

Cradle to Cradle und Prävention von Umweltkriminalität

von

Prof. Dr. Michael Braungart

Dokument aus der Internetdokumentation
des Deutschen Präventionstages www.praeventionstag.de
Herausgegeben von Hans-Jürgen Kerner und Erich Marks im Auftrag der
Deutschen Stiftung für Verbrechensverhütung und Straffälligenhilfe (DVS)

Zur Zitation:

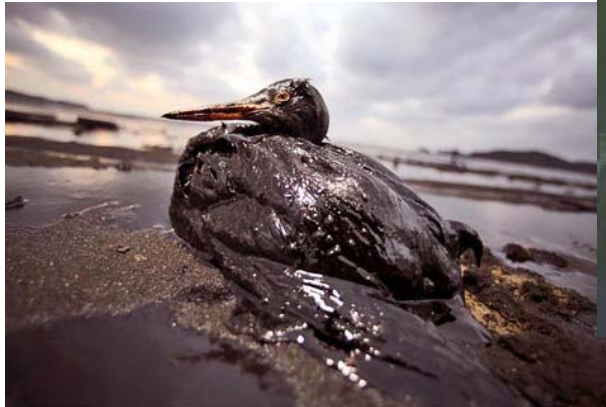
Michael Braungart: Cradle to Cradle und Prävention von Umweltkriminalität, in: Kerner, Hans-Jürgen u. Marks, Erich (Hrsg.), Internetdokumentation des Deutschen Präventionstages. Hannover 2010, www.praeventionstag.de/Dokumentation.cms/1293

CRADLE TO CRADLE® Design- 15. Deutscher Präventionstag

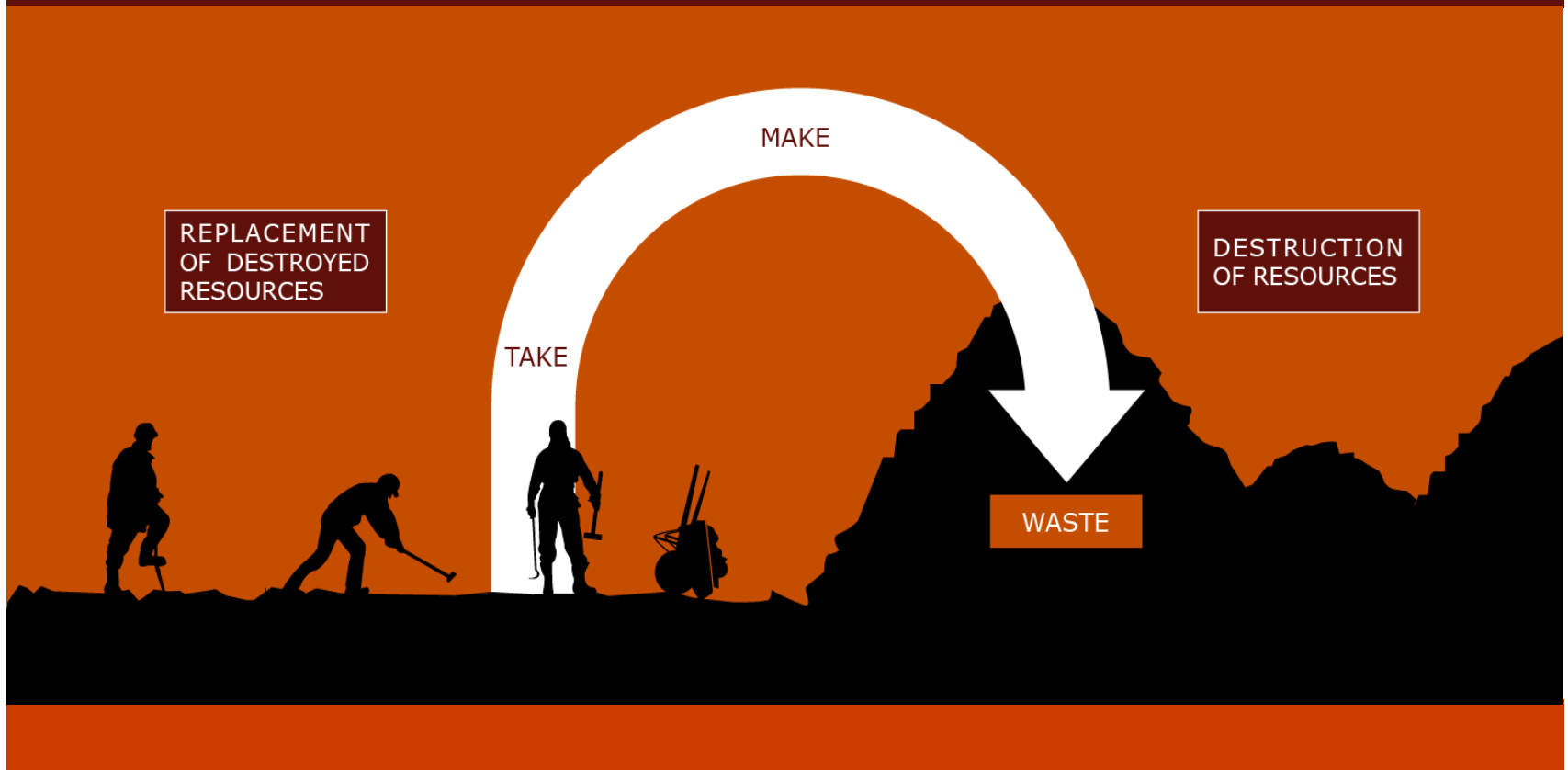
**Cradle to Cradle® und
Prävention von Umweltkriminalität**

**Prof. Dr. Michael Braungart
Berlin, Deutschland
11.05.2010**

**Das ist Erdöl:
British Petroleum**



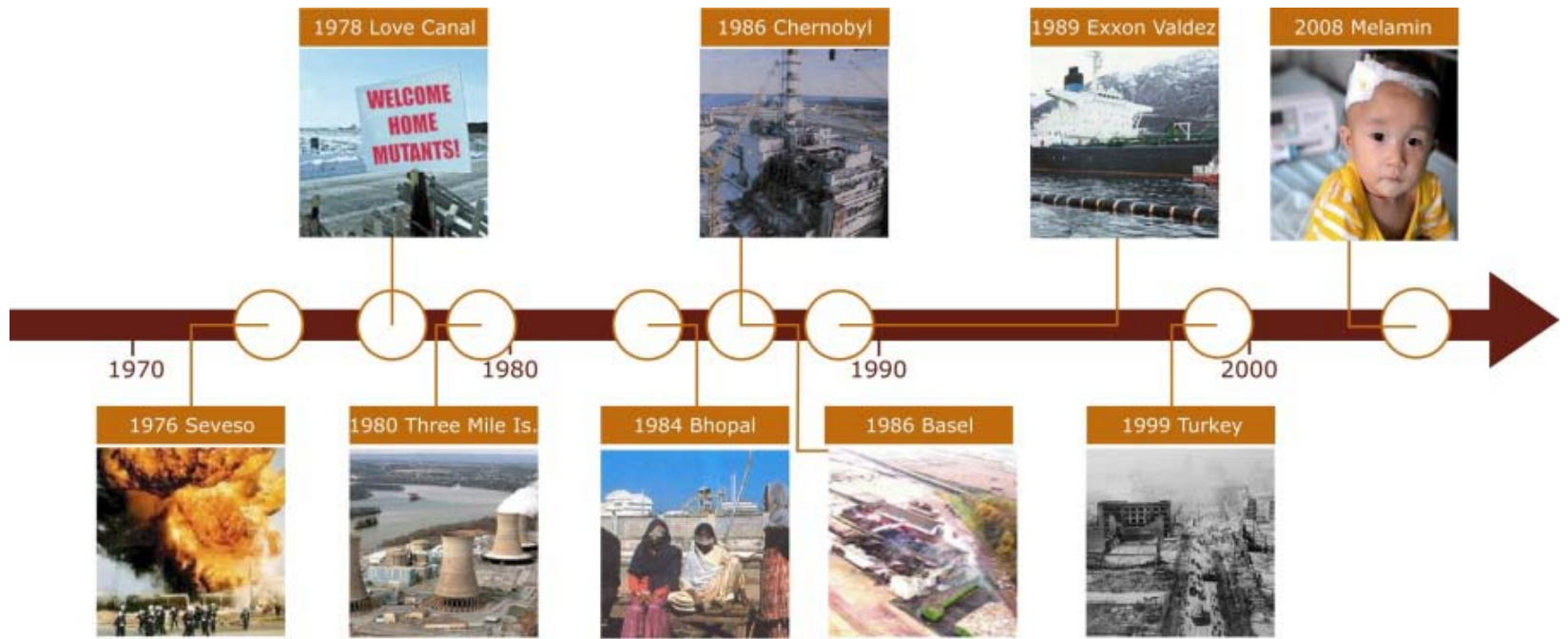
CRADLE TO GRAVE DESIGN PARADIGMA



CRADLE TO GRAVE DESIGN PARADIGMA (VON DER WIEGE ZUR BAHRE)



UMWELTDESASTER



UMWELT KATASTROPHEN





M.GEORGIU



M.GEORGIU

Approximate areas of 'rubbish soup'

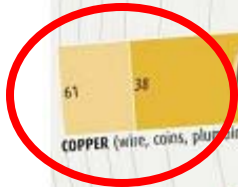
Translucent soup of degrading plastic waste

Depth to 10 metres



ALBATROSSE AUF DER INSEL MIDWAY, ZENTRALPAZIFIK





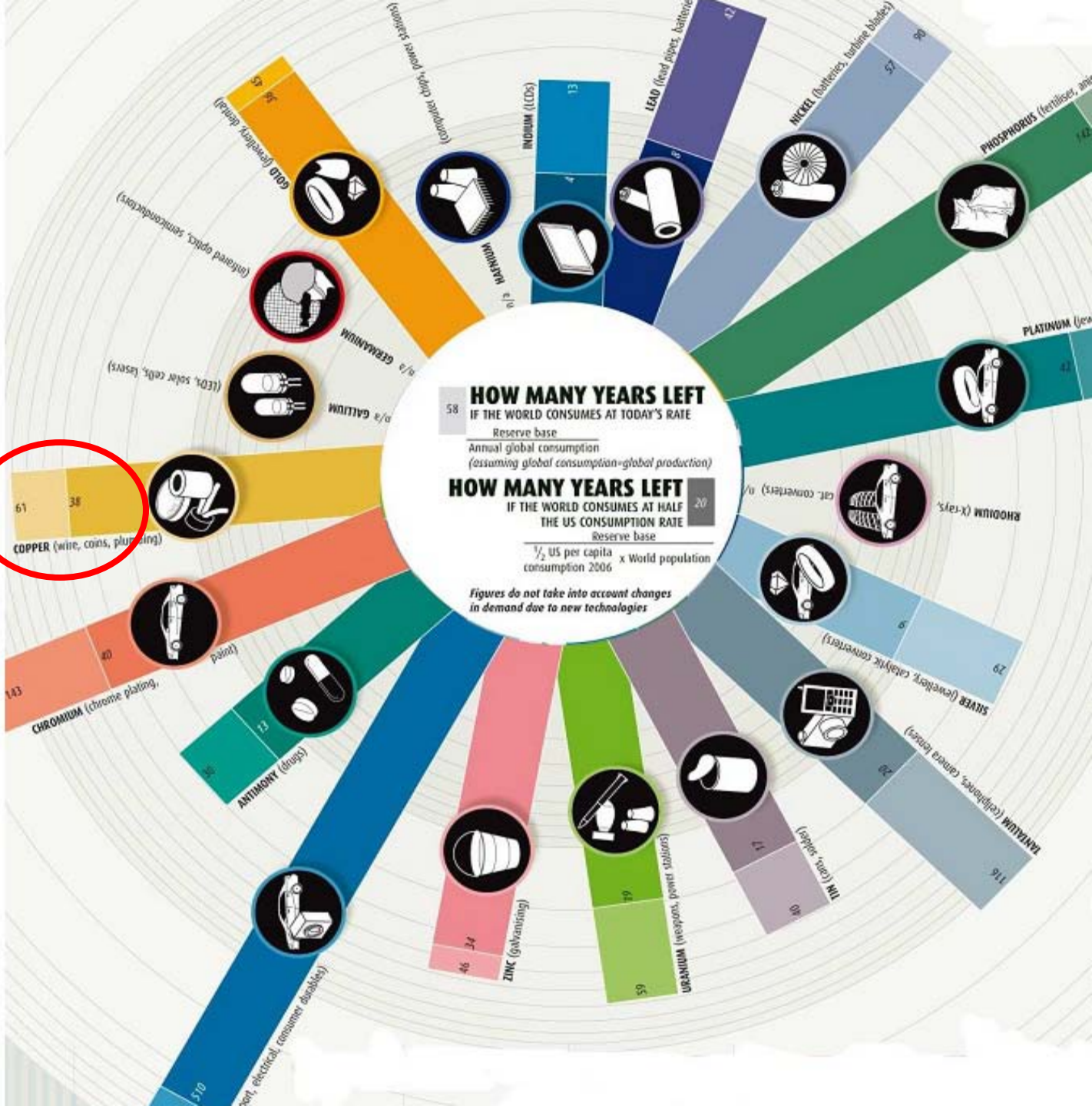
HOW MANY YEARS LEFT
 IF THE WORLD CONSUMES AT TODAY'S RATE

Reserve base
 Annual global consumption
 (assuming global consumption=global production)

HOW MANY YEARS LEFT
 IF THE WORLD CONSUMES AT HALF
 THE US CONSUMPTION RATE

Reserve base
 $\frac{1}{2}$ US per capita x World population
 consumption 2006

*Figures do not take into account changes
 in demand due to new technologies*



KOSTBARE SCHLACKE AUS DER MÜLLVERBRENNUNG



- Verbrennungsschlacke enthält **13.000 T/a** an Kupfer (Durchschnitt BRD)
- Der Wert beläuft sich auf **€ 100 Millionen pro Jahr** (Preisrate 2010)

URBAN MINING: HOHER KUPFERGEHALT IM URBANEN BODEN

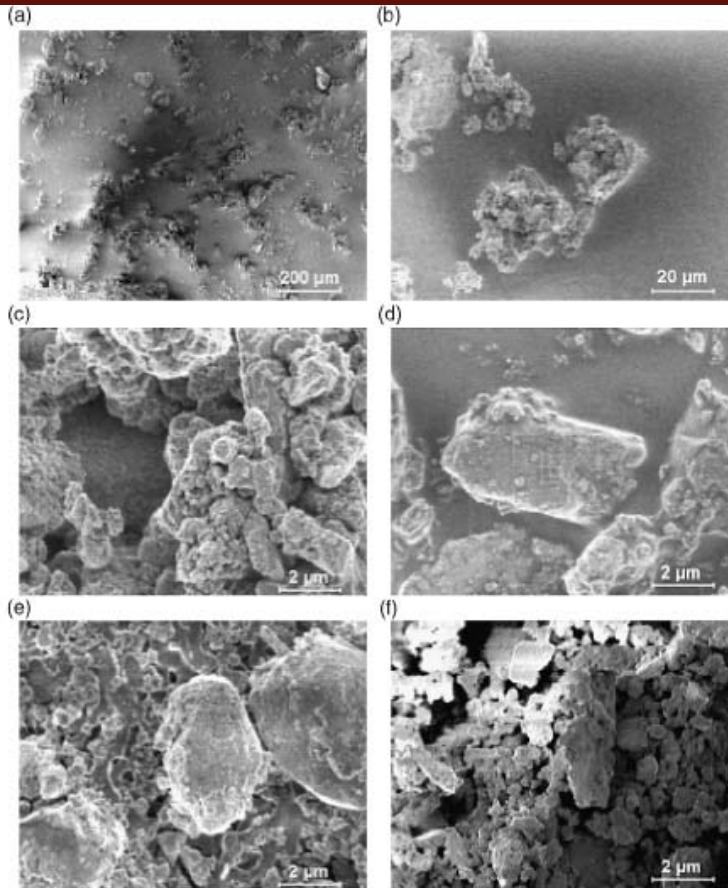




**GREEN
DESIGN**



ASBEST-FREIE BREMSKLÖTZE



EINE LÖSUNG?



ANTIMON IN BREMSKLÖTZEN – EINE CARCINOGENE KOMPONENTE

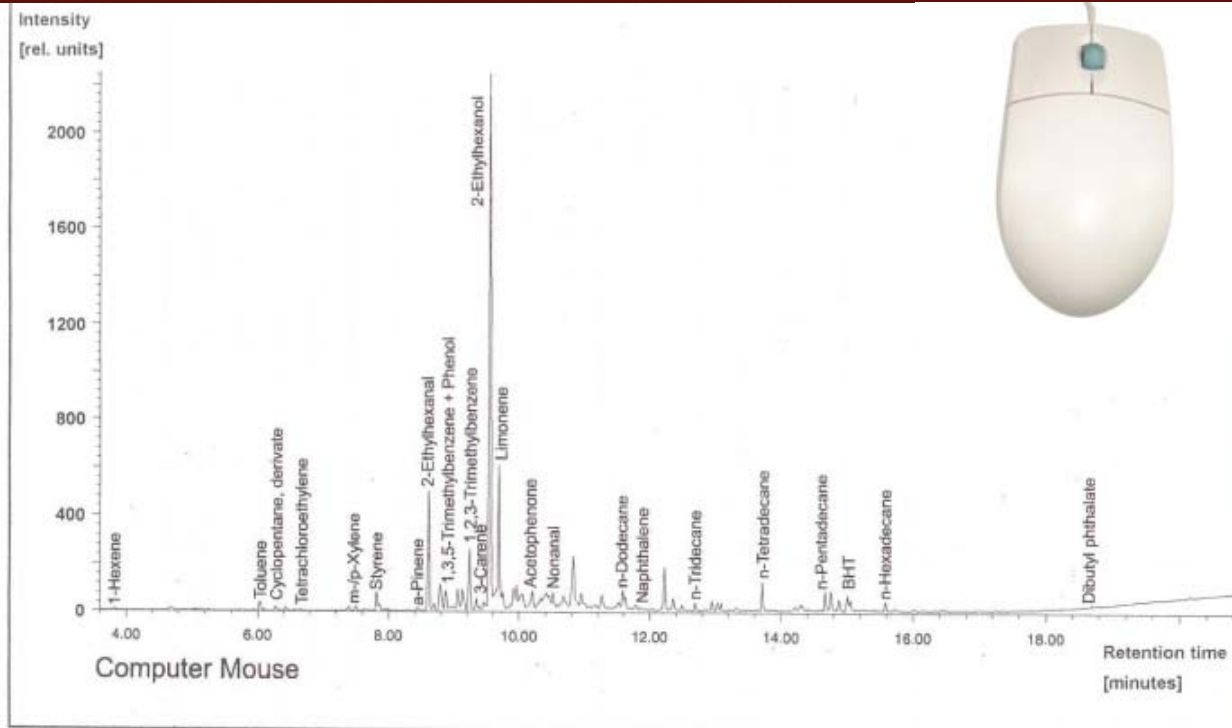
Type of brake	Type of sample	Brake pads	Element concentration (mg/kg)			
			Detection limit Accuracy ^b	Sb 50 ^a c	Pb 2 –	Cd 2 ^a ?
Disc	Dust	[A air filter]	21,000	260	8	40
		[B air filter] ^d	17,000	250	11	20
	Pads	(Jurid 539-20)	46,000	350	71	3
		(Textar 4700)	41,000	670	55	–
		Iveco EuroCargo (Bendix)	41,000	500	45	16
Drum	Dust	BPW trailer	–	91	–	13
		BPW trailer	–	14	–	31
		SAF trailer	–	170	–	20
		Volvo FH12	–	32	–	8
		Volvo FH12	–	110	–	9
		Volvo FH12	–	38	–	37
		(1) Volvo FH12	78	81	–	25
		Volvo FL6	–	170	–	15
		Volvo FL7	–	190	–	16
		(2). Volvo FL10	–	87	–	32
		Scania 143	–	150	–	24
		(3) Scania R143	–	220	–	15
		Scania 143 (Sv. Bromsbf. ^e)	–	85	–	28
		Scania 143 (ROR original)	–	110	–	13
		(4) Mercedes 18.24 (Beral)	–	9	–	22
		(5) Mercedes 18.24 (Jurid 505)	2800	82	–	14
		Mercedes 11.17 (Textar)	190	61	–	30
		MAN 930 (Jurid 505)	1700	52	–	19
Mean	270	97	–	21		
	Pads	(1) Volvo FH12	59	36	–	4
		(2) Volvo FL10	93	37	–	11
		(3) Scania R143	–	180	–	9
		(4) Mercedes 18.24 (Beral)	–	5	–	11
		(5) Mercedes 18.24 (Jurid 505)	6400	48	–	7
		Mean	1300	61	–	8

Quelle: O. von Uexküll and Michael Braungart et al. in Journal of Cleaner Production 13 (2005) 19–31

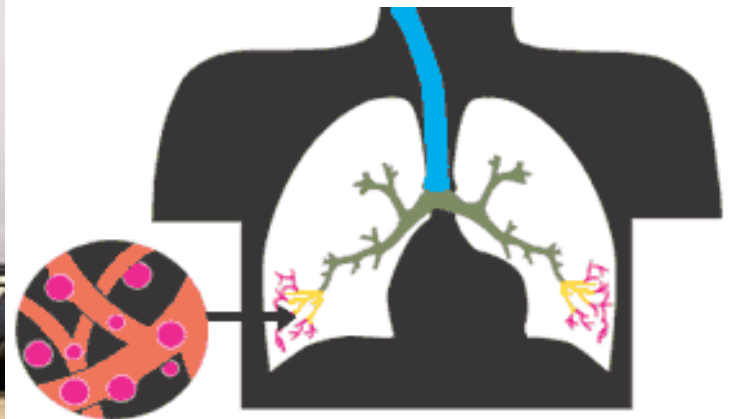
Das Problem mit den Reifen



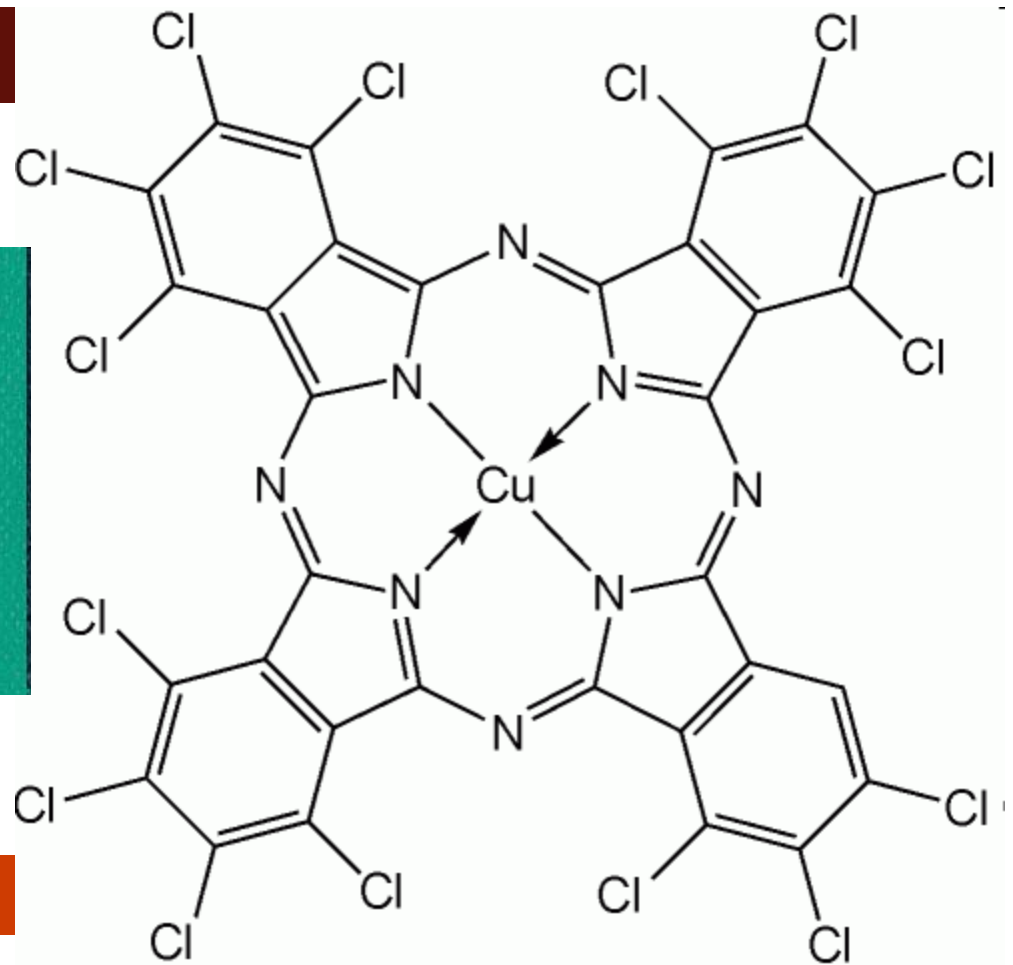
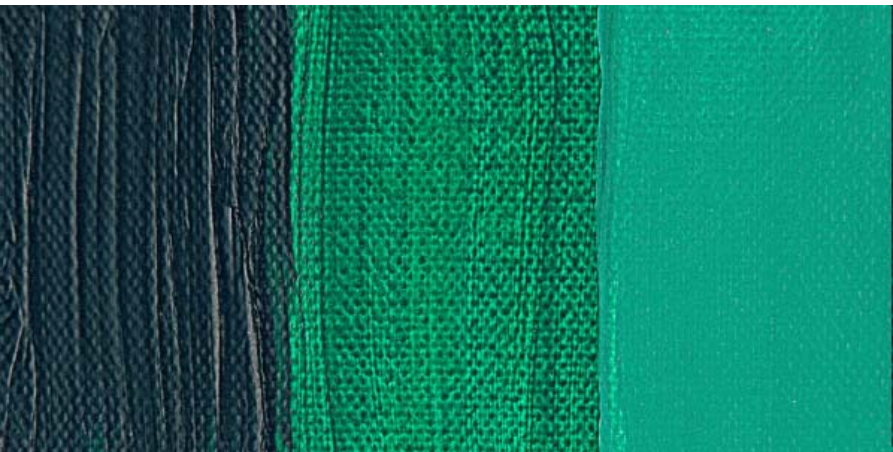
AUSGASUNG: COMPUTER MAUS



TONERSTAUB UND INNENRAUMLUFTQUALITÄT

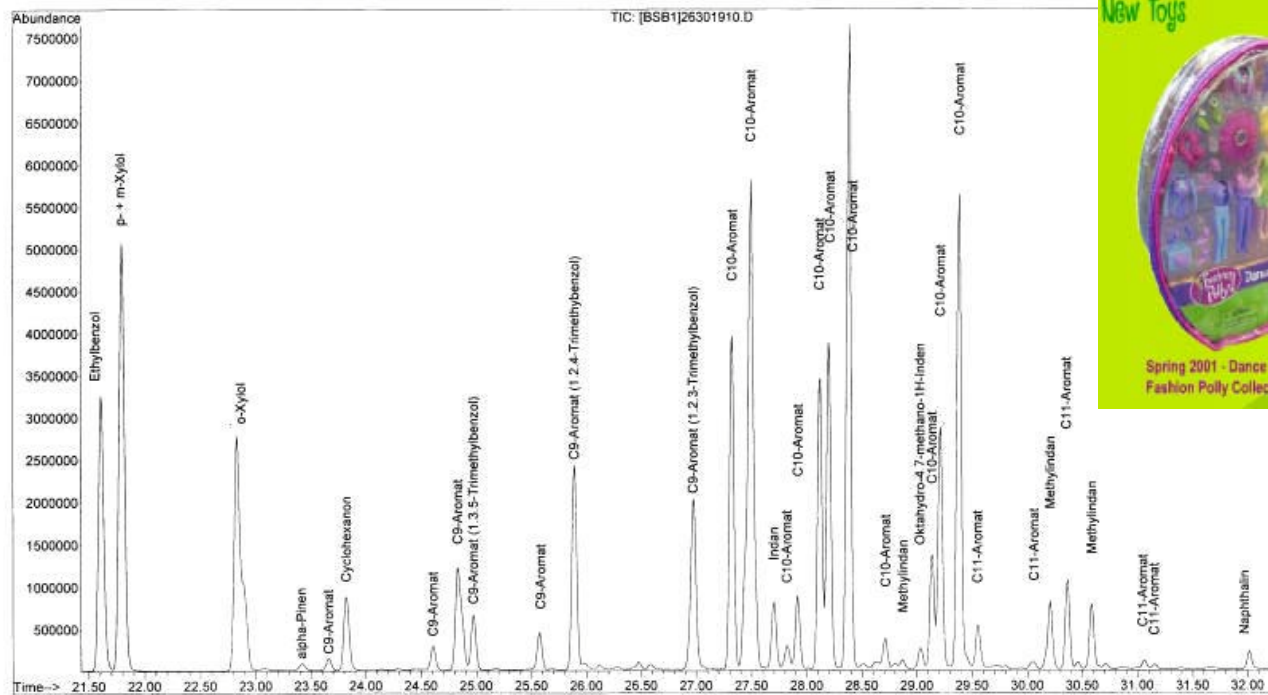


GRÜNES PIGMENT 7



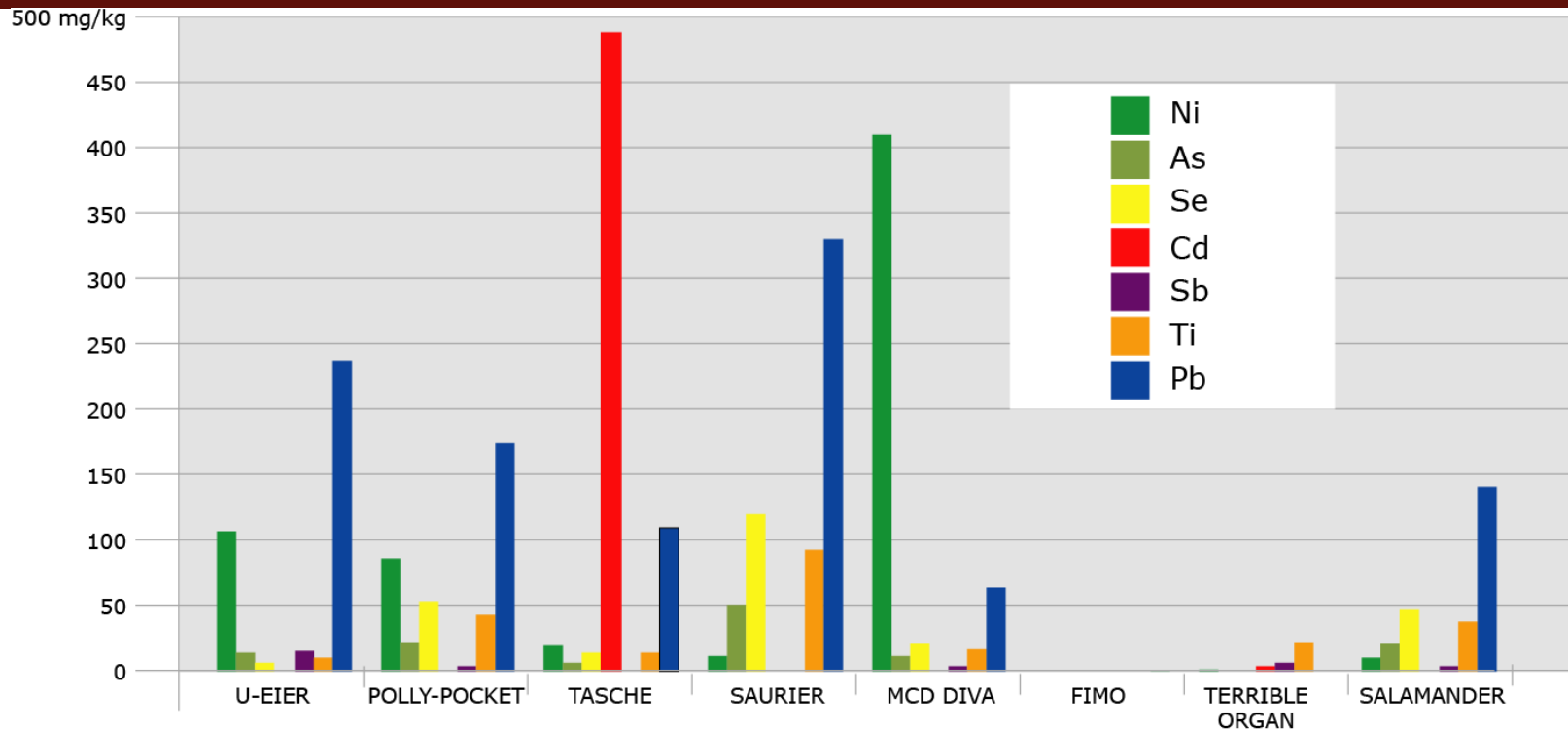
GRÜNE UND NACHHALTIGE CHEMIE?

AUSGASUNGS-CHROMATOGRAMM: SPIELZEUG

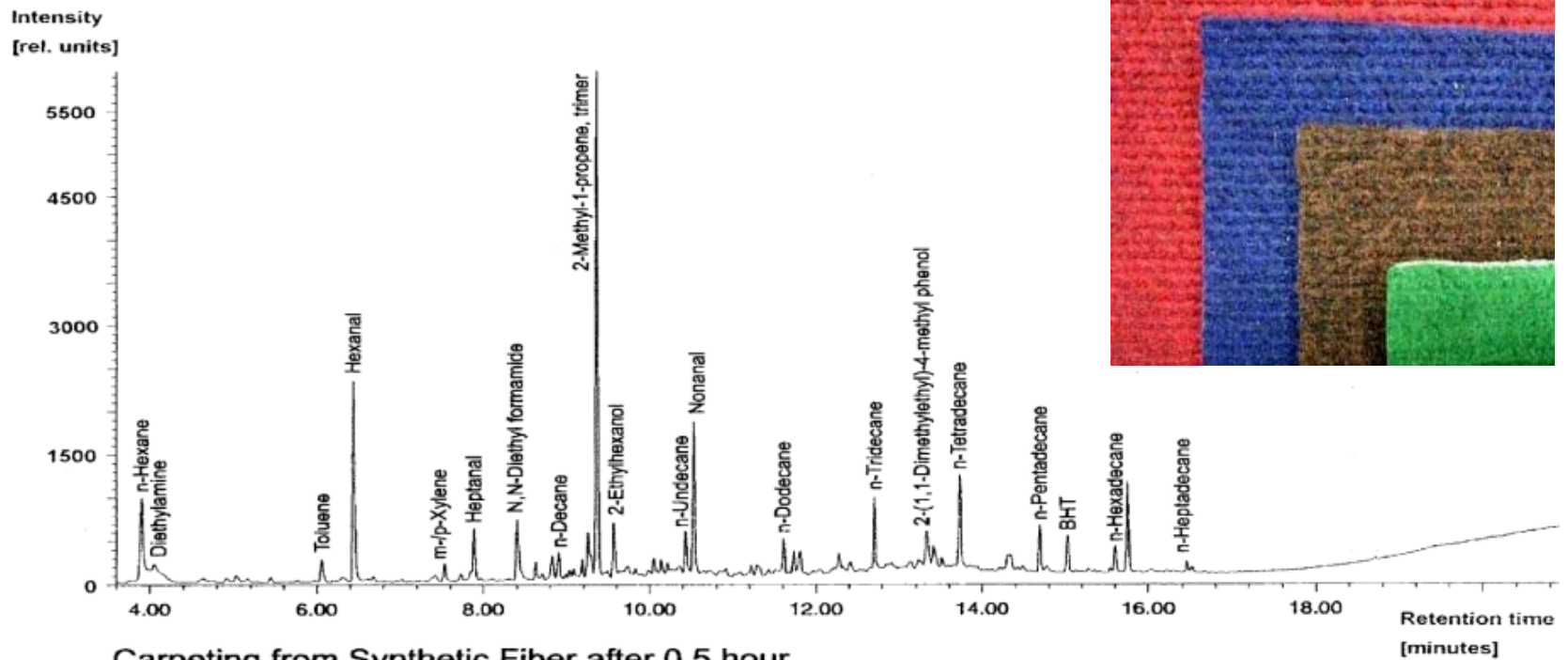


SOURCE: Hamburger Umweltinstitut e. V.

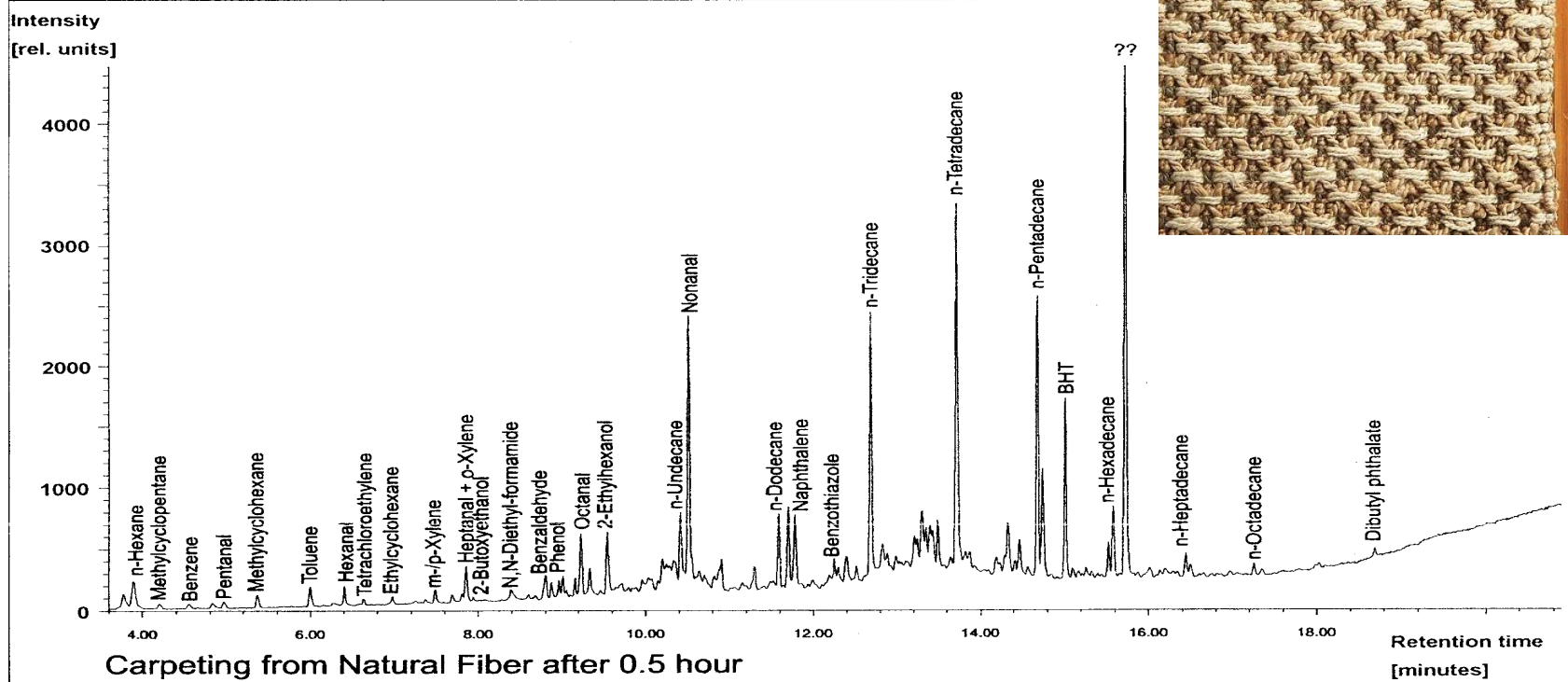
SCHWERMETALLE IN SPIELZEUG



AUSGASUNG: TEPPICH (synthetische Faser)



AUSGASUNG: TEPPICH (Naturfaser)



Carpeting from Natural Fiber after 0.5 hour

KOSTEN SCHLECHTER INNENRAUMLUFT

- **Über 40% aller Kinder haben Allergien.
Früher waren es nur 2 – 3%.**
- **Jeder dritte Person der westlichen Welt hat Allergieprobleme.**
- **Allergien kosten das US Gesundheitssystem jährlich \$18 Milliarden Dollar**



Lösung: Entwerfe Materialien und Produkte für Innenraumnutzung

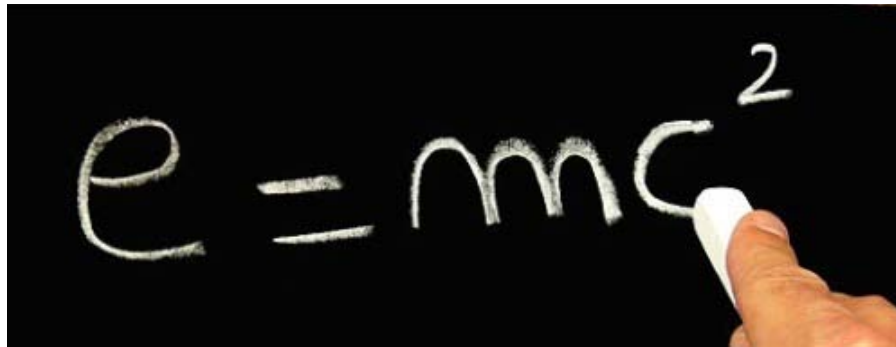
Quelle: National Institute of Allergy and Infectious Diseases

INNENRAUMQUALITÄT FÜR UNSERE KINDERDOOR



„Probleme kann man niemals durch dieselbe Denkweise lösen, durch die sie entstanden sind.“

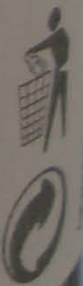
- Albert Einstein


$$E = mc^2$$



Cette bouteille, réalisée en PET, a été étudiée pour préserver toutes les qualités du vin qui vous est proposé.

This bottle, made of PET, has been designed to preserve all the qualities of the wine offered with your meal.



HILDON

Gently Sparkling

AN ENGLISH
NATURAL MINERAL WATER
OF EXCEPTIONAL TASTE

♻️ Printed on 100% Recycled Paper ♻️

Hildon Ltd is a CarbonNeutral® company!

Every drop is green.



FIJI Water is committed to reducing carbon in the atmosphere. We are cutting emissions across our product's entire life cycle and supporting reforestation and renewable energy projects that take us beyond carbon neutral to carbon negative.



fijigreen.com

Typical Analysis in mg/liter:

Silica	85	Magnesium	13	Bicarbonates	140
Calcium	17	pH	7.5	Total Dissolved Solids	210

Please Recycle

Bottled at Source
Source: Yaqara, Viti Levu,
Fiji Islands. Bottled by:
Natural Waters of Viti Limited,
Suva, Fiji

PRODUCT OF FIJI

Information: 1.877.426.3454

CACRV H15c ME 5c
CT#611, NV08403
NYSHD Cert# 1-115

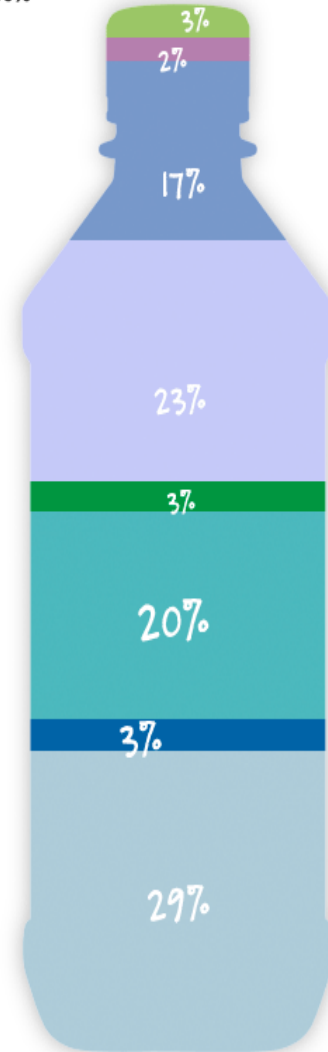


Base year carbon footprint
(tonnes CO₂eq)

Total emissions:
85,396 tonnes CO₂eq

100%

0%



- Sales and administrative
- Consumption
- Distribution
- Ocean freight
- Trucking to port
- Bottling
- Raw packaging materials and equipment transport
- Raw packaging materials manufacturing

Copenhagen
Carbon Neutral
by 2025

Unfolding our
Visions

Copenhagen's Climate Plan



CLIMATE CAPITAL
COPENHAGEN

aim: zero emissions

Nature embraces, nurtures and inspires us.

The Toyota Prius is just one of our vehicles that feature Hybrid Synergy Drive, its combination of electric and petrol power delivers the cleanest engine technology available.

Toyota's hybrid technology is creating a more sustainable tomorrow, today.

www.toyota-europe.com/environment

TOYOTA

aim: zero emissions

We are committed to preserving the delicate balance between man and nature. We've come a long way since we launched our first hybrid car 10 years ago. But our goal goes beyond reducing exhaust emissions. We apply innovative environmental solutions to every aspect of the vehicle's life cycle: from design, manufacture and use, right through to recycling. It's the only way to reach our ultimate aim: zero emissions.

www.aimzeroemissions.eu

TOYOTA



Öko-Haus kurz vor Expo-Eröffnung fast fertig

Dieser Werbegag

kostet uns

6 Mio Euro!

Futuristisch, klimaneutral, aber auch sehr teuer – das ist Hamburgs Beitrag zur Expo 2010 in Shanghai

Hamburg house



Von M. SCHNITKER

City/Shanghai – Mit einem exklusiven Klimahaus will Hamburg auf der Expo in Shanghai für sich werben.

Ein Projekt, das uns Steuerzahler mal eben 6 Mio. Euro kostet!

Und das in Zeiten immer höherer Kita-Gebühren und einer Finanzlage, die katastrophaler

Staatsrat Stephan Hugo Winters eröffnen. 2006 hatte es der damalige Stadtentwicklungssenator Axel Gedaschko (CDU) das Expo-Projekt auf den Weg gebracht.

Das Gebäude ist mit moderner Umwelttechnik ausgestattet, verbraucht besonders wenig Energie. Besonders ist allerdings auch der Preis.

„Das Klimahaus ist doch nur ein Werbegag mit Symbolcharakter. Davon wird das Klima in Hamburg nicht einen Deut besser“, mäkkelt Dora Heyenn, Fraktionsvorsitzende der Linken. Das viele Geld wäre für Solardächer auf Schulen oder energetische Auf-



Während sie Deutschland die Klimatechniken im Winter draußen halten soll, müßten die Klimatechniken des Hauses in Shanghai die Hitze des chinesischen Sommers abwehren. Dafür ist prinzipiell nicht entwickelt.

Nächstes Problem: Gerade mal 200 Besucher dürfen gleichzeitig das 2300 qm große Haus auf vier Geschossen begehren. Ansonsten würde es zu wärmen.

„Es ist die Kunst eines Privathauses, dass alle Einflüsse eingerechnet werden“, sagt Johannes Freudenreich, Sprecher für das Umweltschutzbüro Hamburg Expo-Projekt.

Die Baukosten werden nie wieder reinkommen. Nach der Expo wird das Klimahaus zum Eigentum

Bürgermeister Olo von Boist wird sich am 31. Mai mit



SIND WIR ZU VIELE?

Phasing out the human race by voluntarily ceasing to breed will allow Earth's biosphere to return to good health. Crowded conditions and resource shortages will improve as we become less dense.

Voluntary Human Extinction Movement

**May we live long
and die out**



Voluntary Human Extinction Movement P.O. Box 86646 Portland OR 97286-0646

SIND WIR ZU VIELE ?



“No goal is more crucial to healing the global environment than stabilizing human population.”

Al Gore

SIND WIR ZU VIELE?



SIND SIE ZU VIELE ?



DIE BIOMASSE ALLER AMEISEN IST 4 MAL SO GROß WIE DIE DER MENSCHHEIT



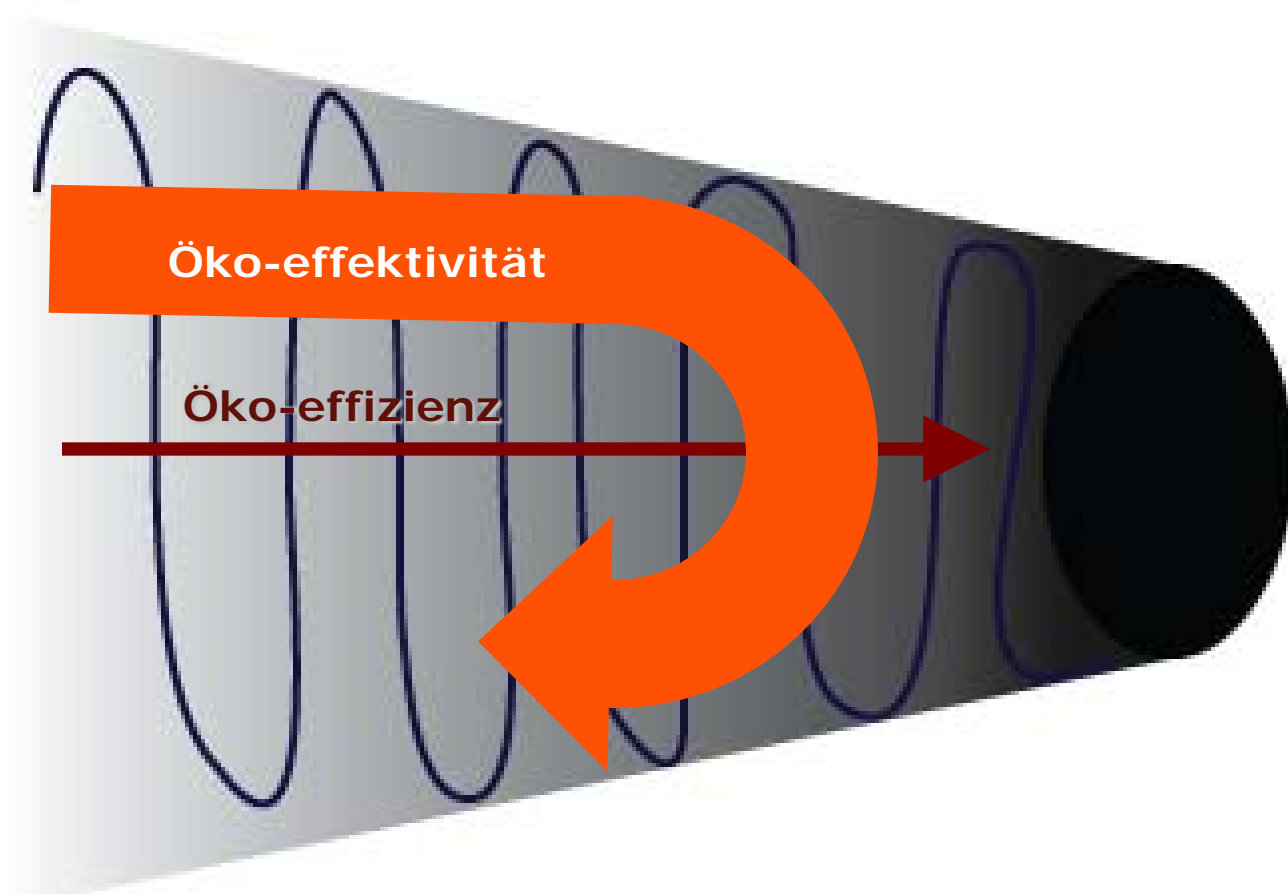
UNWILLKOMMEN AUF UNSERER ERDE?



Öko-Effizienz

Neuordnung der Stühle auf der Titanic



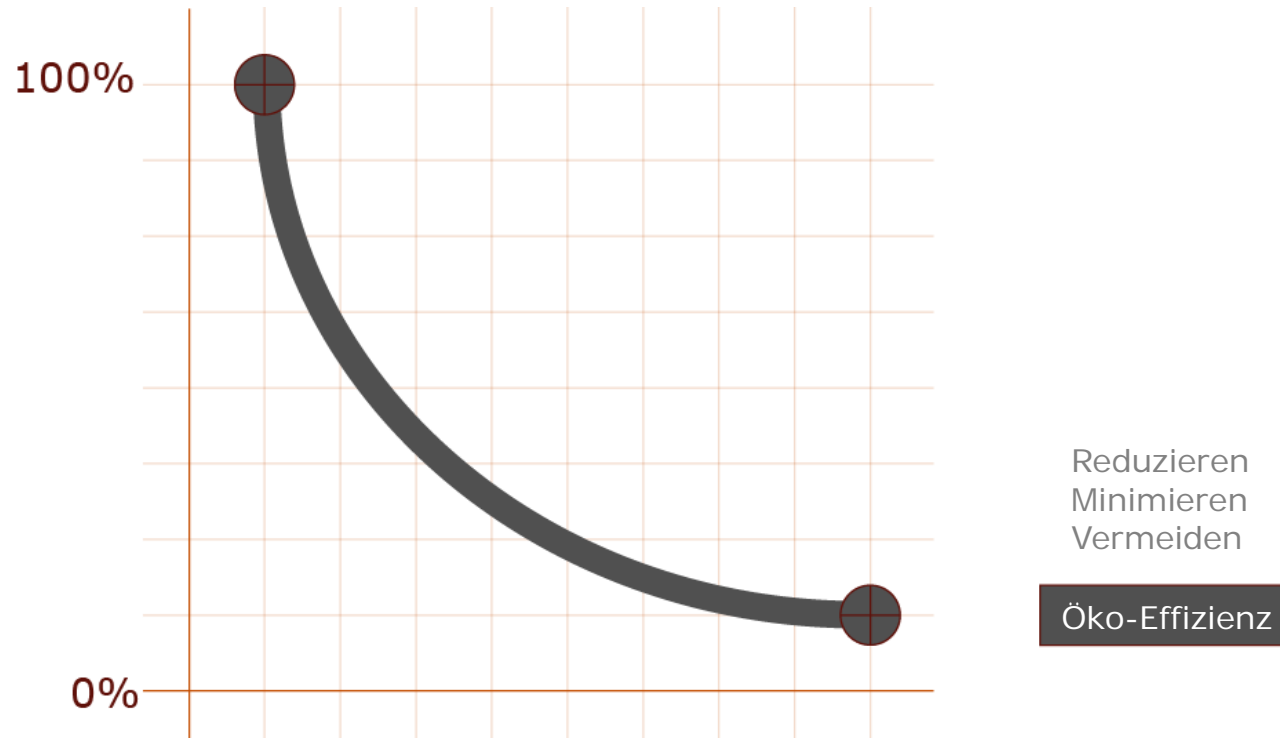


Öko-effektivität

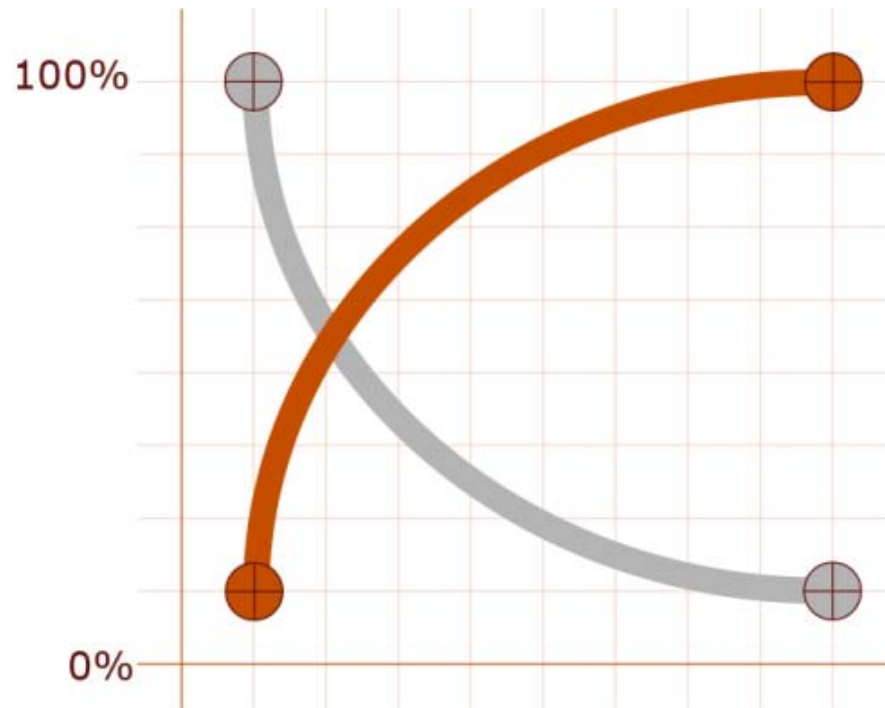
Öko-effizienz

Time

Öko-Effizienz: CRADLE TO GRAVE



CRADLE TO CRADLE® : DAS ZIEL IST QUALITÄT



ÖKO-EFFEKTIVITÄT

DEFINIERE,
STEIGERE,
UNTERSTÜTZE,
OPTIMIERE

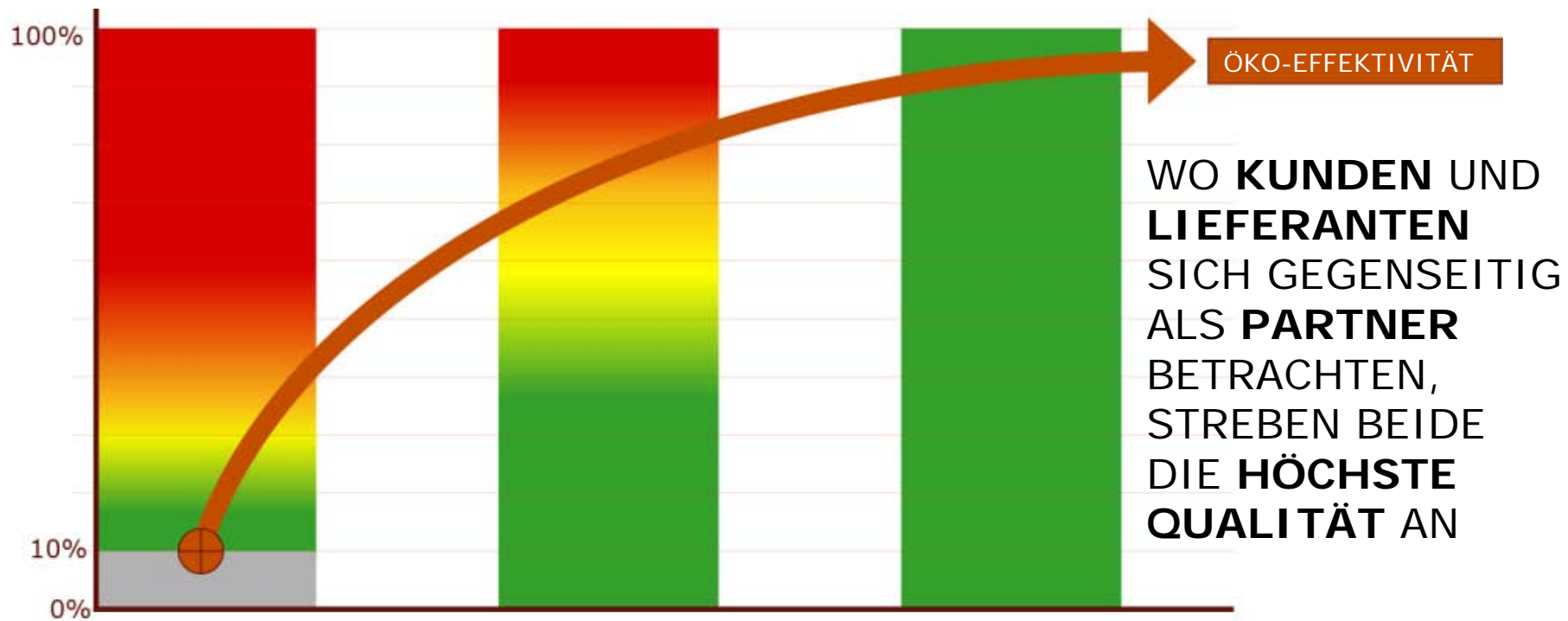
ÖKO-EFFIZIENZ

CRADLE TO CRADLE® DESIGN PARADIGMA

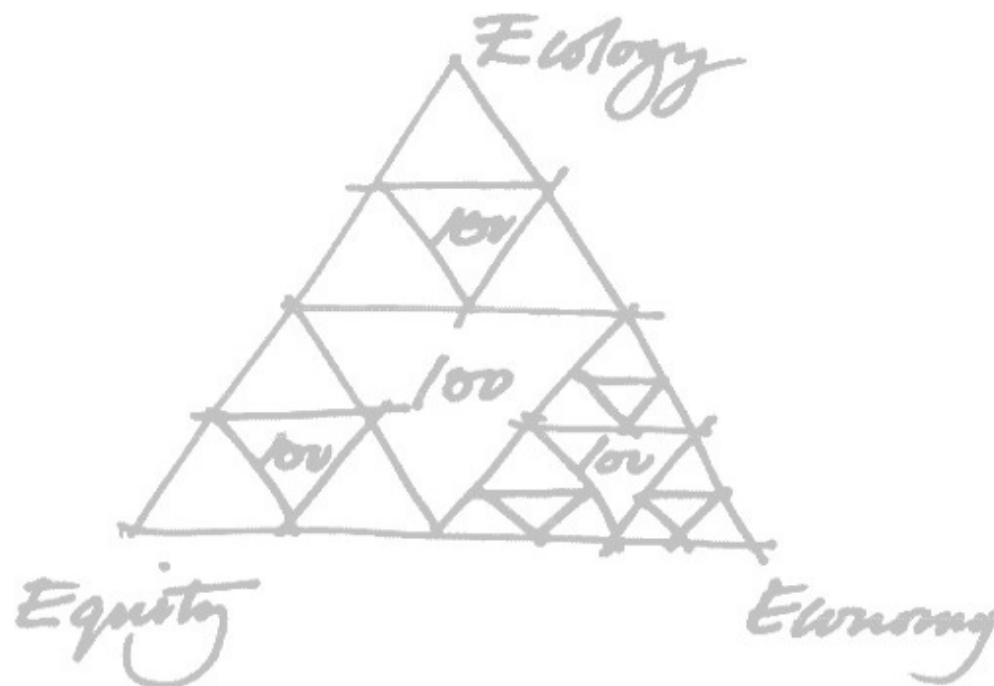
- **ABFALL IST NAHRUNG**
- **GEBRAUCH VON SOLARENERGIE**
- **AKTIVE UNTERSTÜTZUNG VON DIVERSITÄT**

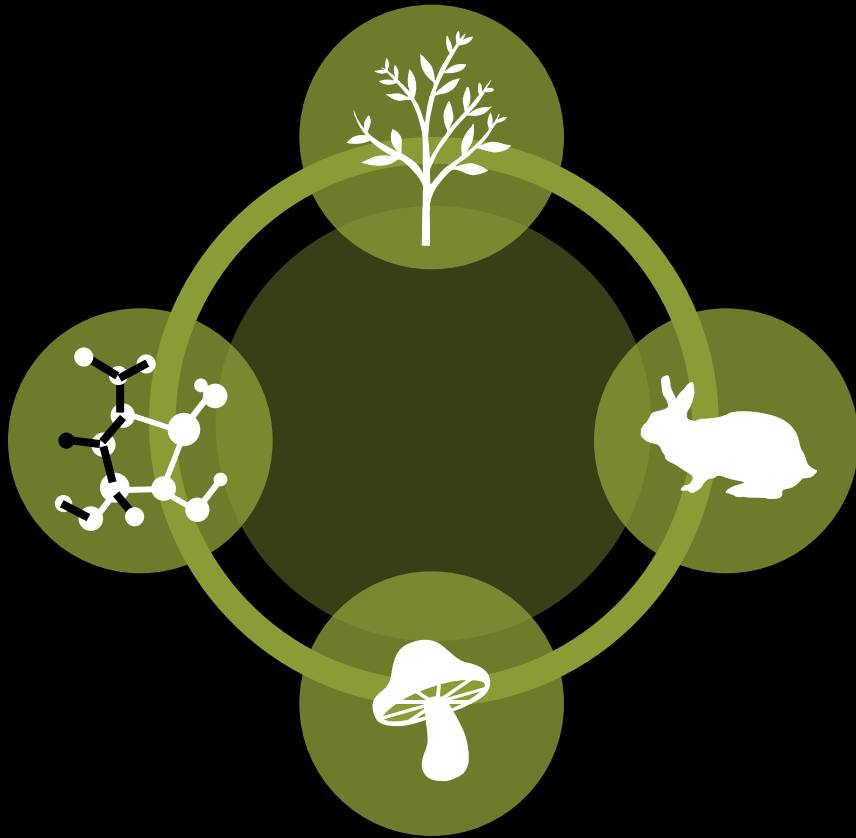


VORANSCHREITEN DER QUALITÄT VON *CRADLE TO CRADLE*® MIT DER ZEIT



RICHTUNG INTELLIGENTES DESIGN: TRIPLE TOP LINE DENKWEISE



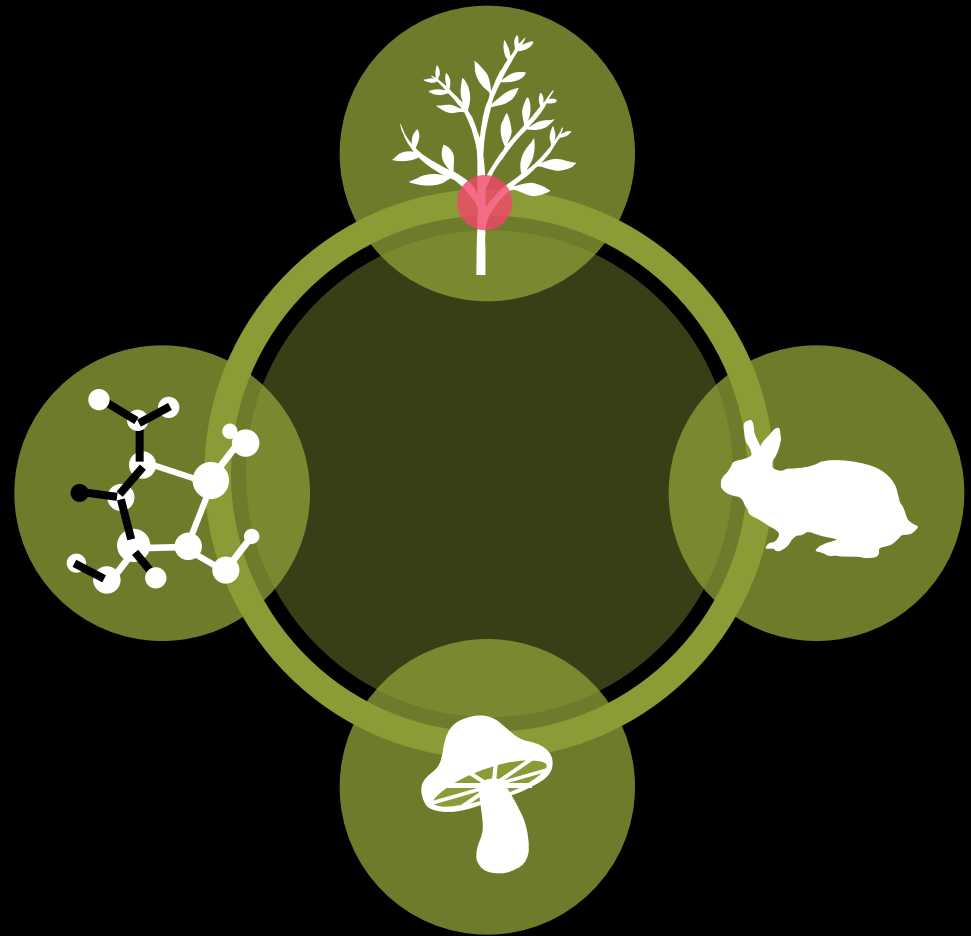


Biologischer
Kreislauf



Technischer
Kreislauf

Biologischer Nährstoff



Climatex® Lifecycle™ und Climatex® LifeguardFR™: Biologische Nährstoffe



Climatex® Lifecycle™ und Climatex® LifeguardFR™ sind Patente und Marken von Gessner AG, Schweiz

KLM – KOMPOSTIERBARE FLUGZEUGSITZE (PROTOTYPEN)

Kompost-Sitze als Musterbeispiel

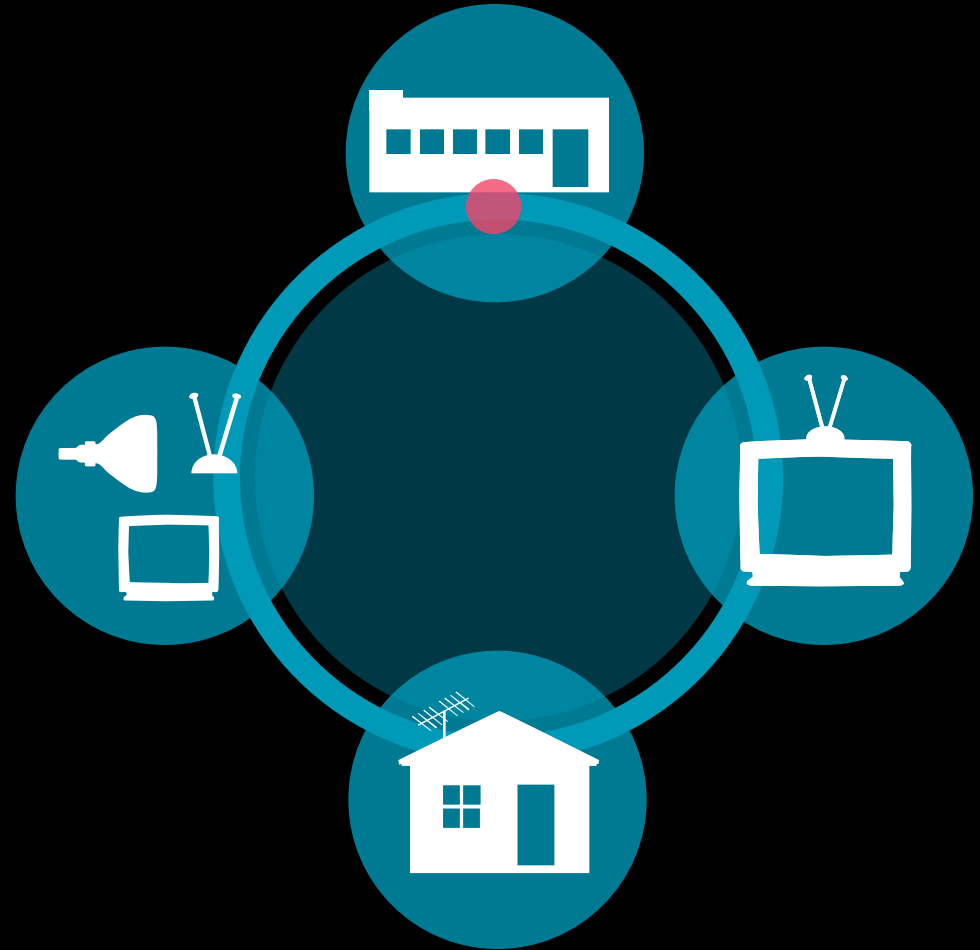
Einige Unternehmen setzen bereits auf biologisch vollständig abbaubare Materialien für ihre Produkte

Handelsblatt, 16. Juni 2005



Die Innenausstattung des Airbus A380 steckt voller Innovationen – viele werden umweltfreundlich hergestellt.

Technische Nährstoffe



DESSO: CRADLE TO CRADLE® BODENBELAG



MIRRA CHAIR - HERMAN MILLER: TECHNISCHE NÄHRSTOFFE



GESUNDE MENSCHENVERPACKUNG

HEIDELBERGCEMENT

DESSO
The Floor is Yours

backhausen
interior textiles



SCHÜCO

XERO floor®

Herman Miller

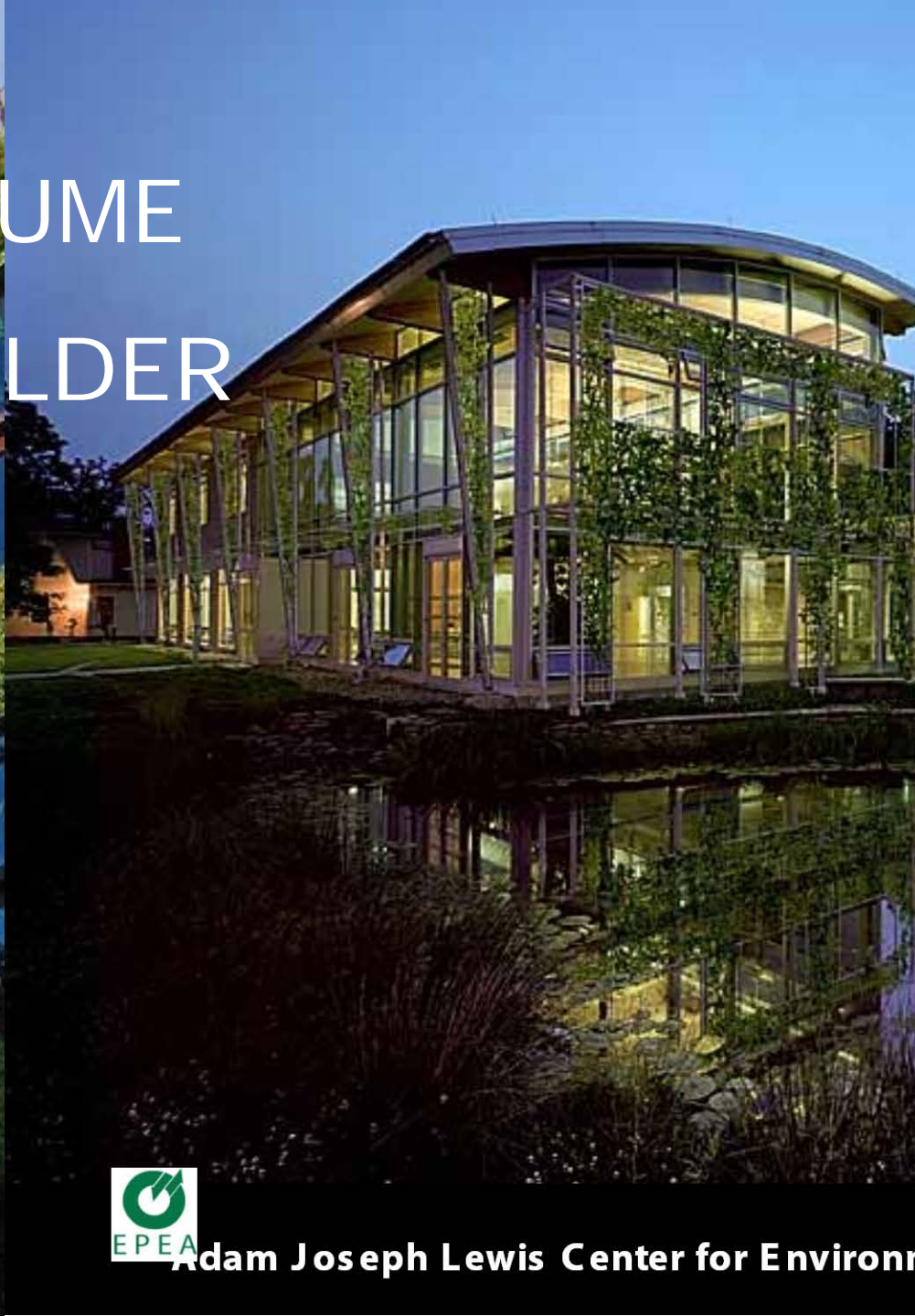
Neues Verwaltungs-Gebäude: BIONORICA AG, Neumarkt (bei Nürnberg)



“Die grünsten Häuser
sind die, die nicht
gebaut werden?”

— Whit Faulconer, [GreenBlue](#)

HÄUSER WIE BÄUME STÄDTE WIE WÄLDER



Adam Joseph Lewis Center for Environ

WILLIAM MCDONOUGH: HÄUSER WIE BÄUME, STÄDTE WIE WÄLDER



FORD ROUGE CENTER



ADAM JOSEPH SMITH CENTER FOR ENVIRONMENTAL STUDIES OBERLIN, OH

LEBENDIGE DÄCHER BEI FORD



XEROFLOR: „RAISED FLORA“

FORD ROUGE CENTER LIVING ROOF DESIGN

Sedum plants

Trap dust, absorb carbon dioxide, release oxygen and create habitat

Vegetation blanket

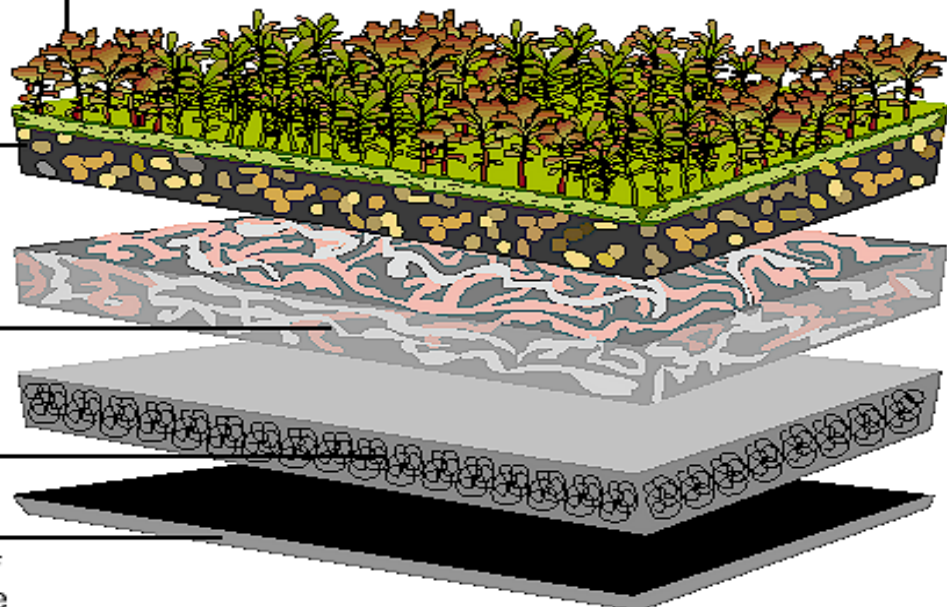
A semi-organic material containing shale, sand, peat, compost and dolomite

Fleece

A felt-like absorbent mat of mineral wool that holds water

Drainage layer

Root-resistant membrane
Protects the underlying roof from water and root damage



2.5" to 3"

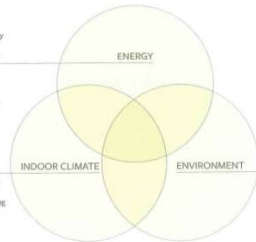
ACTIVE HOUSE ARCTITEKTUR

ACTIVE HOUSE

Active House is a vision of creating balance and unity through buildings that:

- produce more energy than they consume
- have a healthy indoor climate
- interact with their environment

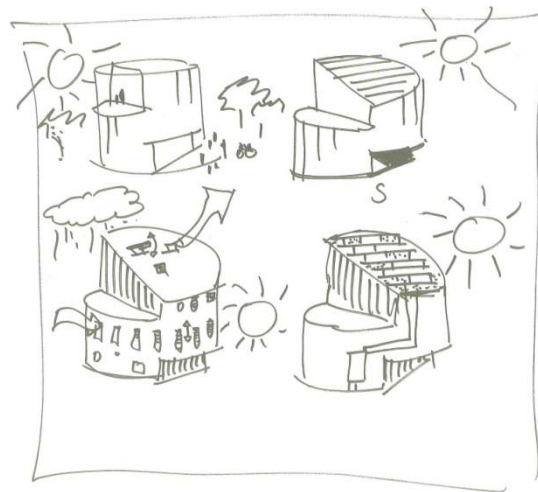
ENERGY: An Active House is CO₂-neutral. By using renewable energy sources it has an exceptionally low level of energy consumption and produces more energy than it consumes.



INDOOR CLIMATE: An Active House has a healthy and comfortable indoor climate, allowing people to express themselves and live their lives to comfort.

ENVIRONMENT: An Active House is designed, situated and constructed to interact with its environment.

The building sector accounts for 40 percent of energy consumption in industrialized nations.
People spend up to 90 percent of their lives inside buildings.
Every third building has a poor indoor climate, which can lead to allergies, depression and reduced learning capacity.



Design parameters, Green Lighthouse, CHRISTENSEN & CO arkitekter a/s.

HOME FOR LIFE

FIRST EXPERIMENT

Home for Life is a single family home located north of Aarhus in Denmark. The home opened in April 2009 as the world's first Active House and the first of eight such experiments. Home for Life was developed and designed by the window manufacturer VELFAC and VELUX in cooperation with AART Architects and Edsman Collaunoy Engineers.

1. A HOUSE THAT INTERACTS WITH ITS ENVIRONMENT

Home for Life is inspired by a traditional Danish 1 1/2-storey saddle roof house. This type of home has a relatively small surface with many possible variations. The long side of the house faces south, providing a view across fields and a bay, while the ridge of the roof points to the north so that the largest portion of the roof surface faces south to absorb solar energy.

2. AN OPEN HOUSE THAT LETS IN NATURE

Window openings are situated to let in daylight from at least two angles in each living space. The window area of the building is 40 percent of the total floor area – twice the area of a traditional house. The openings let in nature, illuminate the rooms, optimize the flow of fresh air and generate spatial experiences indoors and out. While the home is being heated, half of the required heat comes directly from the sunlight that enters through the windows. All rooms have direct access to the outside.

3. AN INTELLIGENT HOUSE CONTROLLABLE ACCORDING TO WEATHER CONDITIONS AND PERSONAL NEEDS

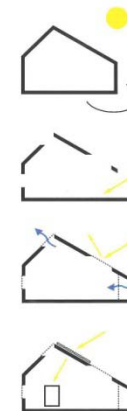
Sensors that register heat, CO₂ and humidity in all rooms and an outside weather station are combined with an intelligent control system to ensure that the house adjusts to the family's need for a healthy, comfortable indoor climate. Automatic window opening mechanisms let in fresh air, while sensors turn off lights when you leave the room. These factors combine to create a home with a very low level of energy consumption.

4. AN ENERGY PRODUCING HOUSE

Home for Life produces more energy than it consumes. With an energy surplus of 9 kWh/m²/year, it takes approximately 40 years for the house to generate the same amount of energy that was used to produce its building materials. At that point, the house will have returned more to nature than it consumed. A solar heat pump and 7 m² solar collectors generate energy for heating and hot water, while 50 m² solar cells generate more electricity than the home consumes.

DESIGN PARAMETERS

WHAT IS AN ACTIVE HOUSE?



1. A HOUSE THAT INTERACTS WITH ITS ENVIRONMENT

The design of an Active House is adjusted to its surroundings and the local climate and culture. The house is energy efficient. It is orientated towards the sun and the surroundings to optimise the view and the effects of daylight, natural ventilation, passive heating and energy production.

2. AN OPEN HOUSE THAT LETS NATURE IN

Openings in the house optimise the quantity of daylight, fresh air and solar heat and offer views that bring the surroundings inside.

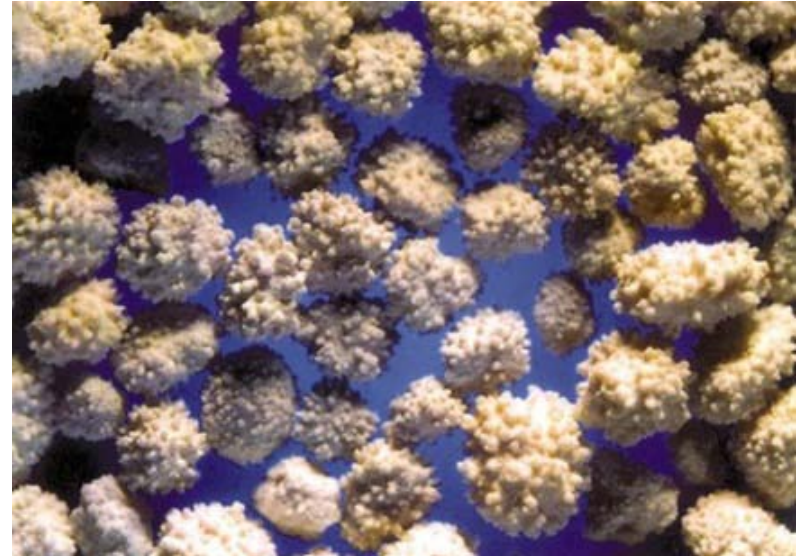
3. AN INTELLIGENT HOUSE, CONTROLLED ACCORDING TO THE WEATHER AND PERSONAL NEEDS

Intelligent controls regulate the heat by circulating fresh air and optimising daylight. This ensures that energy consumption and the level of daylight and fresh air are adjusted according to needs and weather conditions.

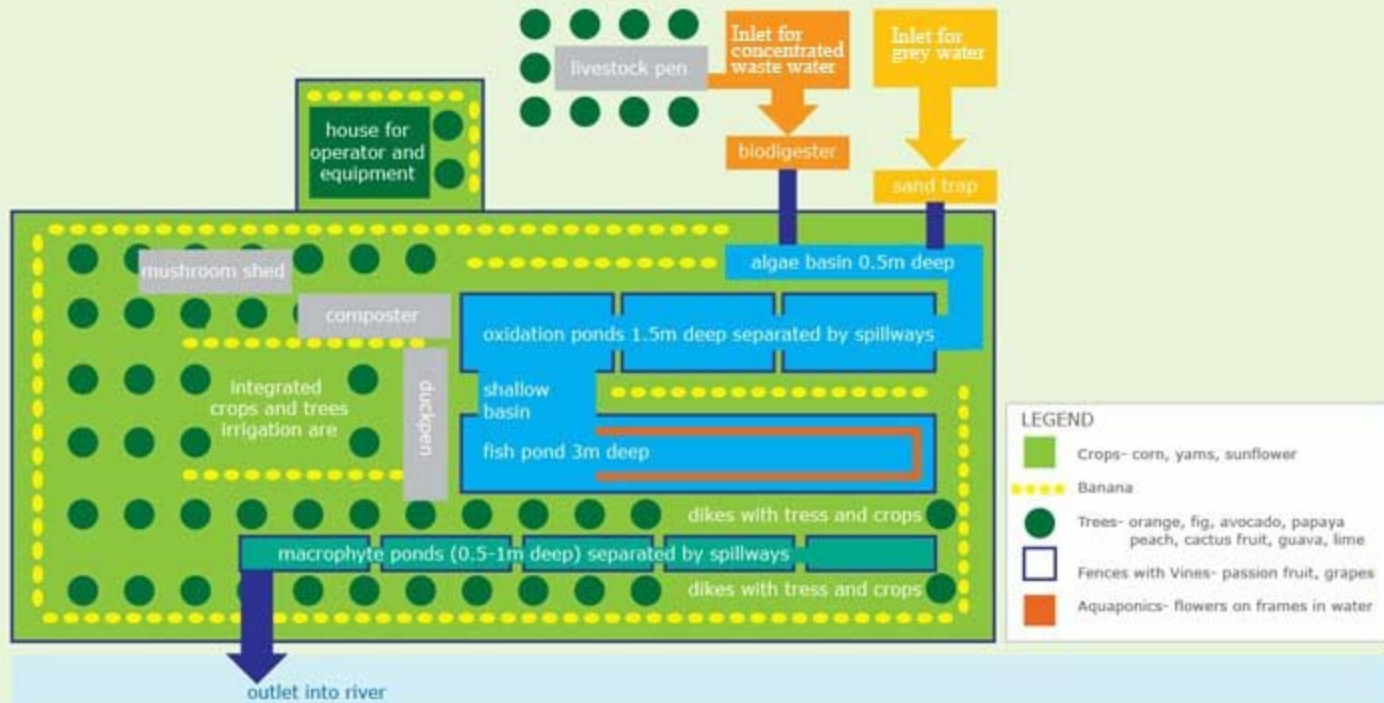
4. AN ENERGY PRODUCING HOUSE

An Active House features integrated renewable energy technologies, such as solar thermal collectors and solar cells that collect the solar energy and convert it into heat, hot water and electricity.

PHOSPHAT RÜCKGEWINNUNG



BIOMASS NÄHRSTOFF RECYCLING: ABWASSERBEHANDLUNG



BIOMASSE NÄHRSTOFF RECYCLING



www.hamburger-umweltinst.org

Verbesserung der Fruchtbarkeit durch Abwasser

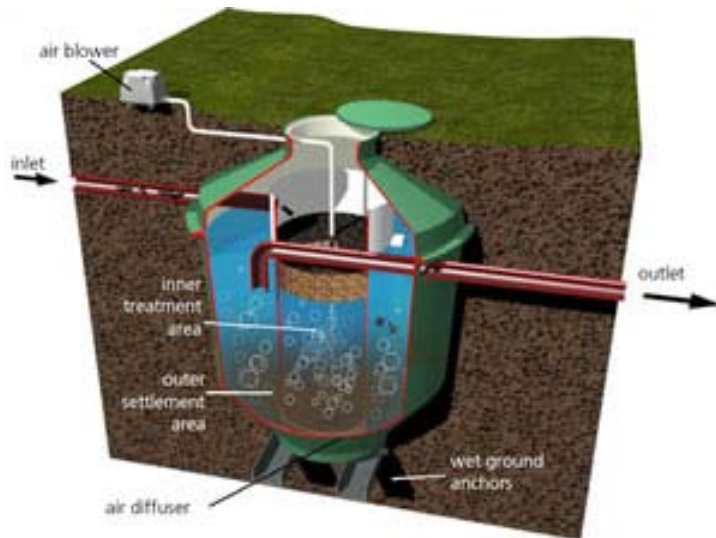
OIA INSTITUTO AMBIENTAL LATEINAMERIKA

- **Bodenerholung**
- **Nährstoff Recycling**
- **Energie aus Biomasse**
- **Soziale Gerechtigkeit**
- **Economische Profitabilität**



BIOMASSE NÄHRSTOFF RECYCLING

- „Biodigester“ im Boden
- Aquaponics
- Macrophyten Teiche
- Pflanzen zum Bewässern



Gebäude in Dongguan, China

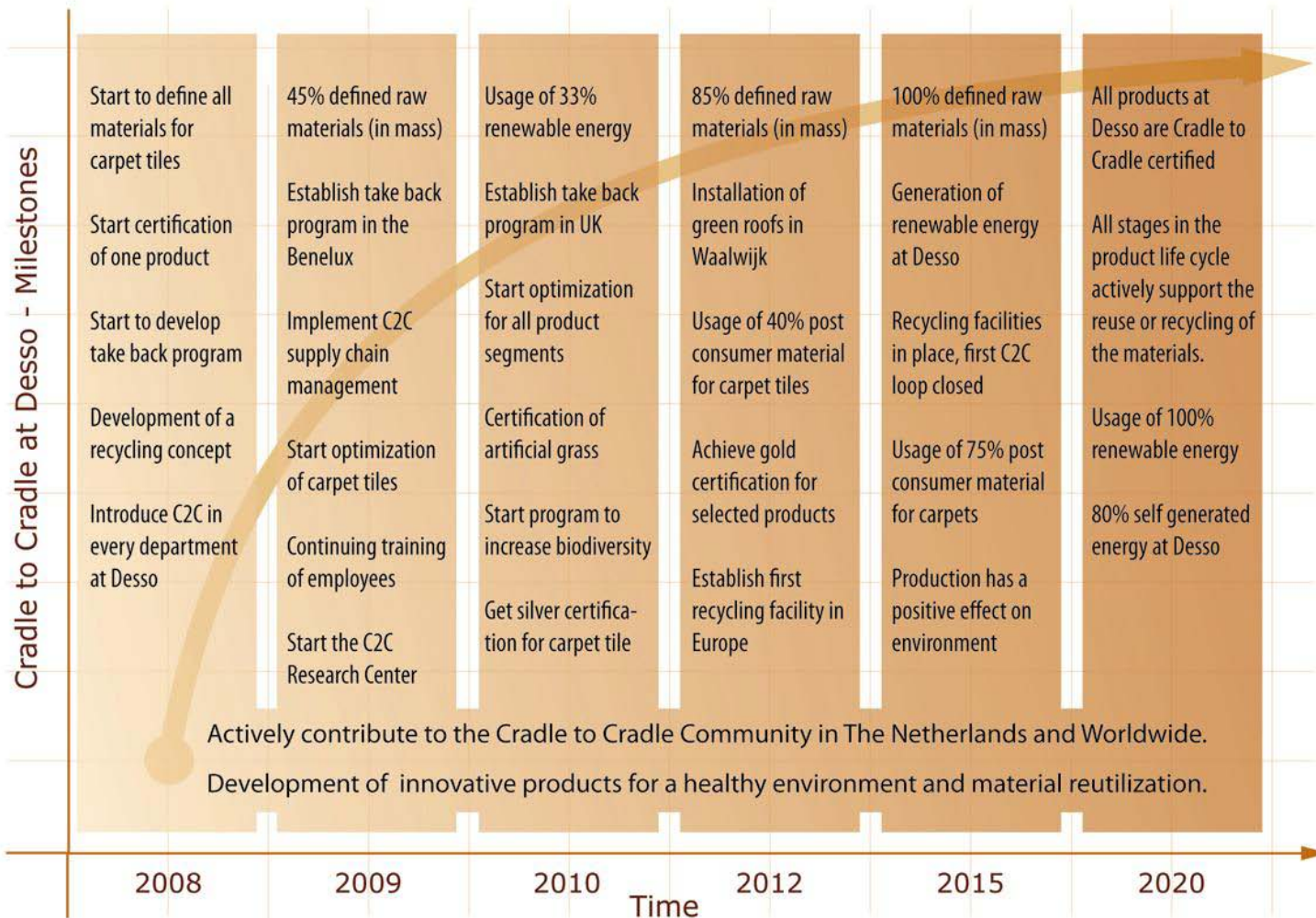
WINDRÄDER AUF FERNLEITUNGSMASTEN



Stef Kranendijk, Desso
CEO



DESSO: CRADLE TO CRADLE® ROADMAP



van Gansewinkel Groep- NUTRIENT MANAGEMENT COMPANY

„For us *Cradle to Cradle* is not an invention but a discovery of what our work really is about! It is so inspirational for our company.“

**Ruud Sondag- CEO
van Gansewinkel Groep**

van Gansewinkel Groep





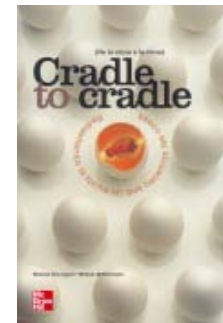
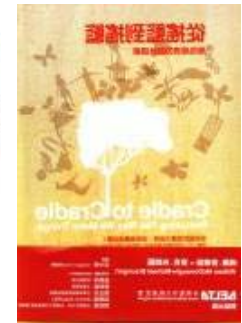
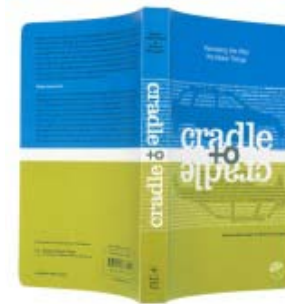
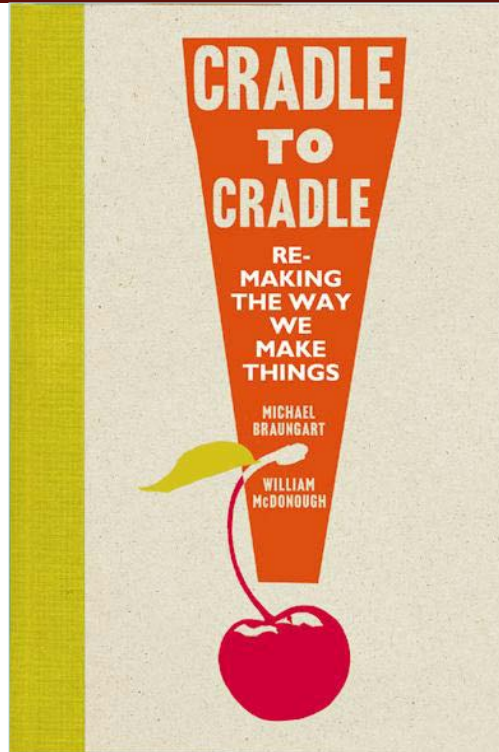
Beispiele einer CRADLE TO CRADLE® Plattform



FÖRDERLICHER ÖKOLOGISCHER FUSSABDRUCK



CRADLE TO CRADLE®: DIE RICHTIGEN DINGE TUN





NUTEC - Gateway to Industrial Change

Internationaler Kongress und Ausstellung für Innovationen und Intelligentes Design



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