-how

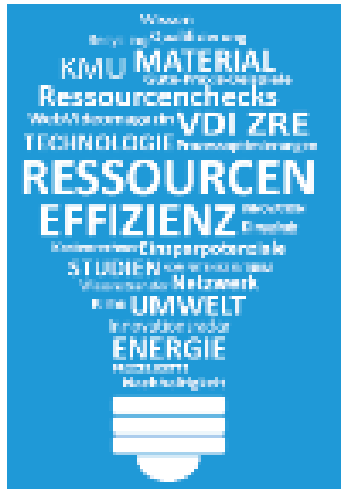
Presenting of Implementation method

- Possible project structures, procedures, methods, project team, possible results

- Skillful overcoming of the **dilemma:**
  "Develop a special solution for us (not a copy), but show us where it has already been successfully implemented"

Necessary requirements for resource efficiency projects

- Creating the **position of trust** of the ‘RE Project Leader’
- **Visualization** of the competitive situation in the company
- **Demonstration** of the influence of RE on the overall cost situation
- Broad **conviction** of the management and employees of RE
- Broad **information**, e.g. works council, middle management, on-site teams, affected parties

Thank you very much for your attention and your contributions to the discussion!

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ggkp.org/ResourceEfficiencyTraining