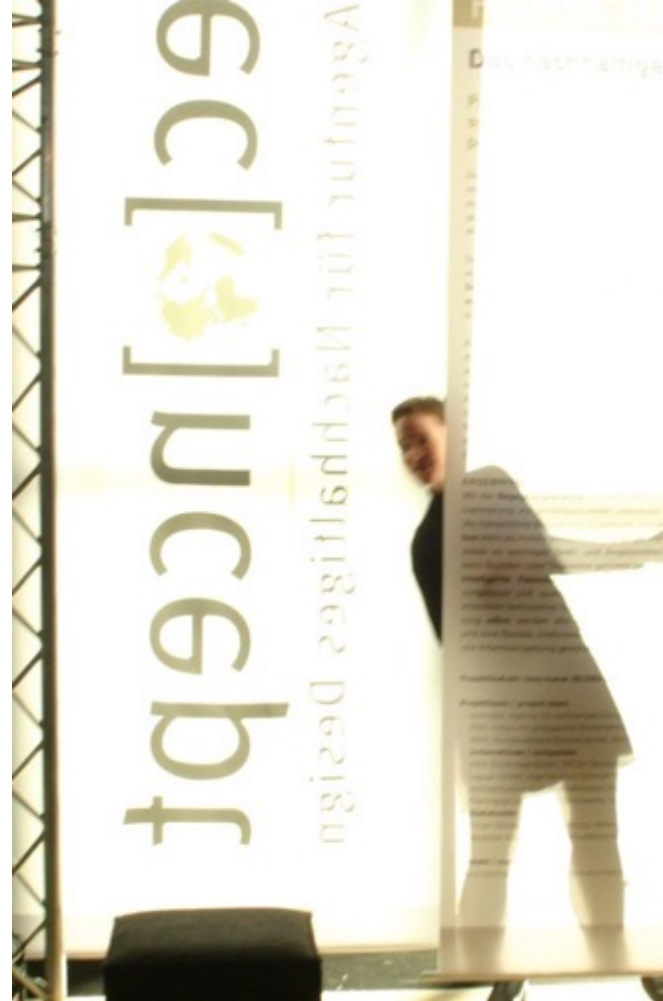


INPUT **ECO**-DESIGN

Ursula Tischner

econcept – Agentur für nachhaltiges Design, Köln

www.econcept.org



INHALT



Warum

Gründe für
Ecodesign



Was

Ecodesign
Strategien



Wie

Methoden
und Tools

SUSTAINABILITY ISSUES

- Klimawandel
- Ressourcenverknappung: Rohstoffe, Frischwasser, Land
- Ungerechtigkeit: Arm-Reich, Nord-Süd, Geschlechter, Generationen
- Biodiversitätsverlust
- Energiewende, Verkehrswende
- Ungesunde Lebensstile: Fettleibigkeit, Diabetes, Burnout
- ...

TO SUMMARIZE ...

We are trashing the planet,
we are trashing the people
and we are not even having fun ...

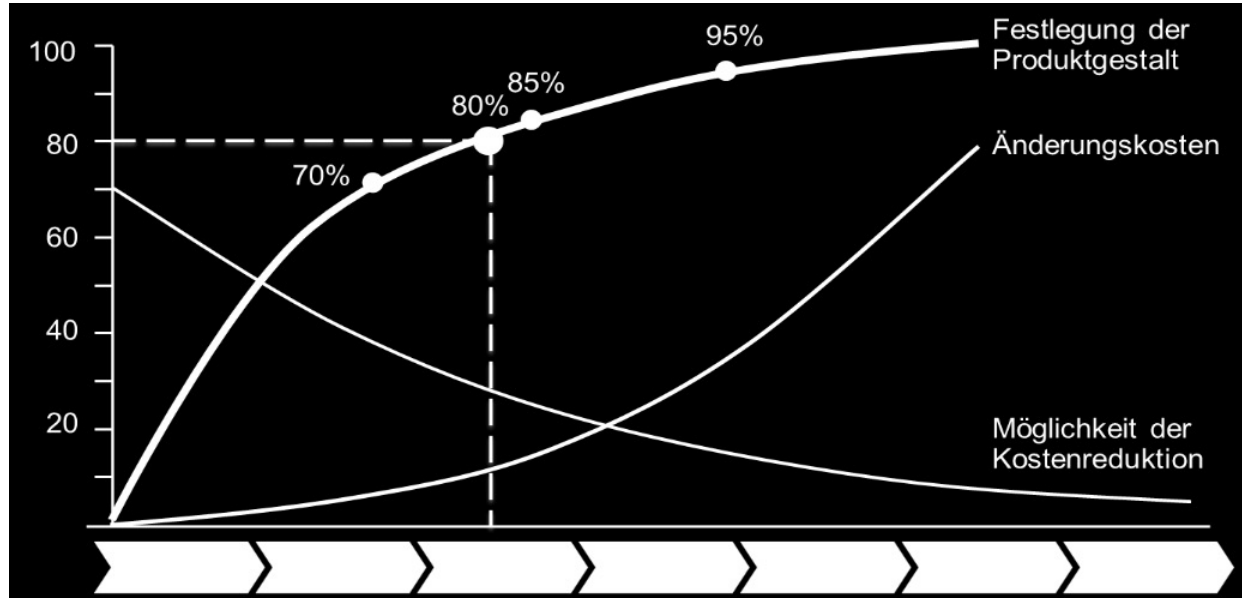
as Annie Leonard says in "the story of stuff",
www.storyofstuff.com



WHY FOCUS ON PRODUCT DESIGN ?

About 80% of product impacts are pre-determined in product design and development phase.

Use and end-of life phase are more difficult to influence. Trade-offs occur. That's why also PSS design is needed.



DESIGN ...

From creator of over-consumption

To enabler of sustainable life styles!



*Fully biodegradable Coffee-to-Go
Cup made from used coffee grounds.
Design: Agatha Sowinski, David
Minatti-Krauhs, FH JOANNEUM*



24-48 h

WARUM ECODESIGN?

Breakout session



PUSH

- ✓ Gesetzgebung
- ✓ Lieferkettengesetz
- ✓ Single Use Plastics Directive
- ✓ WEEE / RoHS / REACH
- ✓ Ecodesign Directive
- ✓ Packaging/ Battery Directive etc.
- ✓ Zertifizierungen und Standards

PULL

- ✓ Kundennachfrage
- ✓ Medien und Öffentlichkeit
- ✓ NGOs und Watchdog Organisationen
- ✓ Skandale und Protest
- ✓ Imageverbesserung
- ✓ Kundenbindung stärken
- ✓ B2B Nachfrage
- ✓ Öffentliche Beschaffung
- ✓ Finanzinvestoren

BENEFITS

- ✓ Gutes Gewissen
- ✓ Zufriedenere Mitarbeiter:innen
- ✓ Innovationsführerschaft
- ✓ Kosten senken
- ✓ Risiken minimieren
- ✓ Kostenlose gute Presse
- ✓ Positive Impact/ Social Value

Photo: user:5688709 / pixabay

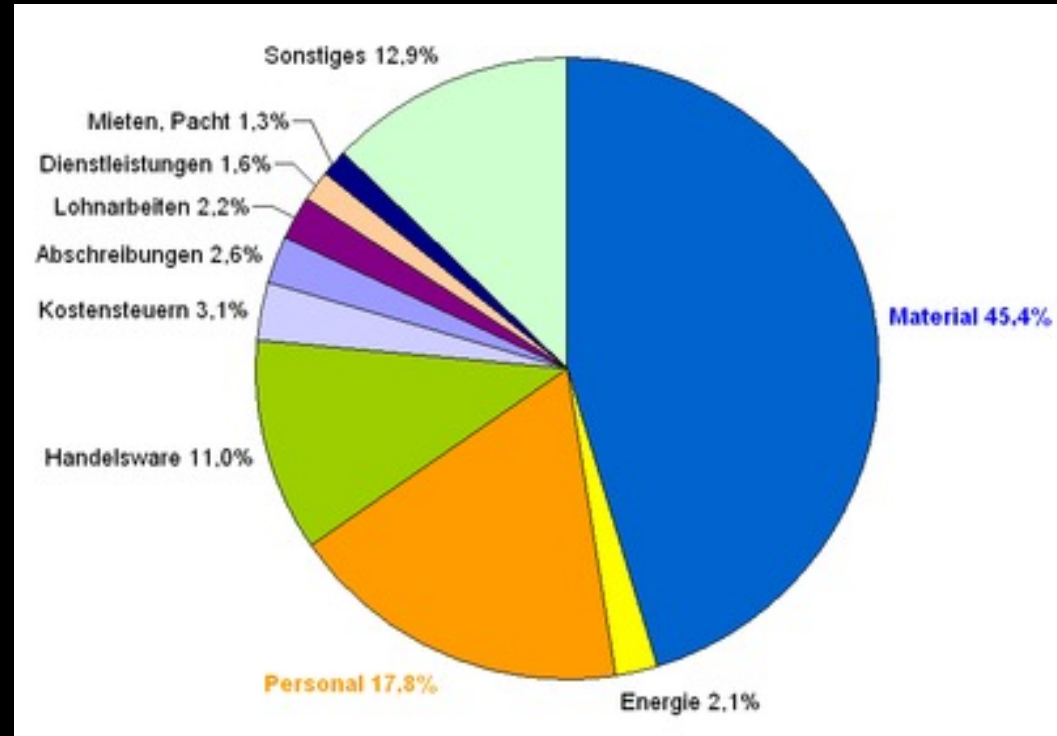
BUSINESS CASE

Der Anteil der Materialkosten am Bruttoproduktionswert im verarbeitenden Gewerbe liegt bei ca. 45 %.

In den Materialkosten sind auch die Kosten der Vorleistungen enthalten, sie umfassen also nicht nur Rohstoffkosten.

Statistisches Bundesamt und
Umweltwirtschaftsbericht 2011

z.B. Materialkosten



THE SUSTAINABILITY BUSINESS ROADMAP

From CSR to
Innovation and
Design for
Sustainability
and Sustainable
Value Creation.

License to Operate

Meet legal requirements on social and environmental issues and avoid fines and penalties.

Giving Back, Doing Good

Contribute to specific causes or promote CSR activities in ways that enhance company brand, image and reputation.

Operational Alignment

Use core competencies, existing processes and systems to improve social and environmental outcomes, and business value.

Primary Value Creator

Differentiating the company as an authentic purpose-led business that designs & innovates to create sustainable value for people, planet and itself.

INHALT



Warum

Gründe für
Ecodesign

Was

Ecodesign
Strategien

Wie

Methoden
und Tools

WAS WIR NICHT GESTALTEN SOLLTEN

Don't design what
no one needs /

Nichts gestalten,
was kein Mensch
(und kein Tier)
braucht



WAS WIR NICHT GESTALTEN SOLLTEN

No greening of
stupid products /

Keine pseudo-öko
Produkte „Öko-
Hummer“



WAS WIR NICHT GESTALTEN SOLLTEN

No built in and
percieved
obsolescence /

Kein eingebautes
und gefühltes
Verfallsdatum

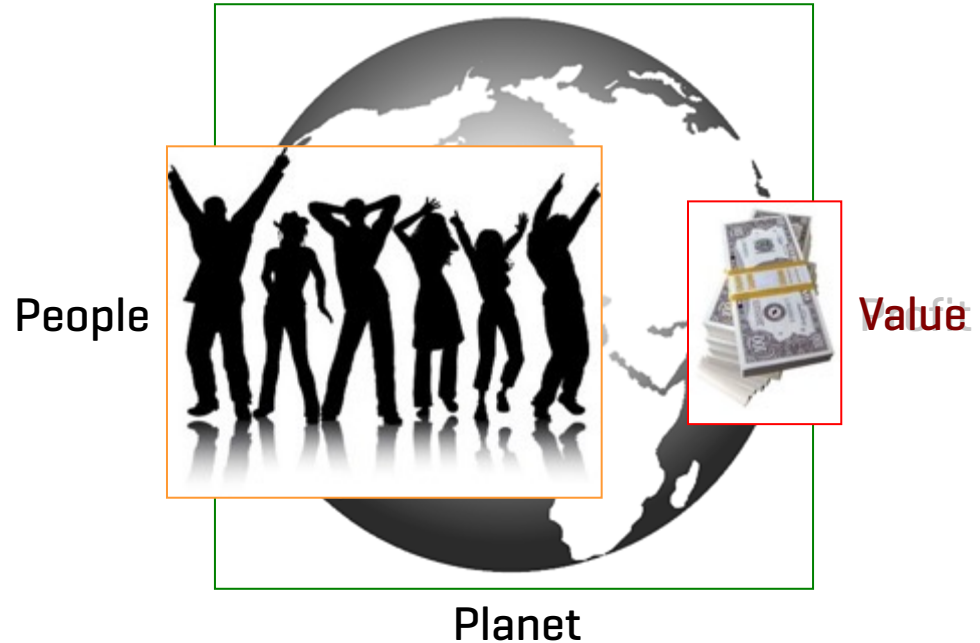


DESIGN FOR SUSTAINABILITY

Design, that is good for people and planet, and creates value and wealth for as many people as possible – not only short term profit for a few.

PARADIGM SUSTAINABILITY 2.0

Without a planet there is neither society nor economy possible.



ZIEL: KREISLAUFWIRTSCHAFT

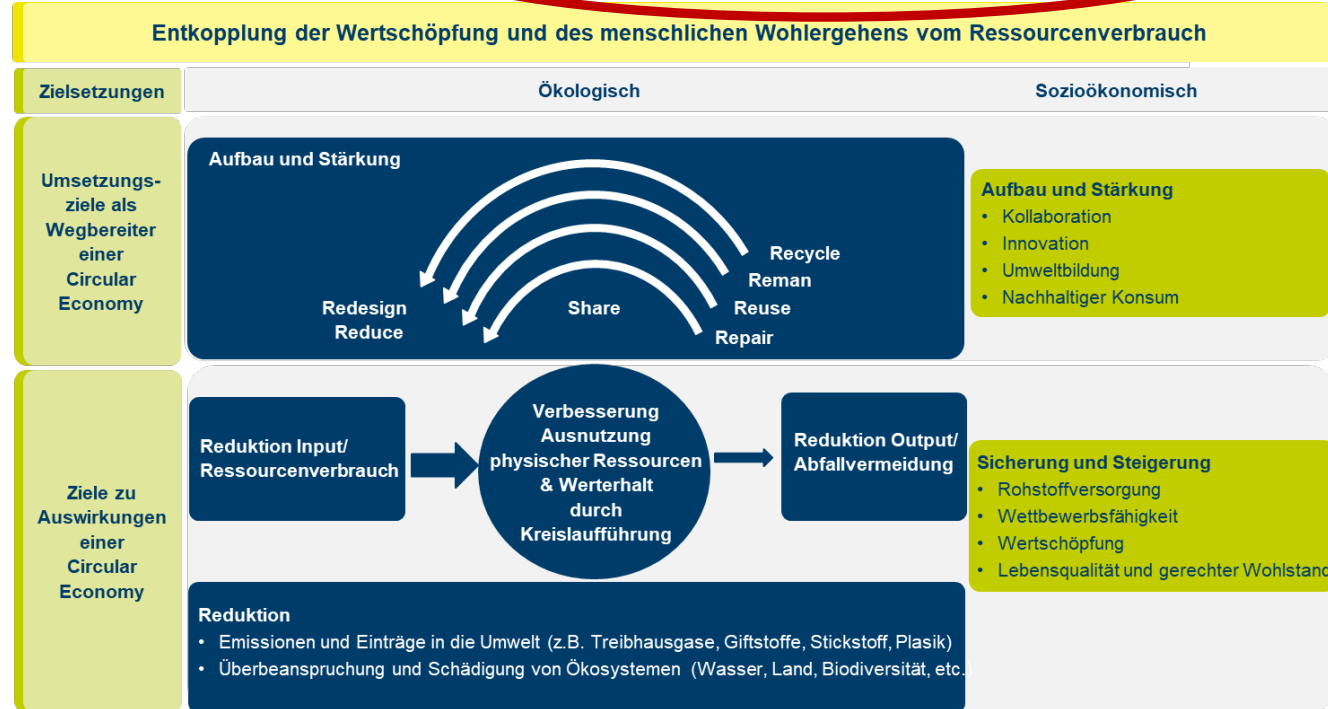
Übernächster Round Table



Design Strategien:

- Re.think
- Re.design
- Re.duce
- Re.use
- Re.pair
- Re.manufacture
- Re.cycle

Aber auch Services (PSS) und Geschäftsmodellinnovationen



Quelle: CEID

ECO-DESIGN STRATEGIEN MATRIX

econcept 2019

Design principle	Life Cycle Stage				
	Material selection & sourcing	Production of components & products	Distribution	Use	End of life
Prevention of hazardous substances [Includes toxicity]	Select materials that have lowest use and emissions of hazardous substances [e.g. avoid BFRs, PVC].	Avoid input or emission of hazardous substances in production of components and product [e.g. those restricted by RoHS].	Use packaging that does not involve hazardous substances or emissions.	Avoid use or emissions of hazardous substances during use [e.g. substances of very high concern according to REACH in nicotine liquids].	Enable end of life treatment w/o release of hazardous substances or emissions [e.g. meet WEEE requirements for selective treatment].
Effective use of sustainable materials	Minimize material use including indirect materials used. Avoid use of critical raw materials [e.g. Neodym magnet] Prefer renewable materials produced by sustainable methods..	Select production methods and producers with most material-efficient production methods. Minimize waste in production.	Minimize primary and secondary packaging along the whole supply chain. Design packaging to avoid transport damage.	Minimize use of consumables Avoid littering	Design for high quality recycling, avoid down-cycling by e.g.: separability of different materials, low diversity of materials, recyclability of materials.
Renewable & efficient energy use	Select materials with lowest energy consumption including grey energy [e.g. avoid Aluminum]. Prefer materials that are produced using energy from renewable sources.	Select production methods and producers with highest energy efficiency. Prefer energy from renewable sources.	Minimize weight and volume of product. Minimize weight and volume of packaging. Select green transportation	Minimize energy consumption during use [e.g. by optimum power management and elimination of stand by energy consumption]. Prefer renewable energy sources.	Enable energy efficient re-use & recycling [e.g. reduce effort for disassembly].
Product lifetime optimization	Select materials with adequate durability for the planned lifetime of the product.			Design for longevity [e.g. allow exchange of battery]. Provide maintenance, repair and upgrade options.	Plan for 2nd and 3rd life options for product, components and materials. Design for re-use.
Recovery & recycling	Select materials that can either be safely returned to nature or to technical cycles [e.g. avoid laminated paper and metal-plastics composites]. Prefer recycled materials [e.g. recycled fibers in packaging].	Allow for input of used components in production. Avoid limiting recyclability through production method, [e.g. plastic on metal overmolding]. Recycle production waste.	Design packaging that can be safely returned to nature or to technical cycles [e.g. avoid gluing and mixing metal with paper].	Select consumables that can either be safely returned to nature or to technical cycles. Inform user about the best end of life options for product and components.	Design for high quality recycling: e.g. low diversity of materials, easy collection, disassembly, separation [respect WEEE targets:]. Offer/communicate take back scheme and correct disposal.
Responsibility in production, use & end-of-life [social aspects]	Select conflict free materials [e.g. minerals]. Select materials from certified/ audited [e.g. SA8000] suppliers.	Guarantee fair & safe working conditions.		Minimize negative, increase positive health impacts. Detail health information on the packaging clearly.	Plan end of life options so that they are not harmful to people, e.g. in developing countries.

ECO-DESIGN STRATEGIEN

z.B. LIDS WHEEL

Eco-Design Strategien
im Produkt Lebenszyklus

Brezet and van Hemel 1995

Breakout session

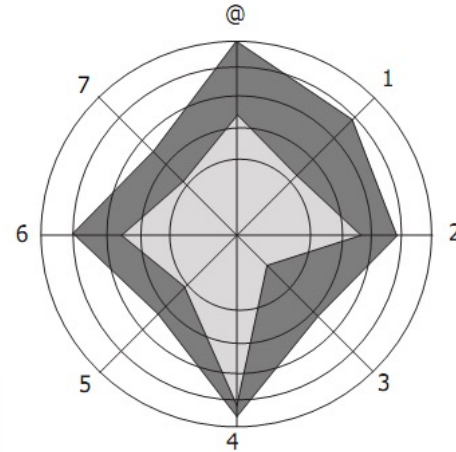


Product System Level

7. Optimisation of end-of-life system
 - Reuse of product
 - Remanufacturing/refurbishing
 - Recycling of materials
 - Safer incineration
6. Optimisation of initial lifetime
 - Reliability and durability
 - Easier maintenance and repair
 - Modular product structure
 - Classic design
 - Strong product-user relation

5. Reduction of impact during use
 - Lower energy consumption
 - Cleaner energy source
 - Fewer consumables needed
 - Cleaner consumables
 - No waste of energy/consumables

- New concept development:
- Dematerialisation
 - Shared use of the product
 - Integrations of functions
 - Functional optimisation of product (components)



Product Structure level

4. Optimisation of distribution system
 - Less/ cleaner/ reusable packaging
 - Energy-efficient transport mode
 - Energy-efficient logistics

Product Component Level

1. Selection of low-impact materials
 - Cleaner materials
 - Renewable materials
 - Lower energy content materials
 - Recycled materials
 - Recyclable materials

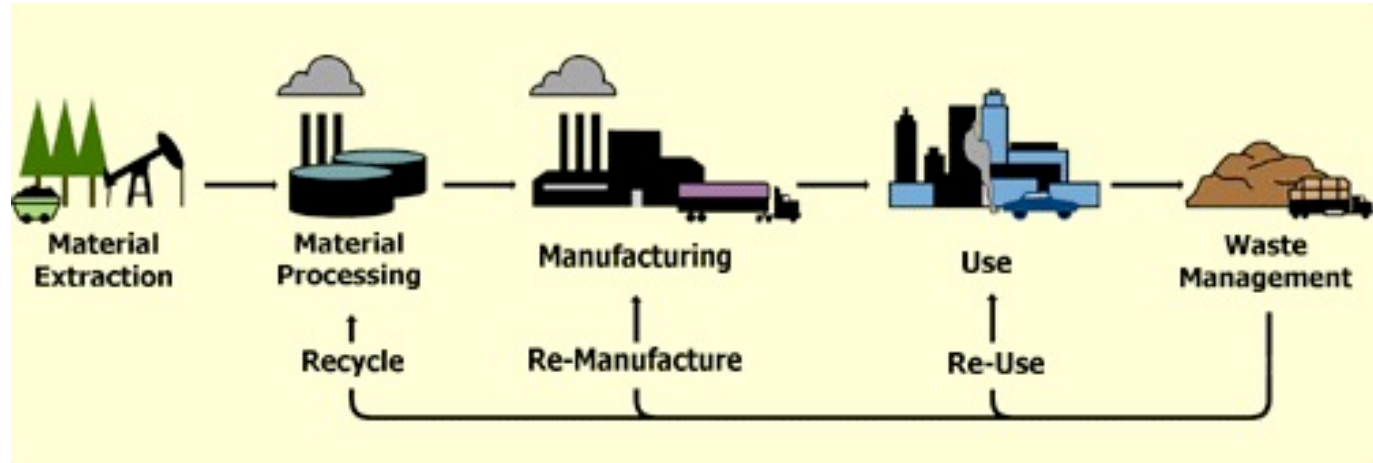
2. Reduction of materials usage
 - Reduction in weight
 - Reduction in (transport) volume

3. Optimisation of production techniques
 - Alternative production techniques
 - Fewer production steps
 - Lower/cleaner energy consumption
 - Less production waste
 - Fewer/cleaner production consumables

■ priorities for the new product
■ existing product

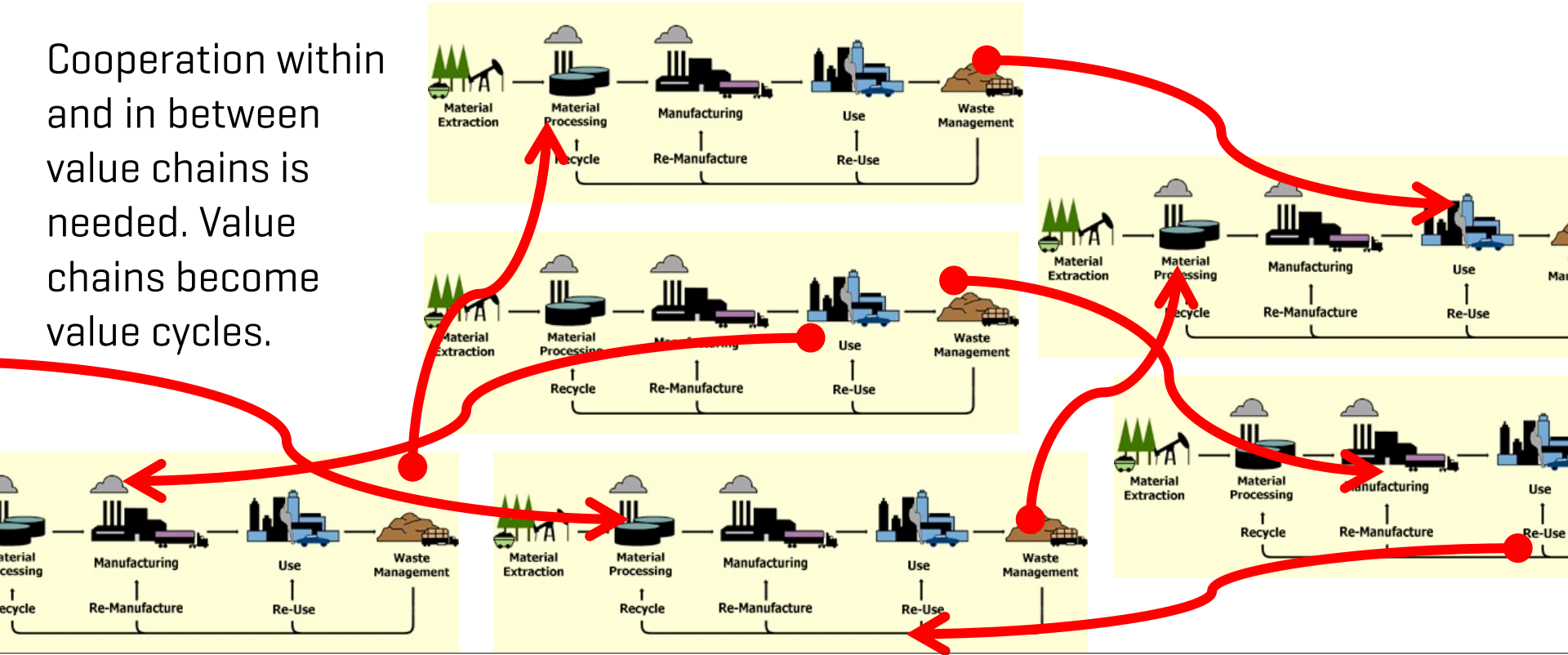
LIFE CYCLE DESIGN

Close the loops as much as possible in technical and / or natural systems.



LIFE CYCLE DESIGN

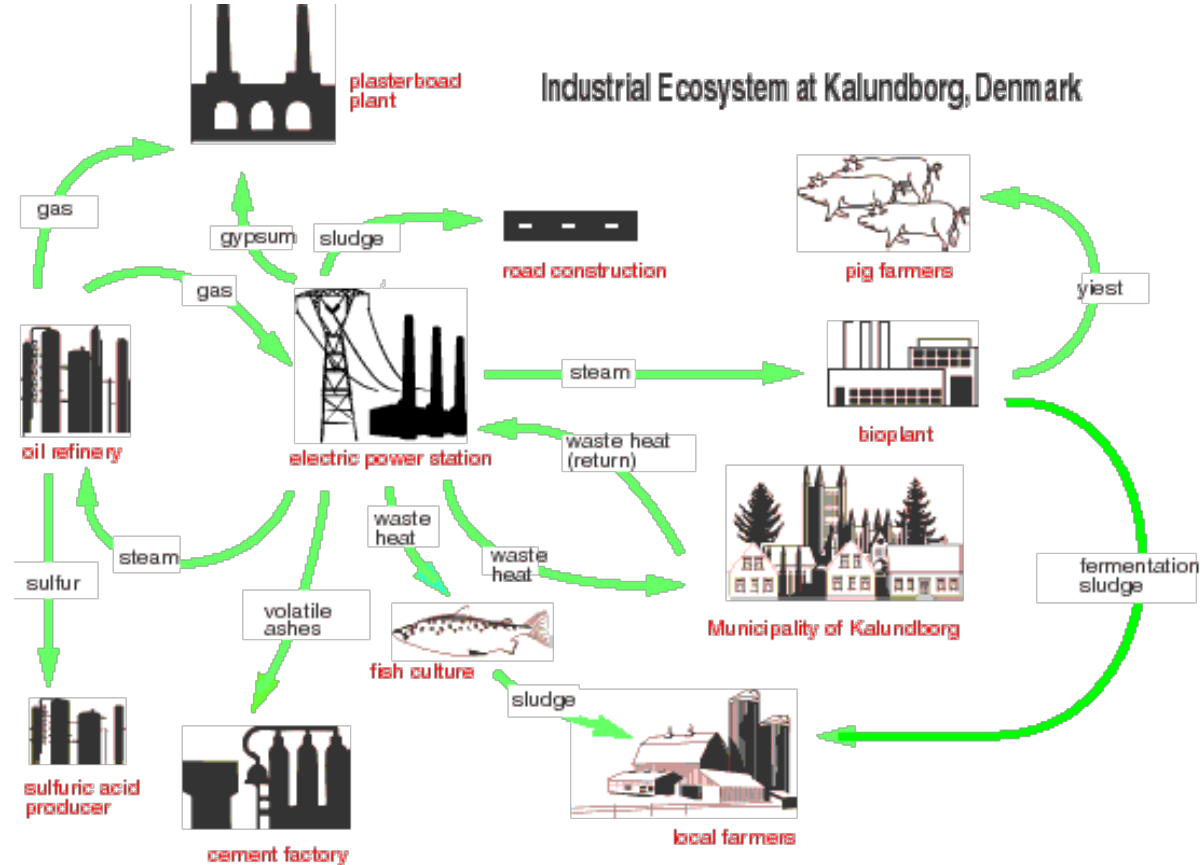
Cooperation within and in between value chains is needed. Value chains become value cycles.



INDUSTRIAL ECOLOGY SYSTEMS

Erleichtert durch
Digitalisierung / IoT /
Industry 4.0:

Marktteilnehmer wissen,
wo Produkte, Komponenten
und Materialien sind, in
welchem Zustand sie sich
befinden und wann sie für
eine nächste Anwendung
zur Verfügung stehen.



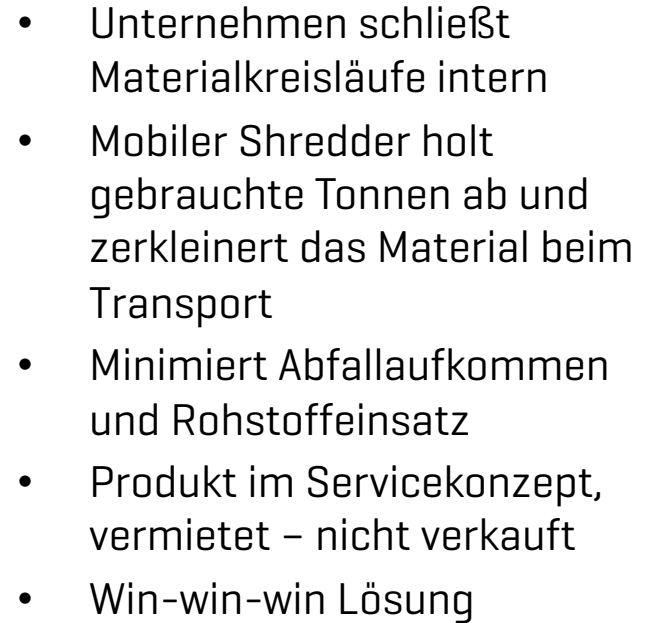
CIRCULAR DESIGN PROJECTS

Fast Food Packaging made from potato flour that you can eat, feed to animals or compost.

Adital Ela,
Design Academy Eindhoven



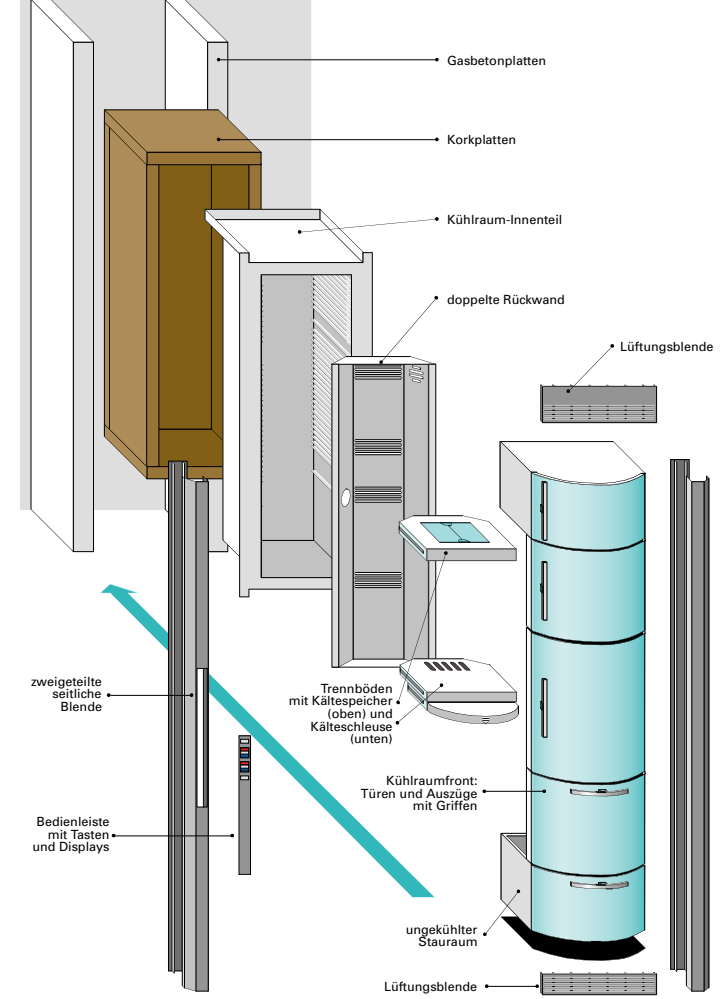
A circular diagram illustrating the ESE waste management process. The cycle includes: 1. Collection (waste bins), 2. Sorting (sorting plant), 3. Recycling (recycling facility), and 4. Energy recovery (incineration plant). The cycle is represented by a green ring with white arrows indicating the flow. The background is a blue sky with clouds.



ECODESIGN PROJEKT FRIA

Umweltschonendes Kühlkonzept für den Haushalt:
In die Küche fest installierte Kühlkammer, die um
einen Faktor 4 effizienter ist als herkömmliche
Kühlschränke.

Design: Ursula Tischner



URBAN MINING / UPCYCLING

Upcycling-Design: 'Der Schweizer Offizier' / The Swiss Officer
Reststoffe systematisch als Rohstoffe nutzen



Students from Zürich University of the Arts



NEW CIRCULAR MATERIALS

nächster Round Table



e.g. 'Liquid Wood' / Arboform, made from saw dust, acts like thermoplastics



<https://www.tecnaro.de>



NEW CIRCULAR MATERIALS AND PROCESSES

e.g. 3D-printing of spare parts with recycled plastics, individualization, mass customization

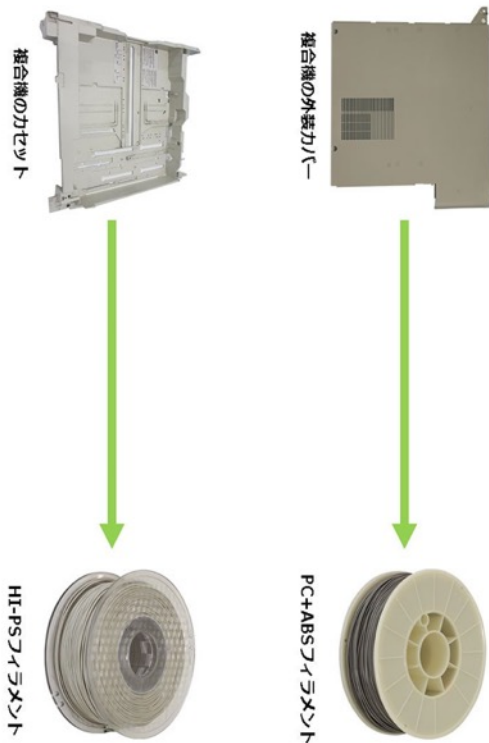
Porsche: 3D-printing spare parts for classic cars.

Canon Ecology Industry: produces 3D-printing filaments from used devices.

<https://www.porsche.com/uk/accessoriesandservice/classic/genuineparts/originalpartscatalogue/>
<https://global.canon/en/environment/circulation.html>

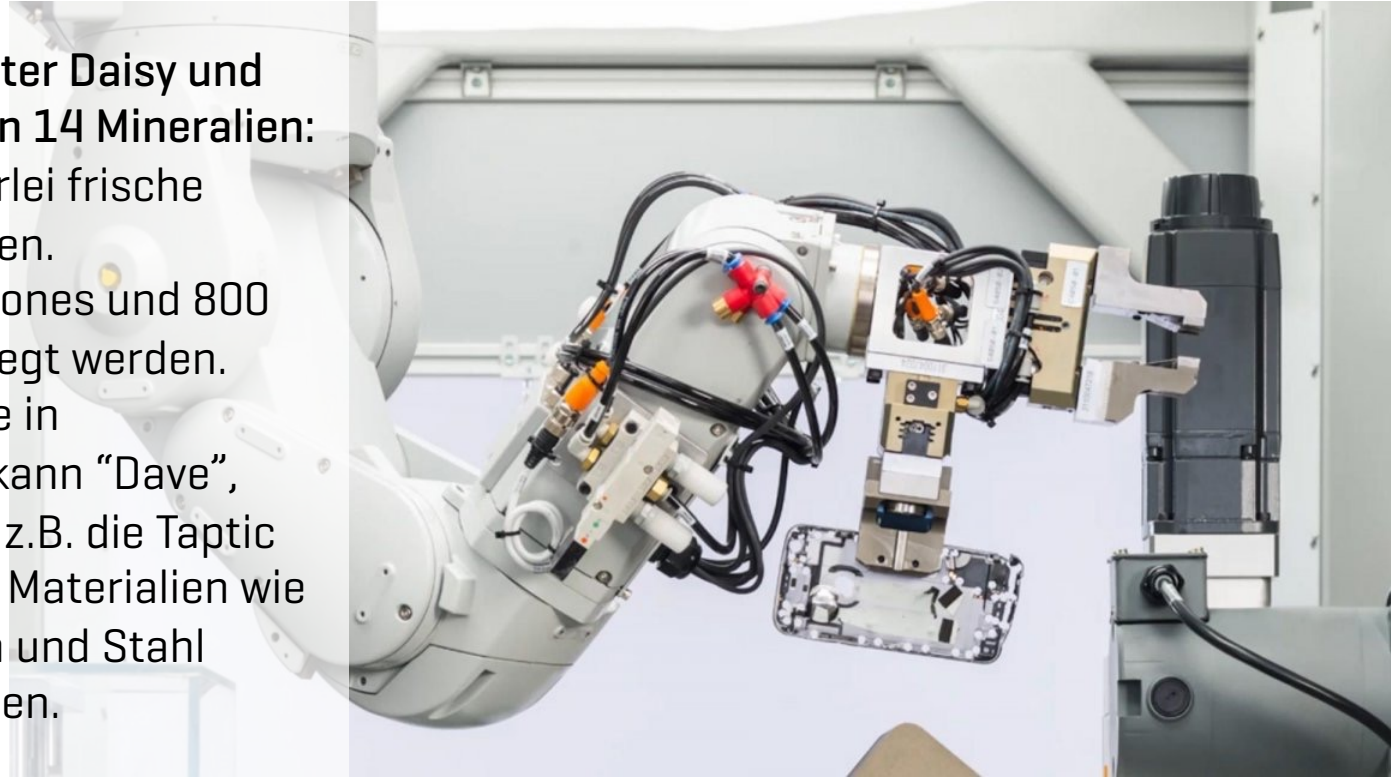


Porsche 3D prints multiple spare parts for its classic cars [Image credit: Porsche]



NEW DISASSEMBLY / RECYCLING TECHNOLOGIES

Apples Recycling-Roboter Daisy und Dave trennen iPhones in 14 Mineralien: Künftig will Apple keinerlei frische Rohstoffe mehr ankaufen. Derzeit können 200 iPhones und 800 Module pro Stunde zerlegt werden. Während "Daisy" Geräte in Komponenten zerlegt, kann "Dave", einzelne Komponenten z.B. die Taptic Engine verarbeiten, um Materialien wie Seltene Erden, Wolfram und Stahl besser wiederzugewinnen.

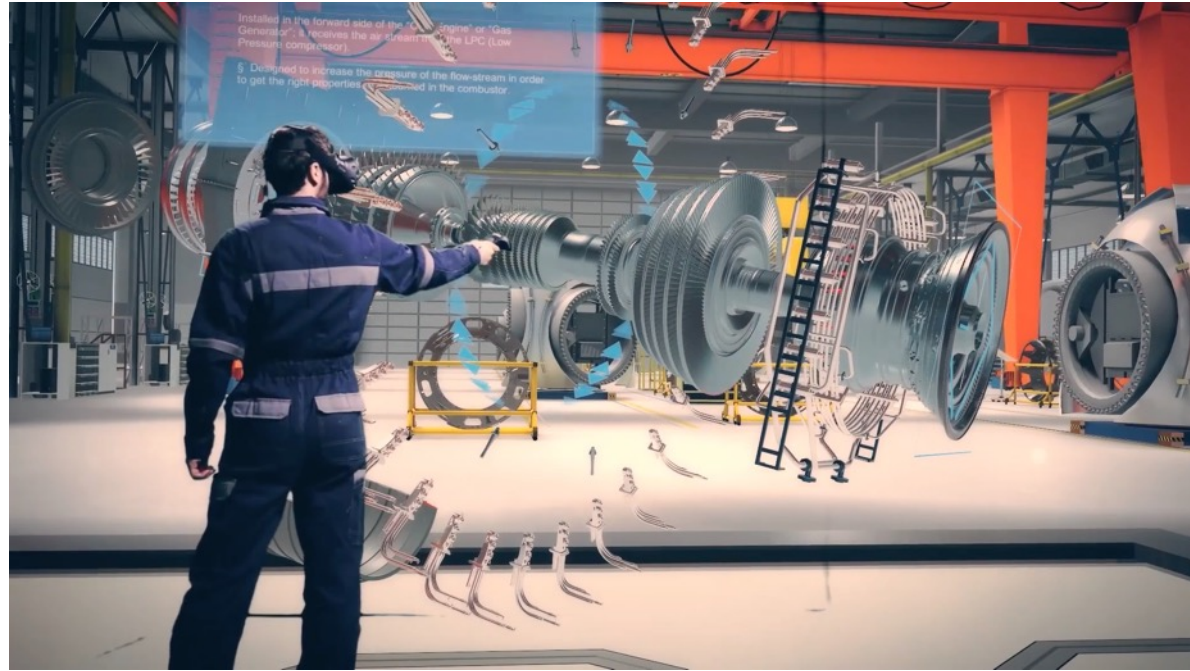


https://www.apple.com/environment/pdf/Apple_Environmental_Progress_Report_2020.pdf

DIGITALLY ASSISTED REPAIR, DISASSEMBLY, REMANUFACTURING, RECYCLING TECHNOLOGY

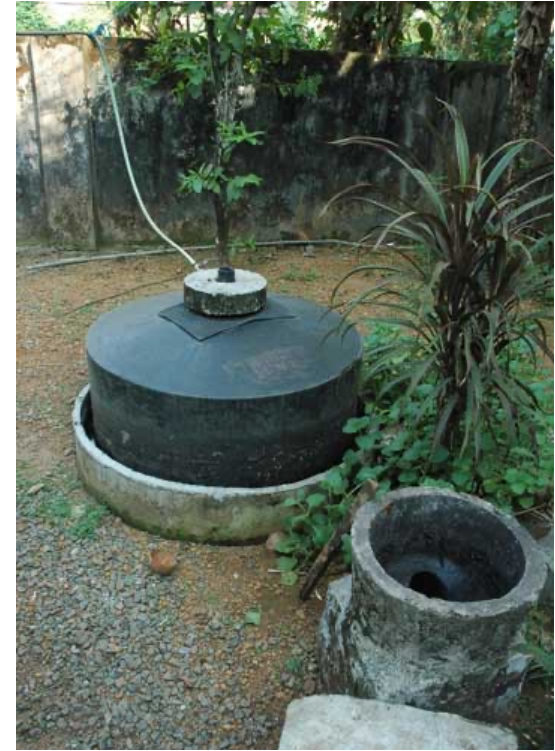
Virtual Reality,
Augmented Reality und
Artificial Intelligence
in Repair, Remanufacturing
and Recycling Technologies /
Digital Twins etc.

<https://www.turbomachinerymag.com/virtual-and-augmented-reality/>



HAS TO BE BASED ON RENEWABLE ENERGY

e.g. Biogas Systems



LANGLEBIGKEIT HAT HOHE PRIORITÄT

Stuhl von meiner Oma geerbt

Lebensdauer derzeit 84 Jahre

Ressourceneffizienzfaktor 10,5 [$10,5 * 8 = 84$]



Stuhl von meiner Mutter geerbt

Lebensdauer derzeit 64 Jahre

Ressourceneffizienzfaktor 8 [$8 * 8 = 64$]



Stuhl aktuell

Gesamte Lebensdauer geschätzt 8 Jahre

Ressourceneffizienzfaktor 1 [$8 * 1 = 8$]

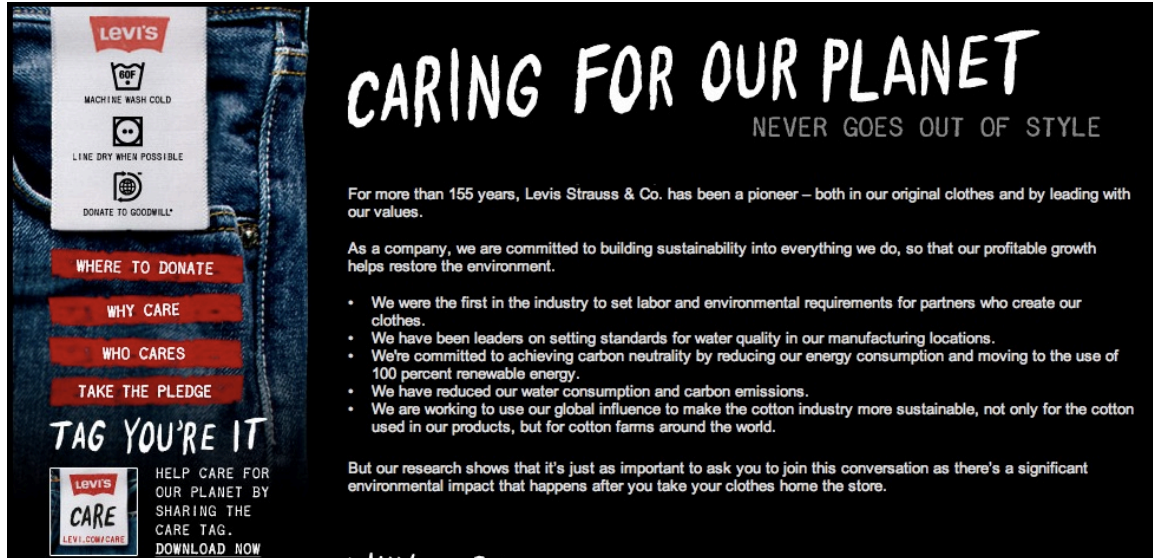


*Annahme ungefähr gleicher Ressourceneinsatz



GEBRAUCHSPHASE WICHTIG

Für die meisten Produkte mit Verbräuchen an Strom, Wasser, Reinigungsmitteln etc. erzeugt die Gebrauchsphase größte Umweltbelastungen: Kann man nachhaltigen Gebrauch designen?



Levi's
MACHINE WASH COLD
LINE DRY WHEN POSSIBLE
DONATE TO GOODWILL*

WHERE TO DONATE
WHY CARE
WHO CARES
TAKE THE PLEDGE

TAG YOU'RE IT

HELP CARE FOR OUR PLANET BY SHARING THE CARE TAG. DOWNLOAD NOW

CARING FOR OUR PLANET

NEVER GOES OUT OF STYLE

For more than 155 years, Levi Strauss & Co. has been a pioneer – both in our original clothes and by leading with our values.

As a company, we are committed to building sustainability into everything we do, so that our profitable growth helps restore the environment.

- We were the first in the industry to set labor and environmental requirements for partners who create our clothes.
- We have been leaders on setting standards for water quality in our manufacturing locations.
- We're committed to achieving carbon neutrality by reducing our energy consumption and moving to the use of 100 percent renewable energy.
- We have reduced our water consumption and carbon emissions.
- We are working to use our global influence to make the cotton industry more sustainable, not only for the cotton used in our products, but for cotton farms around the world.

But our research shows that it's just as important to ask you to join this conversation as there's a significant environmental impact that happens after you take your clothes home the store.



VERHALTEN DURCH DESIGN ÄNDERN



z.B. intelligente Stromzähler und Wasserspülungen,
Partizipatives / Co-Design

DESIGN INTERVENTIONEN

Nudging: Urinal

<http://www.urinalfly.com/>

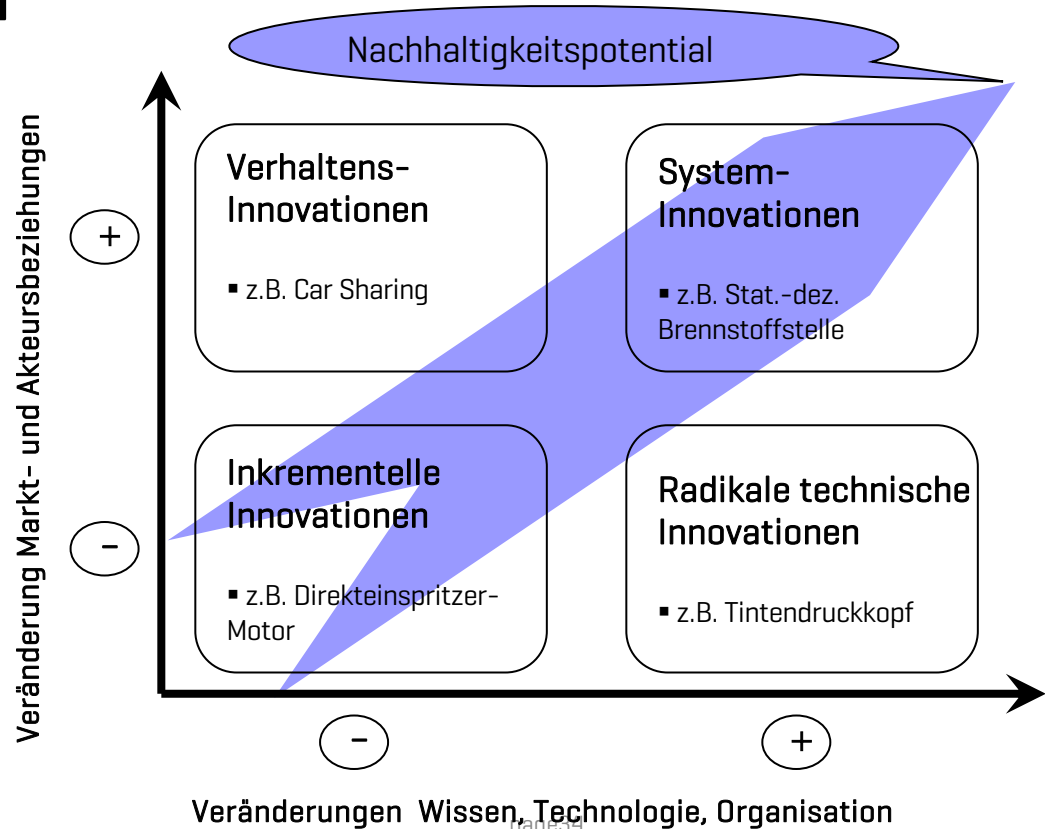


NACHHALTIGKEITSPOTENZIALE VON INNOVATIONSTYPEN

Verschiedene Innovationstypen haben i. d. R. unterschiedliche Nachhaltigkeitspotenziale.

Die größten Potenziale liegen in den Systeminnovationen, die sowohl mit technologischen und organisatorischen wie auch mit Markt-, Akteurs- und Verhaltensänderungen einher gehen. Gleiches gilt für PSS.

Tischner, U./Scholl, G. [2004]: Nachhaltige Produkt-Dienstleistungssysteme, in: Umwelt-Wirtschafts-Forum, Ausgabe 1/2004



SYSTEM INNOVATION: ENERGY

Winfried Werthmann,
Chris Goetze,
FH JOANNEUM



Altes Firmenlogo



Gründer mit Veranschaulichungsmodell

Start Up from Technical University Graz

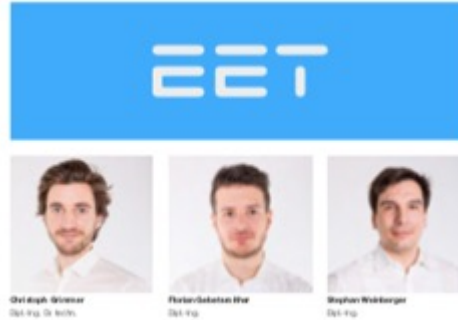
Cooperation with 2 Master Students from Master
Eco-innovative Design, FH JOANNEUM Graz

Master students designed Product, Branding,
Communication and App.



SYSTEM INNOVATION: ENERGY

Winfried Werthmann,
Chris Goetze,
FH JOANNEUM



Olaf d'Agli, Gründer
EET-ING, DE, Berlin

Florian Sebastian Hüb
EET-ING

Stephan Weidinger
EET-ING

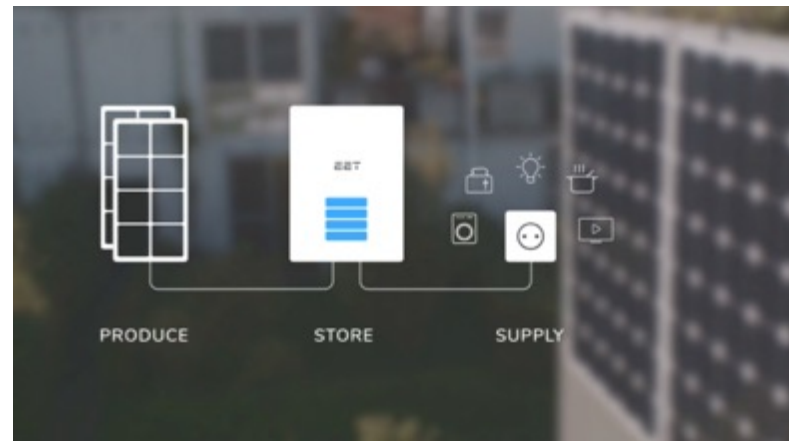
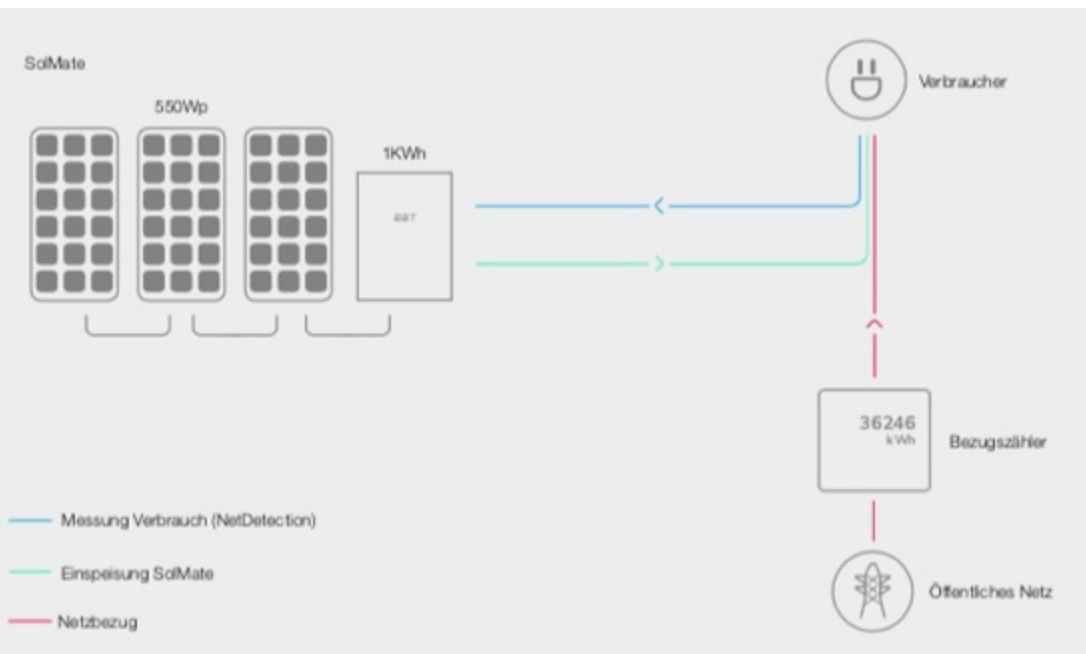


<https://www.kickstarter.com/projects/775226155/solmate-dein-grunes-kraftwerk-fur-zuhause>



SYSTEM INNOVATION: ENERGY

Winfried Werthmann,
Chris Goetze,
FH JOANNEUM



Production, storage and consumption of solar energy in rental apartments possible.

Plug and Play. No contract with energy companies necessary.

SYSTEM INNOVATION: ENERGY

Winfried Werthmann,
Chris Goetze,
FH JOANNEUM

Kickstarter Campaign
reached 205.143 €
from 155 backers.

Originally the start up
asked for 60.000 €.

Erkunden Starte ein Projekt



Suche Q Anmelden

SOLMATE – Dein grünes Kraftwerk für Zuhause



Das erste intelligente Photovoltaik-
und Speichersystem für den Balkon -
Einfach anstecken und selbst grünen
Strom produzieren!

Erstellt von

EET - Efficient Energy Technology

155 Unterstützer trugen 205.143 € bei, um
dieses Projekt zu verwirklichen.

INHALT



Warum

Gründe für
Ecodesign



Was

Ecodesign
Strategien

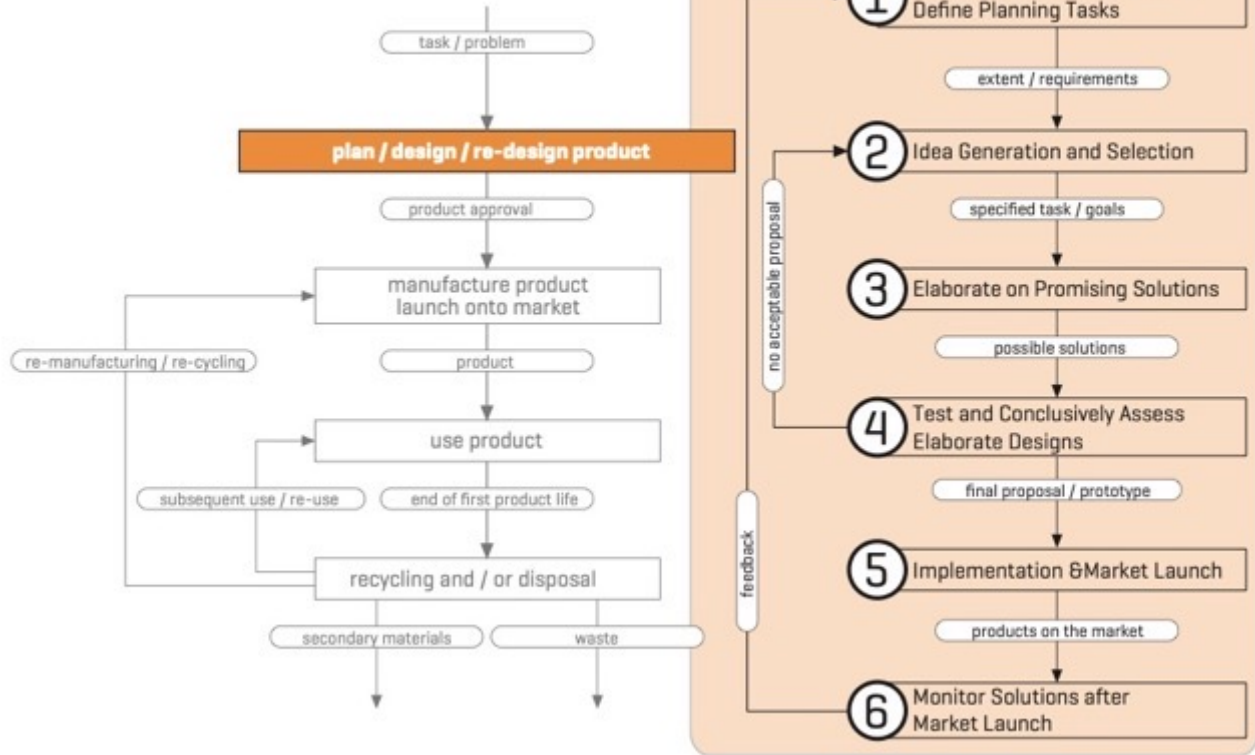


Wie

Methoden
und Tools

HOW TO DO IT

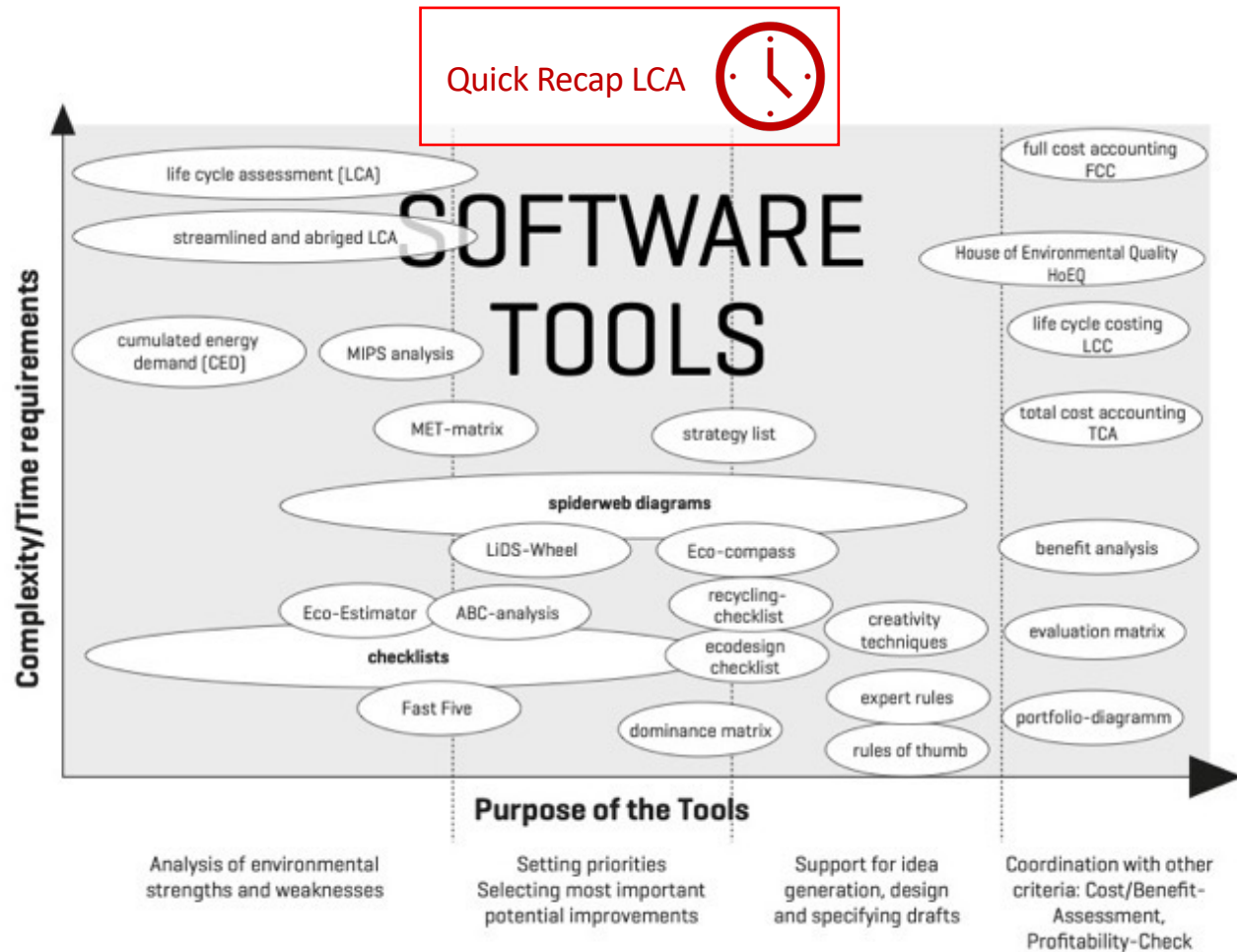
Generic Eco-Design Process, needs to be adapted to the specific company.



HOW TO DO IT

Many methods and tools available: from complex LCA to simple rules of thumb, from environmental to social and economic aspects.

Pragmatic choice of tools recommended:
Normally: [1] analysis, [2] guidance, [3] final evaluation.



TOOLS FOR LIFE CYCLE ASSESSMENT (LCA)

e.g. Ecolizer by OVAM

Analog and digital tool to calculate environmental impacts of products.

www.ecodesignlink.be/en/ecolizer-1



Ferrous metals	
Iron	01.01
Stainless steel	01.02
Steel	01.03
Ferrochrome	01.04
Ferronickel	01.05

Non-ferrous metals	
Aluminium	02.01
Bronze	02.02
Copper	02.03
Brass	02.04
Tin	02.05
Other	02.06

Plastics	
ABS	03.01
EVA	03.02
PA	03.03
PC	03.04
PE	03.05
PET	03.06
PMMA	03.07
PP	03.08
PS	03.09
PUR	03.10
PVC	03.11
SAN	03.12
Recycled plastics	03.13
Bioplastics	03.14
Composites	03.15
Rubber	03.16
Teflon	03.17

Wood	
Wood, untreated	04.01
Wood, layered	04.02
Wood, chipped	04.03

Paper and packaging	
Paper	05.01
Newsprint paper	05.02
Cardboard	05.03
Packaging glass	05.04
Paperboard packaging	05.05

Energy	
Electricity (voltage)	06.01
Electricity (according to extraction)	06.02
Heat	06.03

Transport	
Transport	07.01

Lighting and electronic components	
Lighting	08.01
Electronic components	08.02

Construction materials	
Concrete and cement	09.01
Plaster and chalk products	09.02
Brick and ceramics	09.03
Minerals	09.04
Insulation	09.05
Glass	09.06
Blockboard	09.07
Textile	09.08

Chemicals	
Paint and inks	10.01
Inorganic	10.02
Organic	10.03
Glues	10.04

Product or component: chair	Project: example 2		
Date: 2009	Author		
<i>A chair with a polypropylene (PP) seating and a plied stainless steel frame. The frame is connected to the seating by four stainless steel screws. The chair's life cycle is estimated at 15 years, but since it doesn't cause any impact during use, this is hardly relevant. There is no energy consumption involved and maintenance products are not required. Delivery per van to the customer averages out at 150 km. Recycling is always the preferred waste phase. We detailed both recycling and conventional waste treatment to show you the difference in environmental impact.</i>			
Data			
Polypropylene seating 2 kg - injection moulding Frame made from secondary stainless steel 3 kg - rolling - 20 cm bending 4 screws stainless steel 0.01 kg - milling transport per van <3.5 tonnes			
Production			
Material or process	Quantity kg	Indicator	Result
PP seating	2	276	552
injection moulding PP	2	126	252
Stainless steel primary	3,04	551	1675
Stainless steel plate rolling	3	59	177
Stainless steel bending	20 cm	2	40
Stainless steel milling	0,04	704	28
Subtotal			2724
Transport			
Process	Quantity kg	Indicator	Result
Total weight	5 Kg = 0,005 tonnes		
Van		186	
Transport distance	150 Km -> 0,75 tkm		
subtotal			140
Disposal			
Material and type disposal	Quantity kg	Indicator	Result
Recycling option			
Recycling polypropylene	2	-251	-502
Recycling stainless steel	3	-475	-1425
Total for option 1: recycling			937
Waste treatment option			
PP scenario			
waste treatment in EU	2	36	72
Stainless steel scenario			
waste treatment in EU	3	26	78
Total for option 2: waste treatment in EU			3014

TOOLS FOR LCA

Sustainable Minds: Online Tool for averaged Life Cycle Assessments. www.sustainableminds.com

 Sustainable Minds®

Welcome, Ursula Tiechner
My Account | Logout

HomeProjectsLearning Center

vase

OverviewAssessment goalsAssessment scopeConcepts

This project uses the SM2009 methodology (Okala) for impact factor scores and results. You can update this project to SM2011. [Learn more >](#)

Functional unit: 1 year of using the vase

Create a new Concept +

	Impacts / functional unit mPts/func unit	CO ₂ eq. kg / functional unit CO ₂ eq. kg/func unit	Performance improvement from reference mPts	Performance improvement from reference %	Units of svc delivered Svc. Units	Assessment type
Reference, Lowest impact  porcelaine vase Copy Declare as: Final	0.037	0.063			8	Estimate
 bio-plastics vase Copy Delete Declare as: Reference Final	16	0.96	-16	-4.2x10 ⁴ %	1	Estimate

Impacts per functional unit

Total amount of service delivered
Impacts of total service delivered
Assessment level

Greatest Impacts

SBOM input
Impact category
Life cycle stage

Total impacts by impact category

0.037 mPts per 1 year of using the vase

8 x 1 year of using the vase
0.30 mPts
Estimate

Ceramics
Human Toxicity
Manufacturing



Impact category	%
Ecological damage	
Acidification	0.2
Ecotoxicity	36.79
Global Warming	2.42
Ozone Depletion	0
Water Eutrophication	0.1
Resource depletion	
Fossil Fuel	0.13
Human health damage	
Human Respiratory	0.03
Human Carcinogens	20.8
Human Toxicity	39.36
Smog	0.17

WAS NUTZT DIE LCA?

Aufgabe: Einen besseren Becher für ein großes Fast Food Unternehmen gestalten.

Schritt 1:
Benchmarking
mit Wettbewerb

Expanded Polystyrene [EPS] cup,
Polypropylene [PP] cup,
double wall paper cup lined with PLA [DWPC PLA],
double wall paper cup lined with PLA with PCW
paper sleeve [DWPC PLA S],
Polylactic acid cup[PLA].

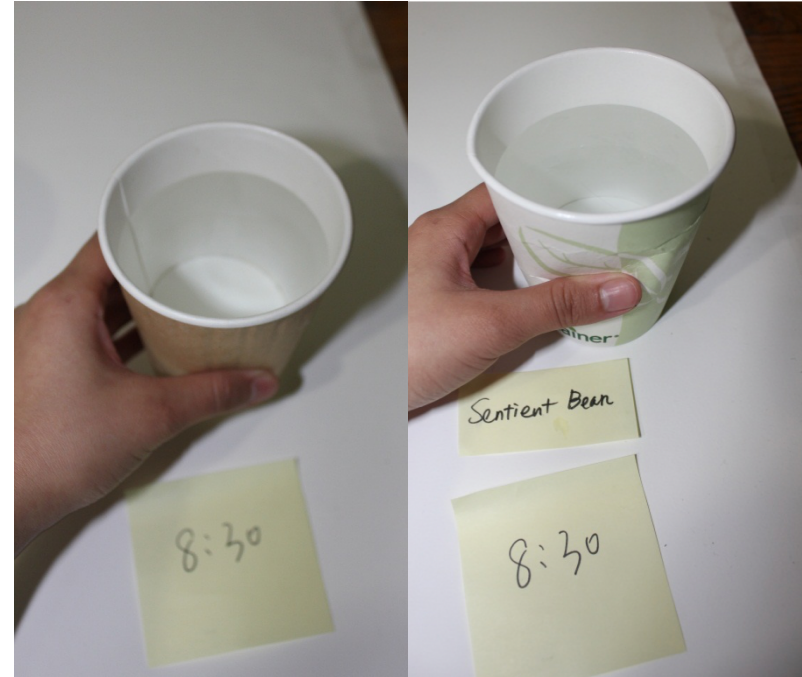
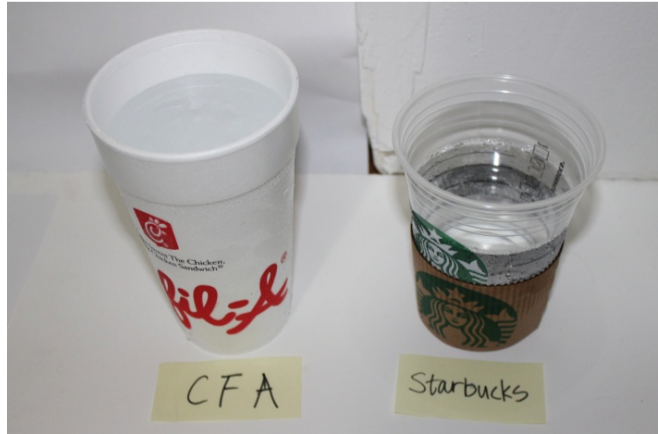


WAS NUTZT DIE LCA?

Aufgabe: Einen besseren Becher für ein großes Fast Food Unternehmen gestalten.

Schritt 2:

Bewertung aller
Becher durch
Nutzungstests
und LCA



WAS NUTZT DIE LCA?

Referenz: PS Becher/Müllverbrennung

Reference

Polystyrene Cup - Incineration



0.24 mPts per
1 time of use

1 x 1 time of use
.24 mPts
Calculation

Polystyrene, expandable (EPS)
Human Toxicity
Manufacturing



Impact category

Ecological damage

Acidification

Ecotoxicity

Global Warming

Ozone Depletion

Water Eutrophication

Resource depletion

Fossil Fuel

Human health damage

Human Respiratory

Human Carcinogens

Human Toxicity

Smog

PS Becher /
Recycling =
68% besser

Polystyrene Cup - Recycle



68% performance improvement

0.077 mPts per
1 time of use

1 x 1 time of use
.077 mPts
Calculation

Polystyrene, expandable (EPS)
Ecotoxicity
Manufacturing



Impact category

Ecological damage

Acidification

Ecotoxicity

Global Warming

Ozone Depletion

Water Eutrophication

Resource depletion

Fossil Fuel

Human health damage

Human Respiratory

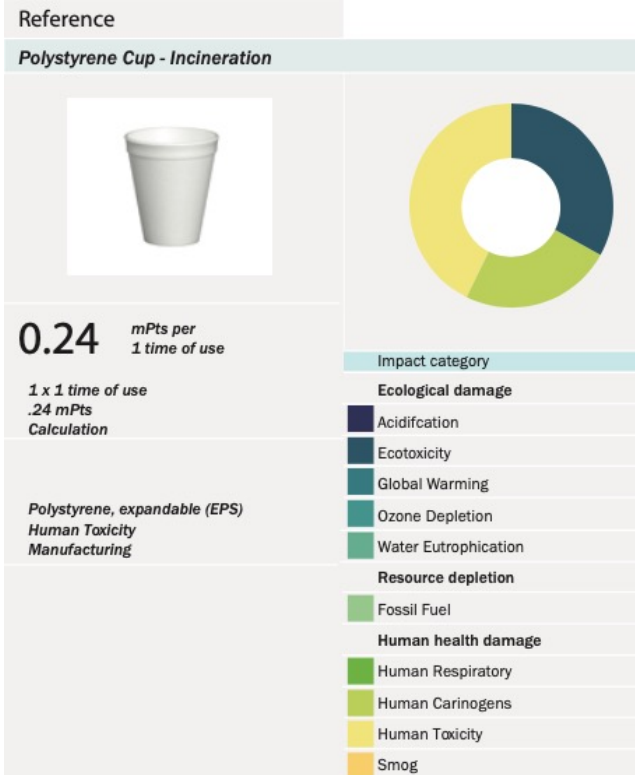
Human Carcinogens

Human Toxicity

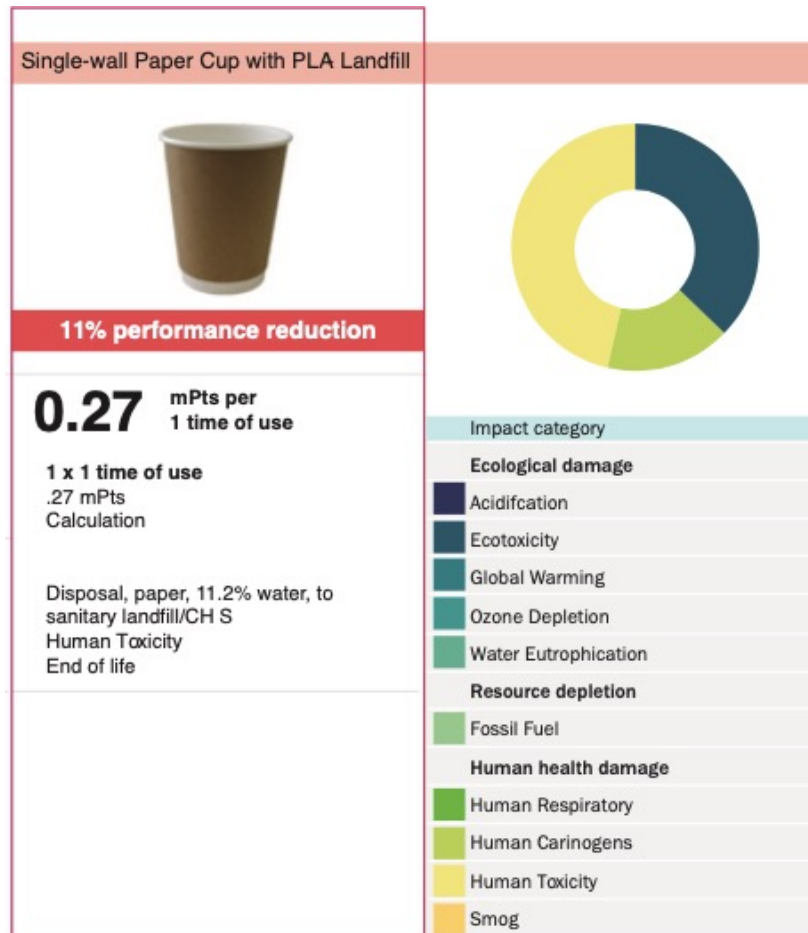
Smog

WAS NUTZT DIE LCA?

Referenz: PS Becher/Müllverbrennung

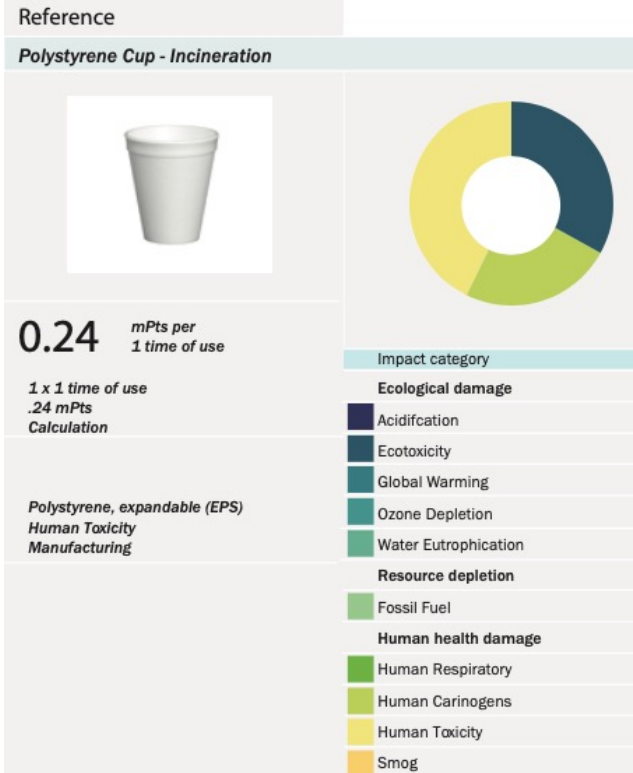


Papier Becher/
Landfill =
11%
schlechter

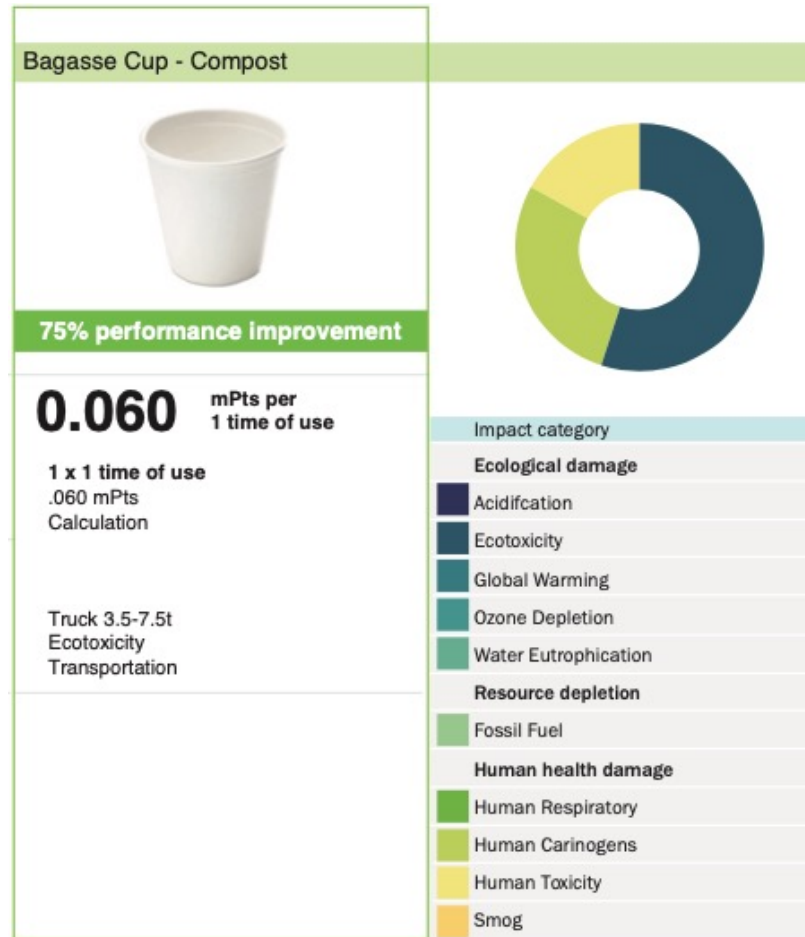


WAS NUTZT DIE LCA?

Referenz: PS Becher/Müllverbrennung

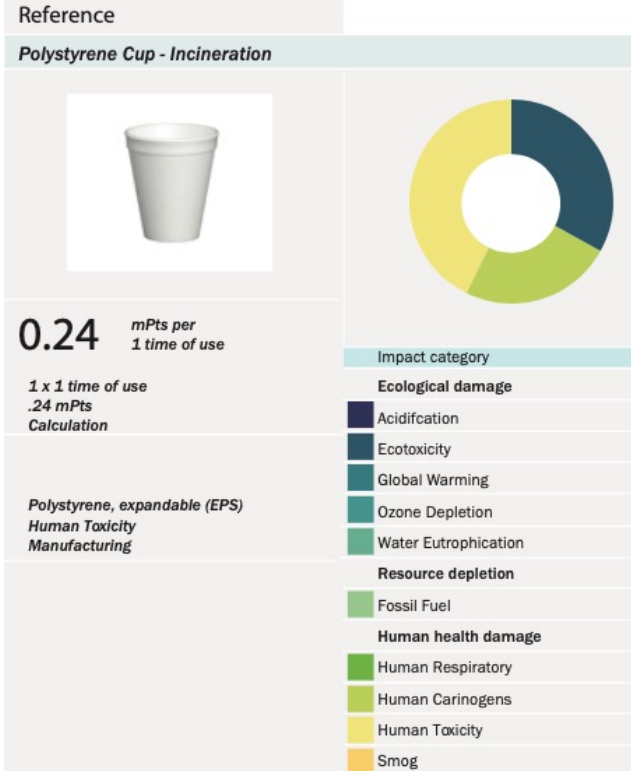


Bagasse Becher/
Kompost =
75% besser

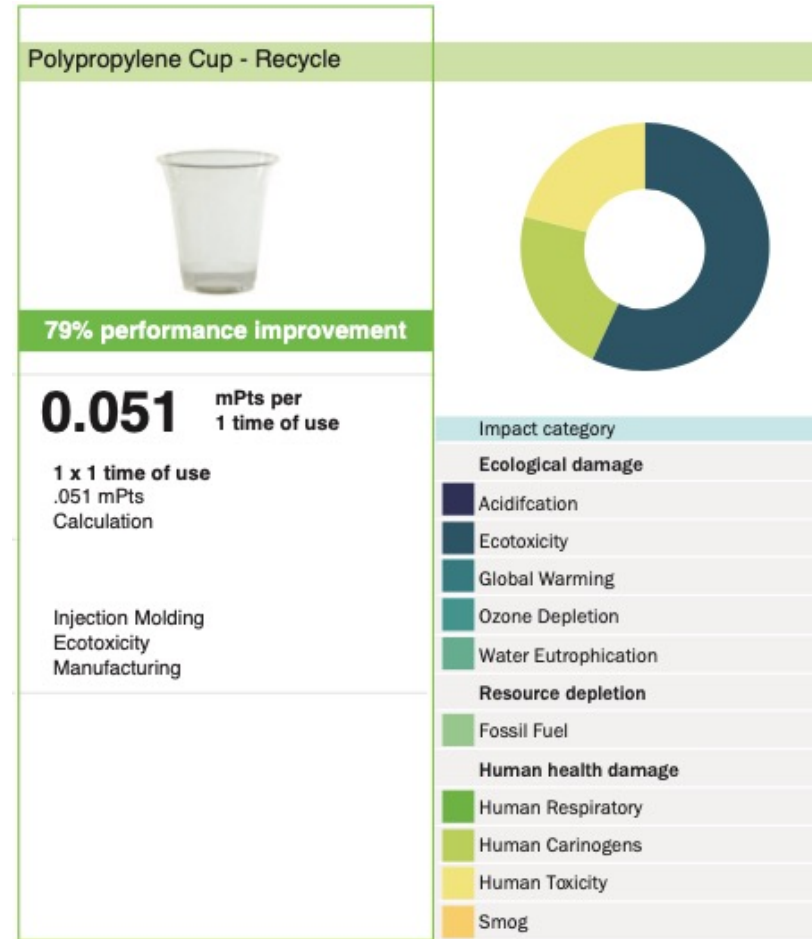


WAS NUTZT DIE LCA?

Referenz: PS Becher/Müllverbrennung



PP Becher/
Recycling =
79% besser



WAS NUTZT DIE LCA?

Lösung: Neuer Mehrweg Becher aus PP mit Rücknahme und Recycling System.
Sleeve besteht aus PP Rezyklat.

Design: Laura Schoenthaler



SHORTCUTS POSSIBLE BY DISTINGUISHING PRODUCT GROUPS



Energy using products



Moving products/ vehicles



Long lasting products



Consumption products

Carry out Sustainability Analysis for most important products. Formulate criteria and rules of thumb for design. Monitor progress, learn. Repeat analysis from time to time. Do benchmarking. Search for radical innovation in parallel.

SUSTAINABILITY SYSTEM ANALYSIS

e.g. with the
Sustainability Strength –
Weaknesses –
Opportunities – Threats
Analysis [S-SWOT].
Identify Windows of
Opportunities.

SWOT	Current Situation		Future Situation	
	Strengths	Weaknesses	Opportunities	Threats
Environment				
Society/ social-ethical				
Economy - for the company - for the customer				
Technology				
Legislation				

BIOMIMICRY/BIONIK

Von der Natur lernen für technische und organisatorische Effizienz-Innovationen, z.B. Leichtbau, Lotus Effekt, aerodynamische Prinzipien und Formen (Kofferfisch)



How would Nature get water in the desert?

Bumps on the back of the namib desert beetle collect and condense fog into water. When the beetle lifts its hind legs, the water rolls into its mouth. Humans have mimicked this to create panels that harvest water without drilling beneath the surface.



z.B. <https://asknature.org>

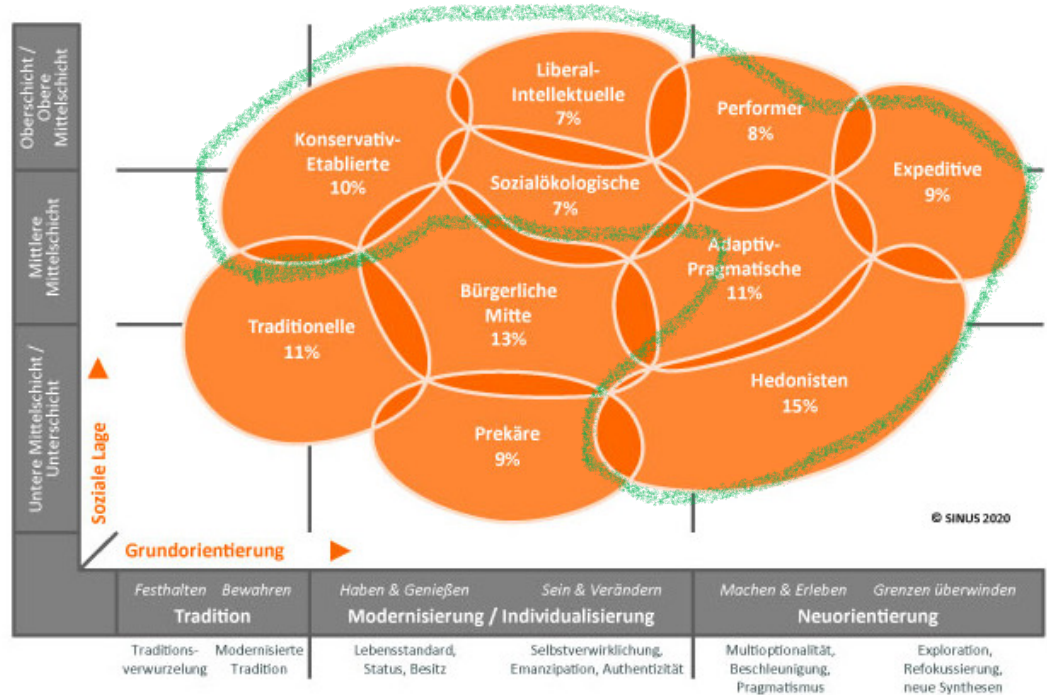
ANALYSING TARGET GROUPS

e.g. Sinus Lifestyle Groups.
Which are potential target groups and what are their sustainability values and expectations?

Focus e.g. on LOHAS and first movers.

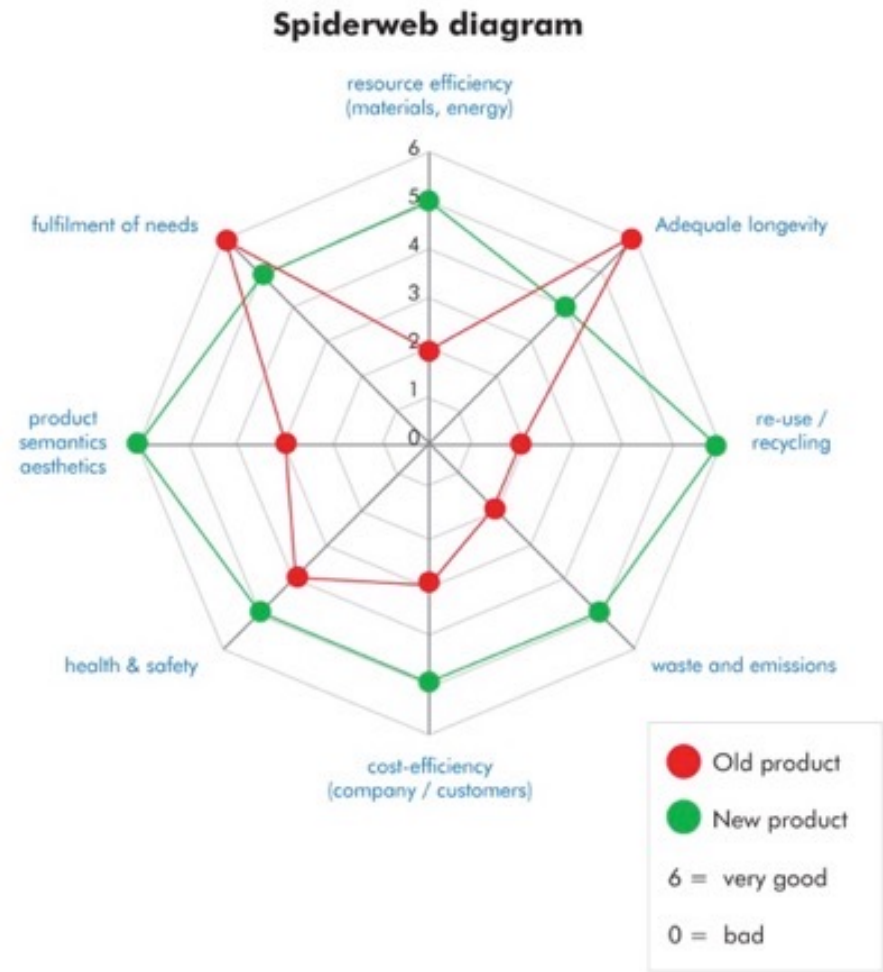
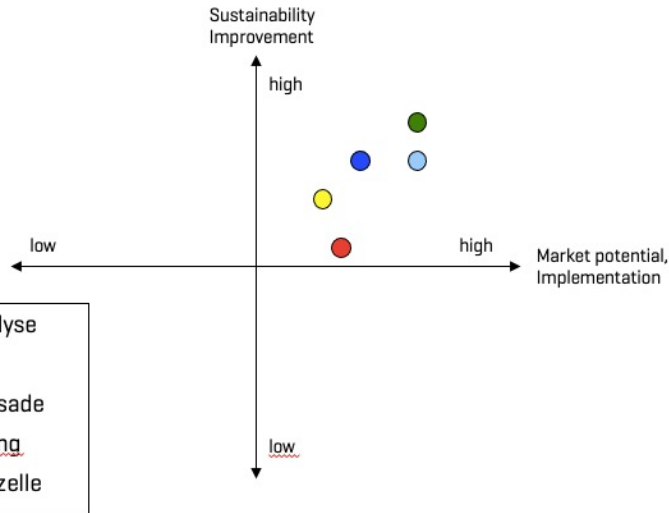
Quelle: <https://www.sinus-institut.de/sinus-loesungen/sinus-milieus-deutschland/>

Die Sinus-Milieus® in Deutschland 2020 Soziale Lage und Grundorientierung



EVALUATE AND COMPARE SOLUTIONS

e.g. with Spider Web Diagram,
Sustainability-Portfolio or
Balanced Score Card.



SIMPLE GUIDANCE AND CHECKLISTS

e.g. econcept's life cycle
wide Eco-Design Checklist

To support designers in the
design process when there
is little time.

Qualitative evaluation with
lower complexity compared
to LCA.

Can also be used as
guidance in the design
process.

Please mark the appropriate values: + = good solution, +/- = indifferent, - = bad solution, 0 = not relevant

Reuse/Recycling (closing technical material and energy cycles)

	+	+/-	-	0	remarks:
• recycling strategy in place?					
• guarantee for take back in place?					
• re-use of the complete product (e.g. second-hand, recycling cascade)					
• recycling of components (e.g. upgrading, reuse of components)					
• recycling of materials					
• dismantling of products					
• separability of different materials					
• low diversity of materials					Lots of diverse parts
• low material and energy input for reuse/recycling					

Final Disposal

	+	+/-	-	0	remarks:
• compostable, fermentable products (closing biological cycles)					
• combustion characteristics					
• environmental aspects at deposition					

Result:

total value:	number of marks:	name the 8 most important criteria for improvement		personal remarks:
good solution	19	1. low diversity of materials	2. compostable fermentable products	
bad solution	7	3. environmental disposal	4. minimising material input	minimising size and material used
indifferent	24	5. possibilities of combination	6. environmental aspect at deposition	functional use and recycling
not relevant:	1	7. recyclable materials	8. minimising pre-consumer waste	

In case the requirements could not be met, the most important weak points (-) should be eliminated to improve the product

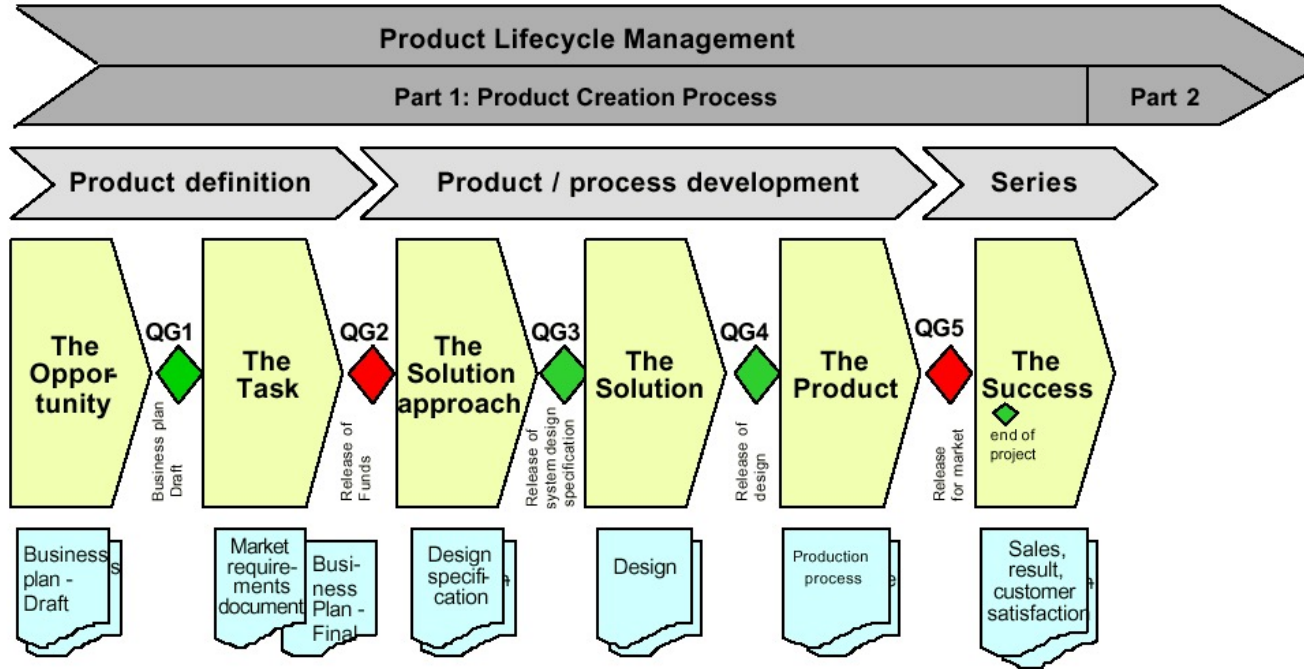
NACHHALTIGE MATERIALAUSWAHL

8 KRITERIEN ZUR MATERIALAUSWAHL

- 1 & 2 Verbrauch von Ressourcen und Energie
- 3 Gefährliche Substanzen, Emissionen
- 4 Herkunft und Transporte
- 5 Aspekte der Lebensdauer
- 6 Re-use, Recycling und Abfall
- 7 Biodiversität/Naturschutz
- 8 Soziale Aspekte

Material	CO ₂ equivalent in kg		Comment/ Source of Data	Hazardousness Classification: red = avoid, yellow = try to substitute, green = low/ no hazardousness			Scarce/S Critical/C
	per lb	per kg					
Ceramics							
Clay	0.016	0.035	Ecolinvent data			X	
Kaolin	0.099	0.218	Data used are from one single company in Europe. They are used here for an average dataset for RER (Europe).			X	
Concrete, generic	0.268	0.591	Average data of 11 German concrete plants			X	
Glass, flat, uncoated	0.274	0.604	Average data for European flat glas production			X	
Glass-packaging, brown	0.451	0.994	Average data for European situation, based on information from EU-IPPC BAT document about the glass industry Technology: Mix of present used technologies in Europe			X	
Glass-packaging, green	0.439	0.968	Average data for European situation, based on information from EU-IPPC BAT document about the glass industry Technology: Mix of present used technologies in Europe			X	
Glass-packaging, white	0.321	0.708	Average Swiss consumption situation Technology: Present situation in Switzerland			X	

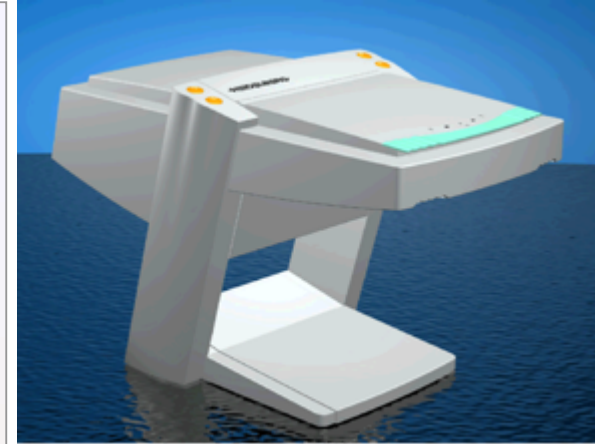
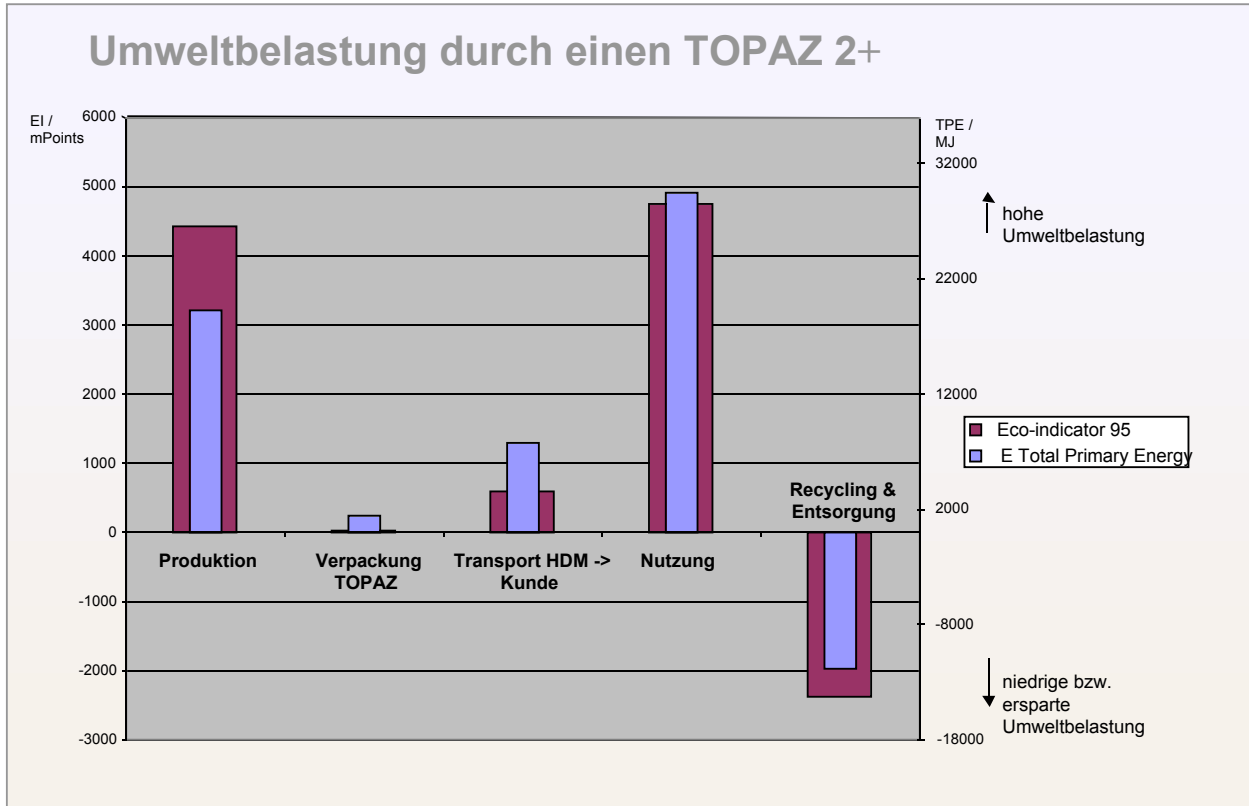
CASE STUDY: HEIDELBERGER DRUCKMASCHINEN



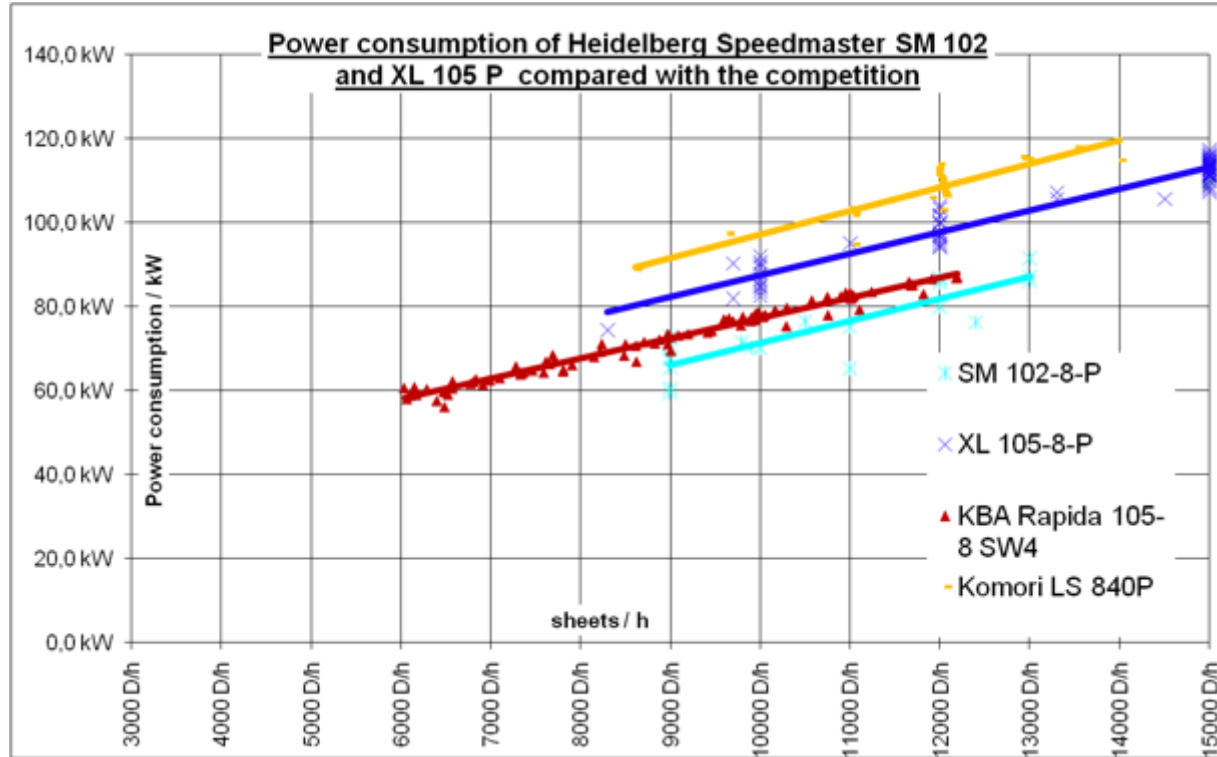
HEIDELBERG

- Ecodesign project over 3 years
- Life cycle assessments
- Revision of the products
- Environmental handbook for developers
- Integration into the company

LCA OF SCANNER TOPAZ



BENCHMARKING WITH COMPETITION



HEIDELBERG



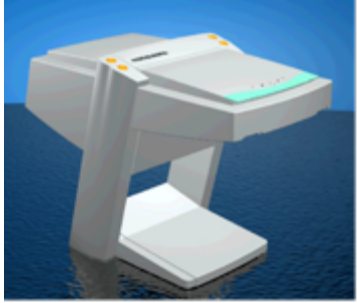
DISASSEMBLY & SUPPLIER STUDIES



HEIDELBERG



PILOT PROJECT FROM TOPAZ TO NEXSCAN



HEIDELBERG

- Energy consumption minus 20%
- No stand by energy consumption
- Material usage reduced from 150 to 90 kg
- Design for Recycling & Recycling Manual

INTERNAL TOOLS AND MEASURES

8 KRITERIEN ZUR MATERIALAUSWAHL

- 1 Materialien bevorzugen, die Verbrauch von Ressourcen inklusive Wasser und Fläche minimieren; erneuerbare Materialien bevorzugen, wo sinnvoll.
- 2 Energieeffizient hergestellte und mit erneuerbaren Energien hergestellte Materialien bevorzugen. Beispiel: Aluminium hat einen sehr hohen Energieverbrauch, aber in Norwegen wird dieser mit Wasserkraft gedeckt.
- 3 Materialien bevorzugen, die mit geringstmöglichen Schadstoffen und Emissionen verbunden sind.
- 4 Herkunft prüfen und wenn sinnvoll regional produzierte Materialien wählen; Transporte minimieren und nachhaltige Transportmittel bevorzugen.
- 5 Materialien wählen, deren Lebensdauer optimal für die erwartete/erwünschte Produktnutzung ist.
- 6 Kreislaufwirtschaftsfähige Materialien wählen, Re-Use bzw. Recycling maximieren und Abfall minimieren; wo sinnvoll kompostierbare Materialien verwenden.
- 7 Materialien wählen, die biologische Vielfalt vergrößern und Schutz von Naturgebieten fördern, z.B. solche, die keine Monokulturen benötigen, oder wertvolle Biotope zerstören.
- 8 Soziale Aspekte berücksichtigen, z.B. Arbeitsbedingungen bei Anbau und Gewinnung der Materialien.

- Checklists/Guidelines for material selection, disassembly-friendly design, batteries, packaging etc.
- ELIS: internal database for environmental and social laws and standards in all relevant markets
- Ecodesign Champion appointed
- Improved communication between environmental and design departments

INTERNAL AND EXTERNAL COMMUNICATION

WARUM?

Heute schon an morgen denken

Wir wollen auch langfristig den Unternehmenserfolg sichern. Dazu gehört, dass wir mit unserer Umwelt so schonend umgehen, dass wir unsere und die Existenz zukünftiger Generationen nicht gefährden. Die Heidelberger Druckmaschinen AG hat sich daher in ihren Unternehmensgrundsätzen verpflichtet, umweltverträgliche Lösungen für ihre Produkte anzubieten.



Einige gute Gründe dafür sind:

- 1. Bessere Qualität der Produkte und Marktchancen
- 2. Kostenreduktion für Unternehmen und Kunden durch Ressourcenschonung und Abfallvermeidung
- 3. Schutz der Umwelt und deren Ressourcen für kommende Generationen
- 4. Gesteigerte Kundenakzeptanz durch umweltverträgliche Produktion und Produkte
- 5. Schutz der Mitarbeiter vor gesundheitlicher Beeinträchtigung

HEIDELBERG
Umweltschutz

WAS?

Heute schon an morgen denken

Auf ein langes Leben!
Reparatur, Instandhaltung und Upgrading verlängern das Produktleben

Low energy – wichtig wie noch nie!
Minimieren Sie den Energieverbrauch vor allem im Gebrauch

Rote Karte für Gefahrstoffe!
Prüfen Sie die eingesetzten Stoffe mit der Gefahrstoffliste.

Heute schon ans abspucken gedacht?
Wie können Material- und Energieeinsatz noch weiter reduziert werden?

Erspar den Kunden Abfall!
Kundenfreundlich ist: Abfallvermeidung im Gebrauch und bei der Entsorgung

Recycling leicht gemacht!
Wählen Sie Materialien und Verbindungen nach ihrer Demontage- und Recyclinggerechtigkeit aus



HEIDELBERG
Umweltschutz

WIE?

Heute schon an morgen denken

- 1. Umweltentwicklungshandbuch und -leitlinien
- 2. Kommunikation mit Umweltfachleuten und anderen Experten sowie Information z.B. durch Intranet
- 3. Umweltanforderungen integriert in Quality Gates, Lasten- und Pflichtenheft
- 4. Mitarbeitermotivation und -schulung
- 5. Entsorgungsanweisung für Kunden



Umweltaspekte müssen wie selbstverständlich in die bestehenden Prozesse integriert werden, d.h. in der Planung den gesamten Lebenszyklus eines Produktes von der Herstellung bis zur Entsorgung betrachten und negative Umwelteinflüsse verhindern. Speziell für die Heidelberger Druckmaschinen AG entwickelte Leitlinien, Hilfsmittel und Vorgehensweisen unterstützen diesen Ansatz. Einige davon sind oben genannt.

HEIDELBERG
Umweltschutz

INTERNAL AND EXTERNAL COMMUNICATION

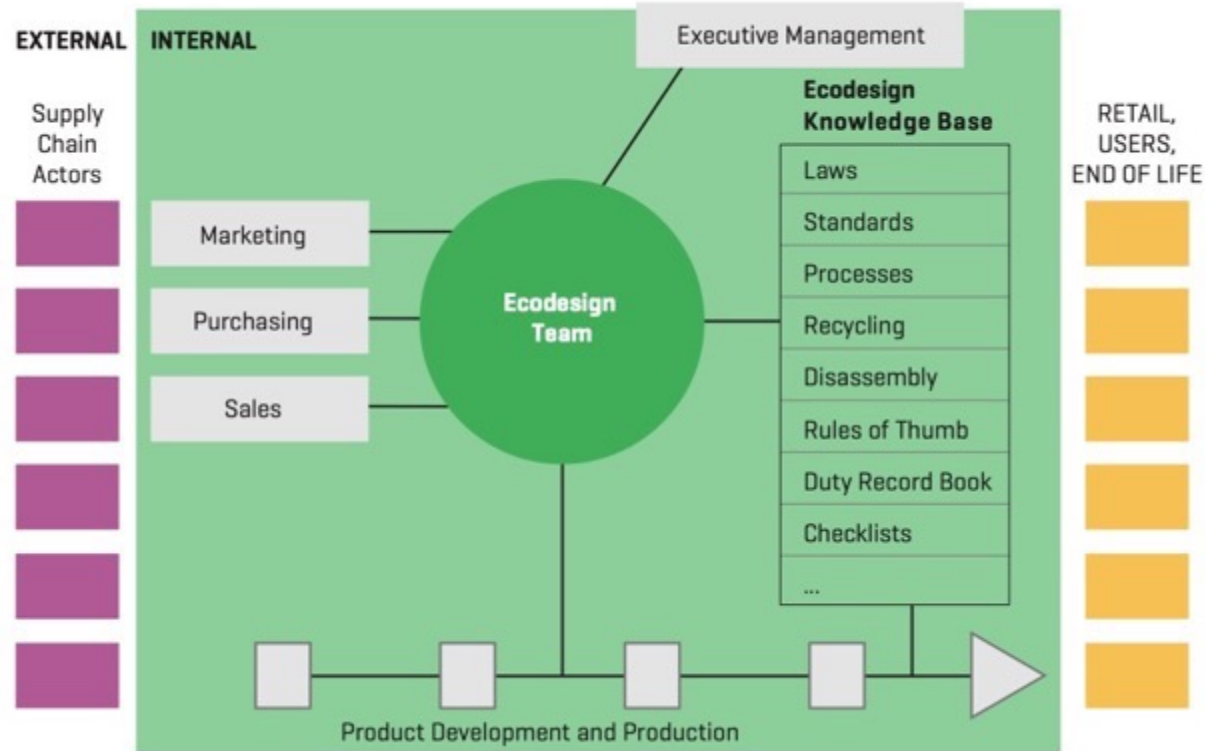


INTEGRATION INTO COMPANY ROUTINES

Breakout session



1. Analysieren, wo man steht
[Unternehmen und Produkte]
2. Ziele definieren [KPIs]
3. Ecodesign Team/ Champions
benennen, Tools auswählen und
spezifizieren
4. Pilotprojekte durchführen
5. Ergebnisse evaluieren
6. Vorgehensweise / Tools
systematisch und formell in die
Routinen integrieren, Training,
interne/externe Kommunikation



FURTHER READING

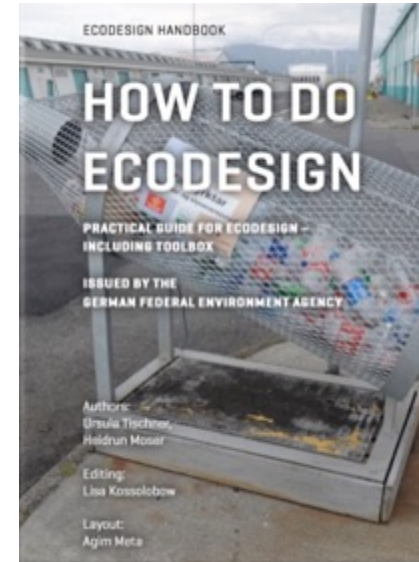
Download for free:
Changing Paradigms,
Stebbing/ Tischner for
Cumulus Association

[https://www.cumulusassociation.org/cha-
nging-paradigms-designing-for-a-
sustainable-future/](https://www.cumulusassociation.org/cha-
nging-paradigms-designing-for-a-
sustainable-future/)



How to do Ecodesign,
Tischner et al 2015, 2.
Edition, Download for free
iBook Store / UBA

[https://books.apple.com/de/book/how-
to-do-ecodesign/id1135764180](https://books.apple.com/de/book/how-
to-do-ecodesign/id1135764180)



CEID PUBLIKATIONEN

Circular Economy Initiative Deutschland

<https://www.circular-economy-initiative.de/publikationen>

Circular Business Models – Overcoming barriers, unleashing potentials



Executive Summary and
Recommendations

acatech, Circular Economy Initiative
Deutschland, SYSTEMIQ (Hrsg.)



Ressourcenschonende Batteriekreisläufe – mit Circular Economy die Elektromobilität antreiben



acatech, Circular Economy Initiative Deutschland,
SYSTEMIQ (Hrsg.)



Deutschland auf dem Weg zur Circular Economy



Erkenntnisse aus europäischen Strategien
Vorstudie

Thomas Weber und Martin Stuchtey (Hrsg.)



It can only be
sustainable,
if it also makes
business sense.

THANK YOU !

u.tischner@econcept.org

