

**CRADLE TO CRADLE® - Danish Facilities Management Network**

**Prof. Dr. Michael Braungart  
Copenhagen, Denmark  
January 28<sup>th</sup>, 2010**



# FACILITIES MANAGEMENT

MICHAEL BRAUNGART & WILLIAM MCDONOUGH

Rigdom  
og vækst  
uden affald

**CRADLE**  
*to*  
**CRADLE**

- en banebrydende vision for  
det 21. århundrede

NYT NORDISK FORLAG ARNOLD BOUSCK

## **CRADLE TO CRADLE® IN DENMARK**



**Samsø & Anholt, C2C-Islands**  
**EU-project around water, energy and materials**

**Danish Industry**  
**Industry Cluster investigating C2C**

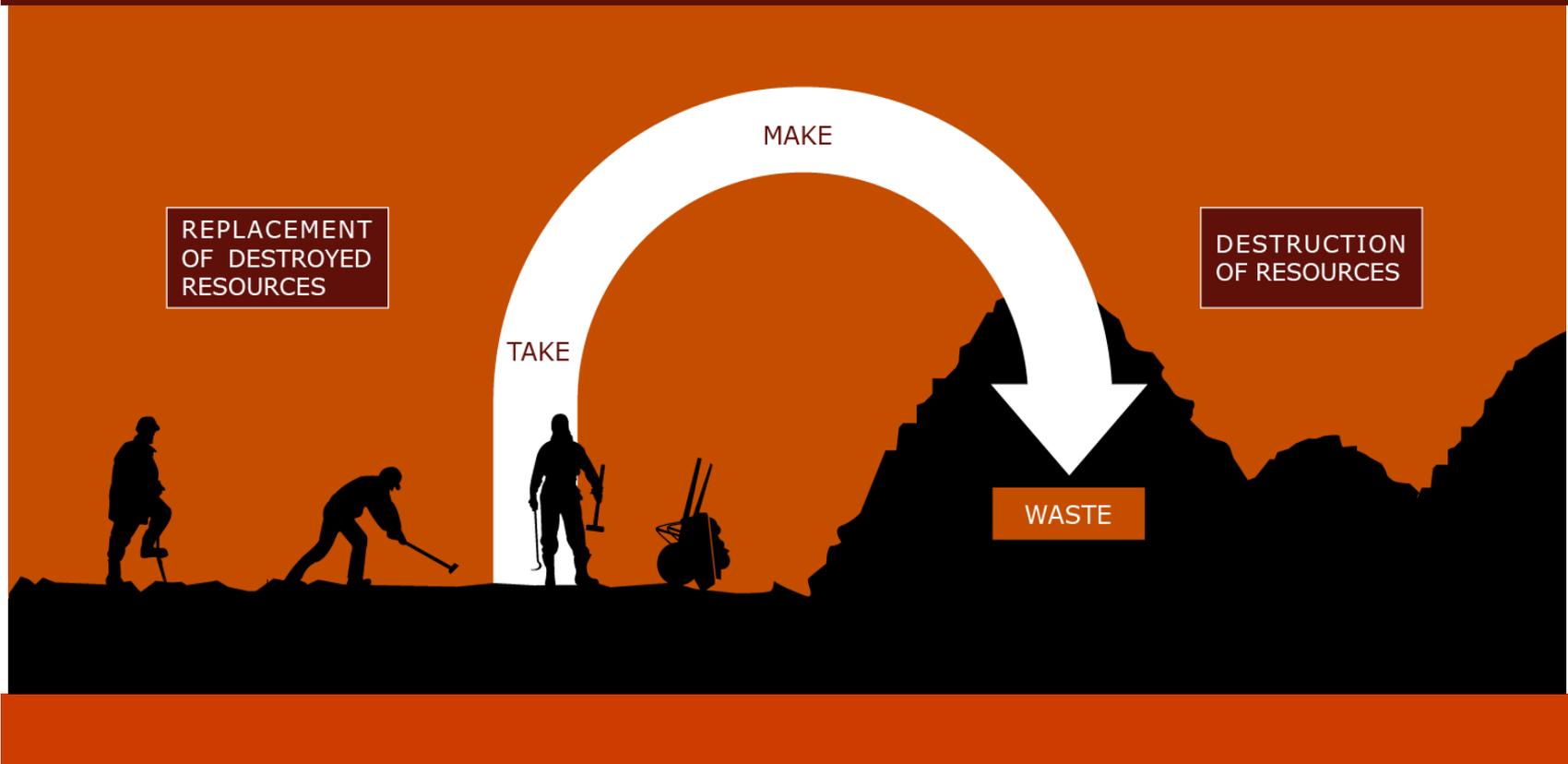
**Center for Samfundansvar**  
**Developing CSR tools for small and medium**  
**companies that includes C2C**

**Engineering companies**  
**COWI & Rambøll promoting C2C**

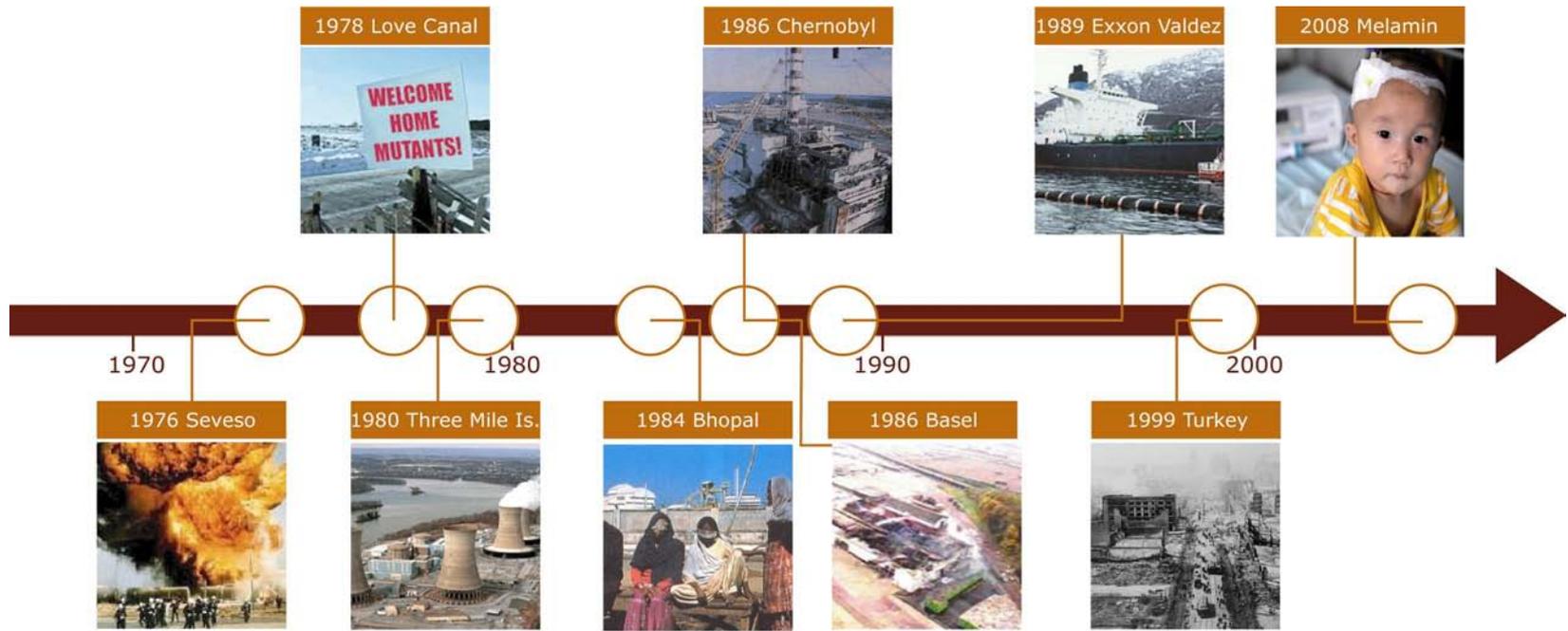
**Louisiana**  
**Museum of modern art is doing an exhibition**  
**on C2C architecture**



# CRADLE TO GRAVE DESIGN PARADIGM



# ENVIRONMENTAL DISASTERS



## CRADLE TO GRAVE DESIGN PARADIGM







M.GEORGIU

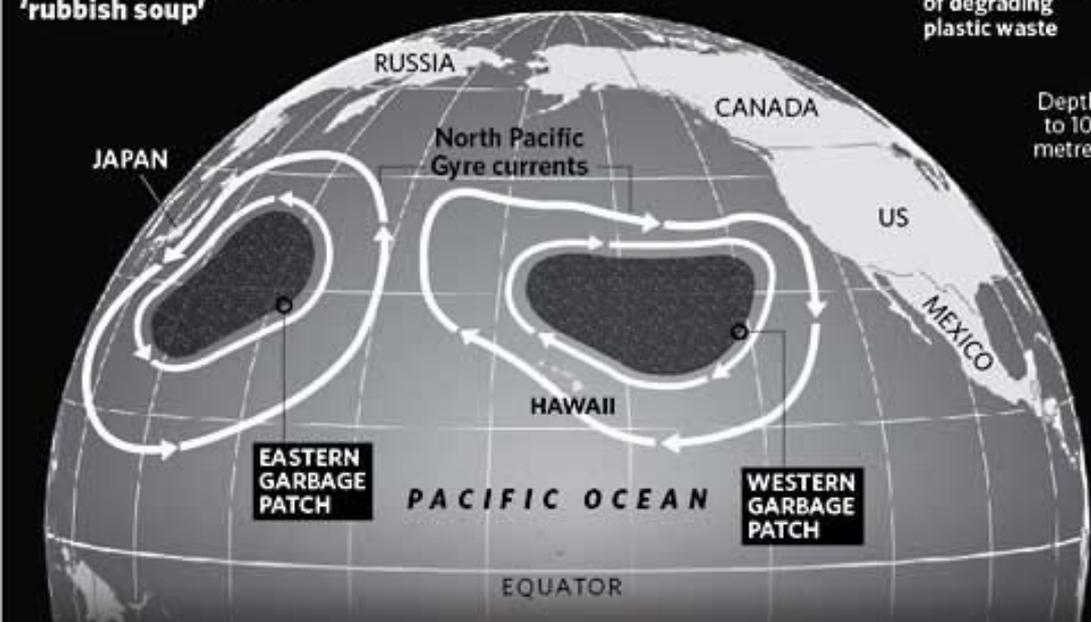


M.GEORGIU

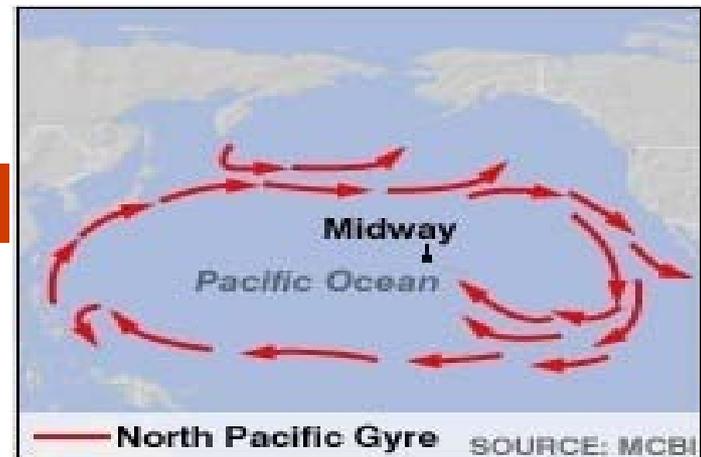
Approximate areas of 'rubbish soup'

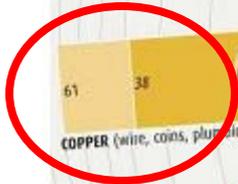
Translucent soup of degrading plastic waste

Depth to 10 metres



## ALBATROSSES ON THE ISLAND OF MIDWAY, CENTRAL PACIFIC





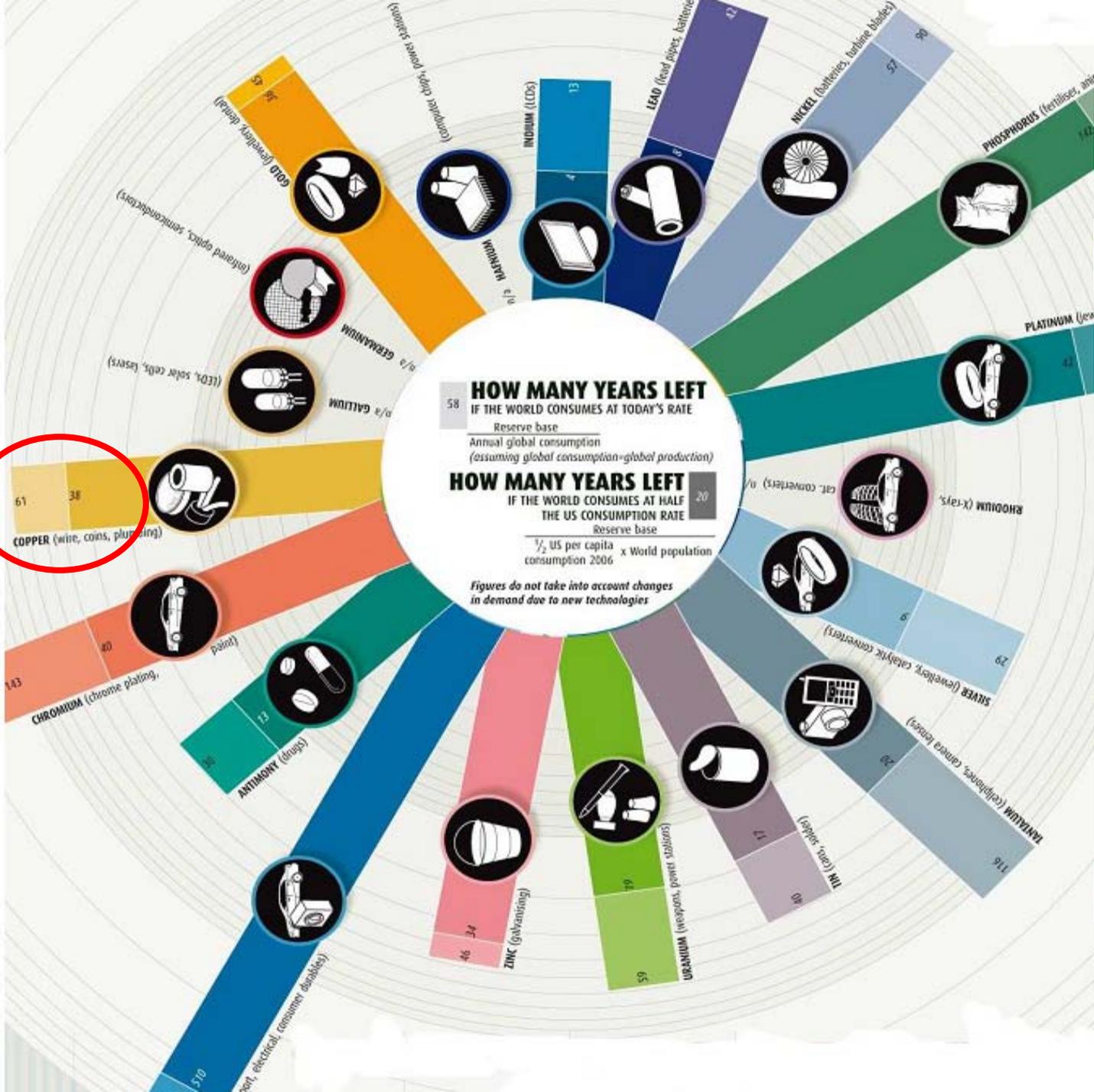
**HOW MANY YEARS LEFT**  
 IF THE WORLD CONSUMES AT TODAY'S RATE

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

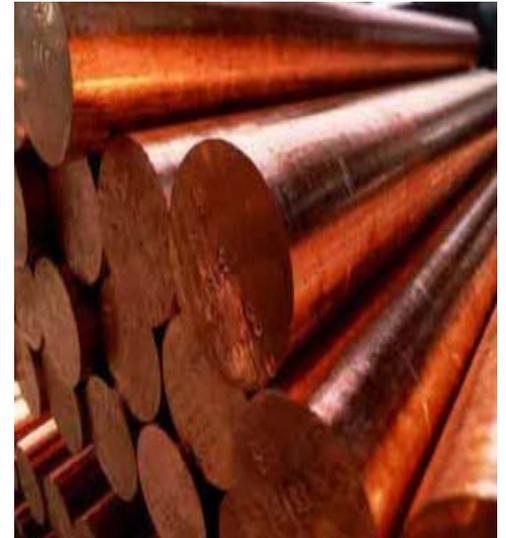
**HOW MANY YEARS LEFT**  
 IF THE WORLD CONSUMES AT HALF  
 THE US CONSUMPTION RATE

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*



## PRECIOUS SLAG FROM WASTE INCINERATION



- Incineration slag contains **13,000 tonnes/a** of copper (average Germany)
- It is worth of **\$ 45 million per year** (Price rate 2009)

WASTE INCERATION=  
POOR MANGAGEMENT

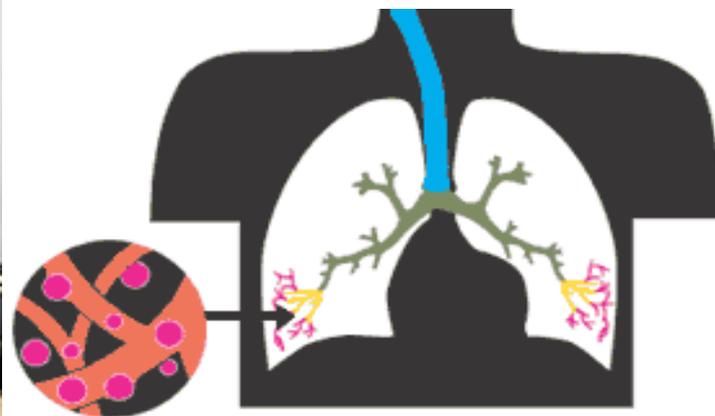


## LOSS OF TOPSOIL

We lose 4000 – 6000 times more topsoil than we rebuild



## TONER DUST AND INDOOR AIR QUALITY



## COST OF POOR INDOOR AIR QUALITY

- **Over 40% of children have allergies.**  
Several decades ago, only 2 – 3% did
- **Every third person in the western world has allergy problems.**
- **Allergies cost the U.S. health care system \$18 billion annually**



**SOLUTION: design materials and products for indoor use**

Source: National Institute of Allergy and Infectious Diseases

## INDOOR AIR QUALITY FOR OUR CHILDREN





**GREEN  
DESIGN**



# HILDON

*Gently Sparkling*

AN ENGLISH  
NATURAL MINERAL WATER  
OF EXCEPTIONAL TASTE

♻️ Printed on 100% Recycled Paper ♻️

Hildon Ltd is a CarbonNeutral® company!



Our goal is zero CO<sub>2</sub> emissions

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](http://www.aimzeroemissions.eu)

**TOYOTA**



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

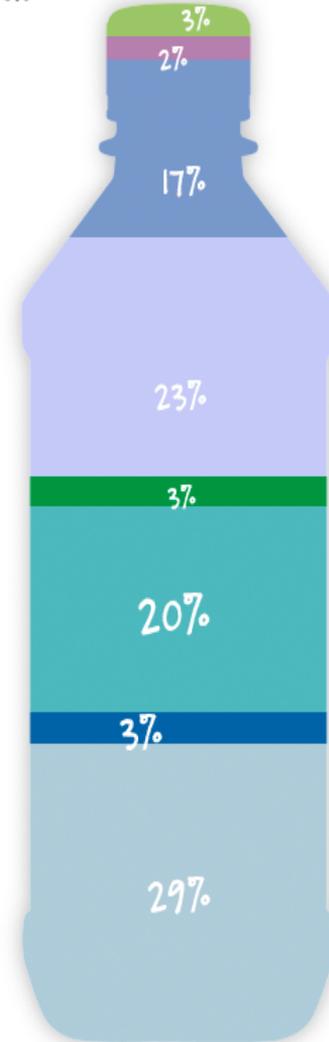


Base year carbon footprint  
(tonnes CO<sub>2</sub>eq)

Total emissions:  
85,396 tonnes CO<sub>2</sub>eq

100%

0%



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

## Something Awkward?





## BENEFITS

All Twinings Classic Herbal Infusions are naturally caffeine free and contain no added sugar, which makes them a perfect choice for a healthy lifestyle.



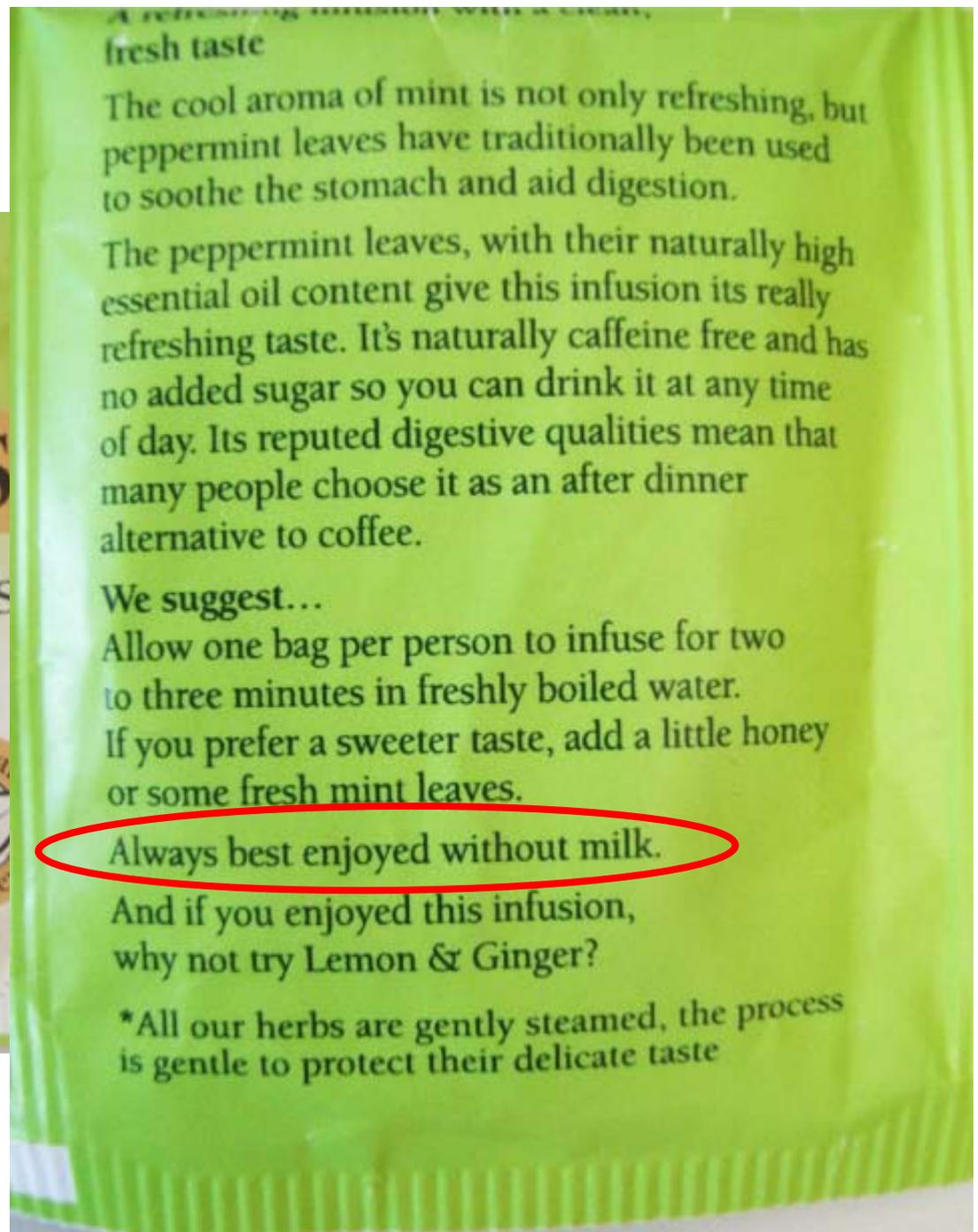
## BREWING INSTRUCTIONS

Allow one teabag per person. Add freshly boiled water to the bag and leave to infuse for 2-3 minutes according to taste.

Can be drunk hot or cold.

To drink cold, prepare with freshly boiled water, allow to cool and consume straight away.

Always drink without milk.



Please Switch off when leaving  
Reduce our carbon footprint



## ARE WE TOO MANY?



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

*Al Gore*

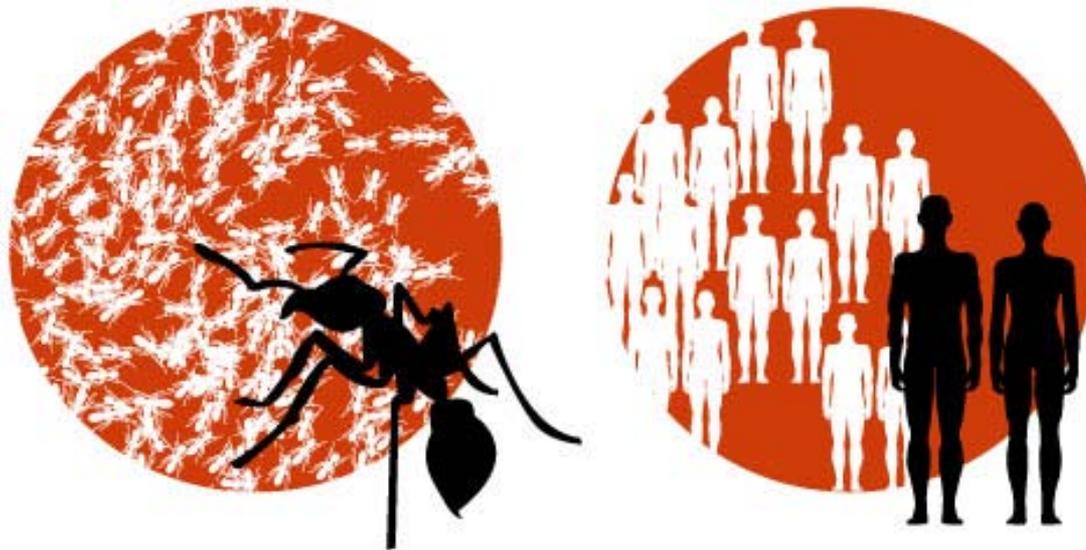
## ARE WE TOO MANY?



## ARE THEY TOO MANY ?

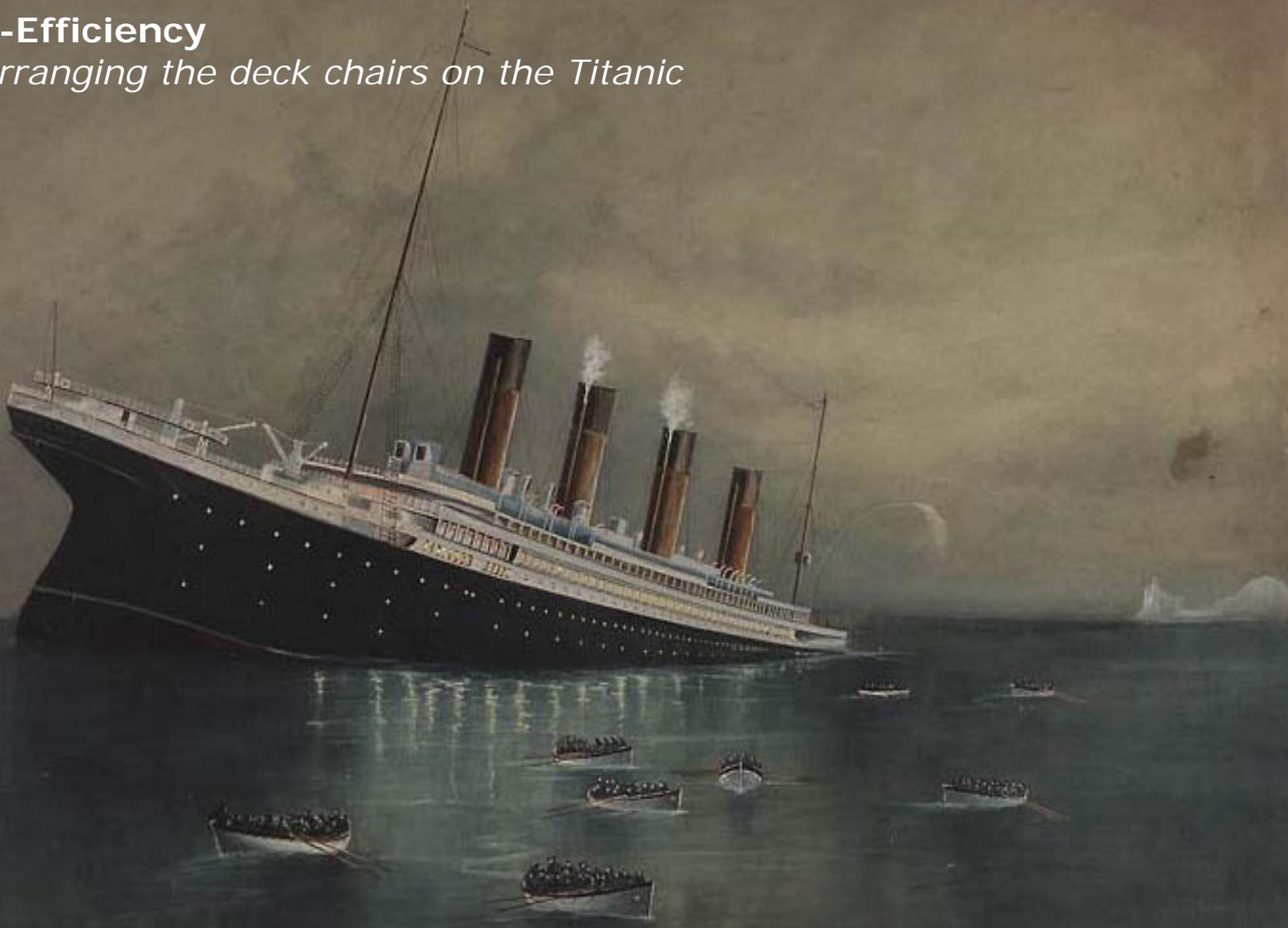


**THE BIOMASS OF ANTS IS FOUR TIMES GREATER THAN THAT OF HUMANS**

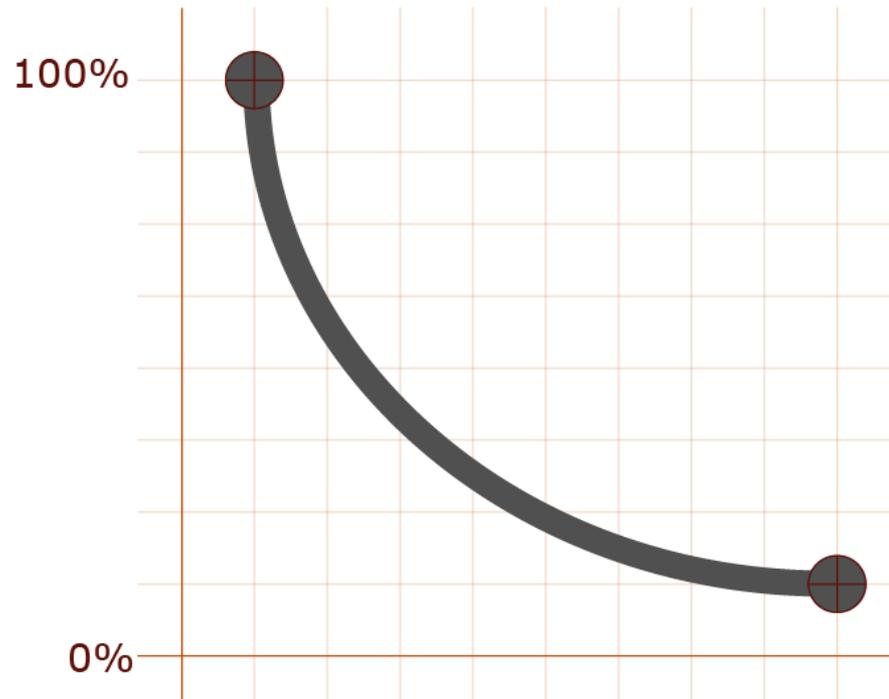


## Eco-Efficiency

*Rearranging the deck chairs on the Titanic*



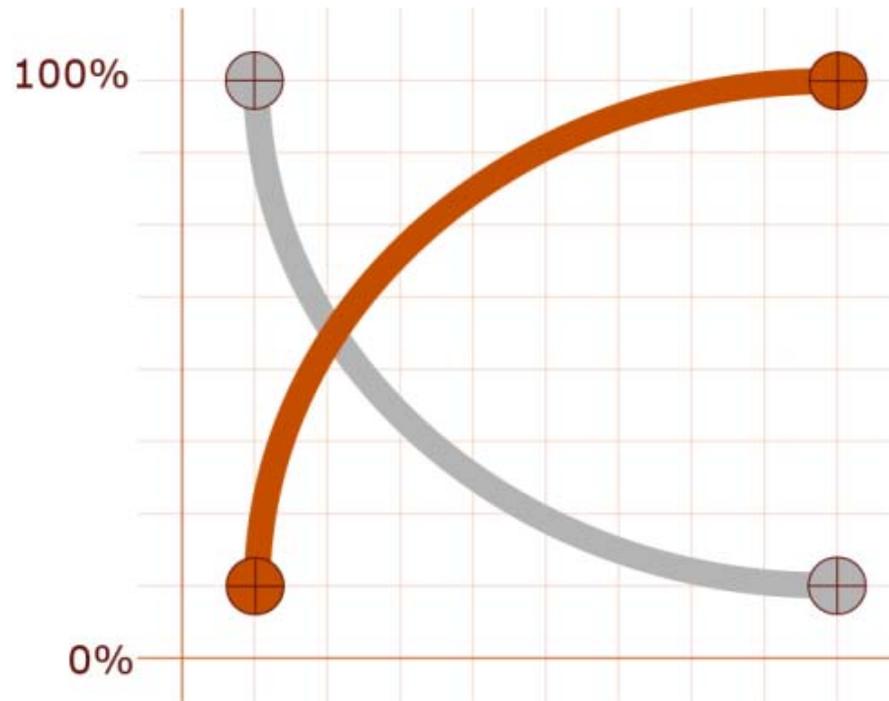
## CRADLE TO GRAVE : TARGET IS ZERO



REDUCTION,  
AVOIDANCE,  
MINIMIZATION,  
PREVENTION.

**ECO-EFFICIENCY**

## CRADLE TO CRADLE® : GOAL IS QUALITY

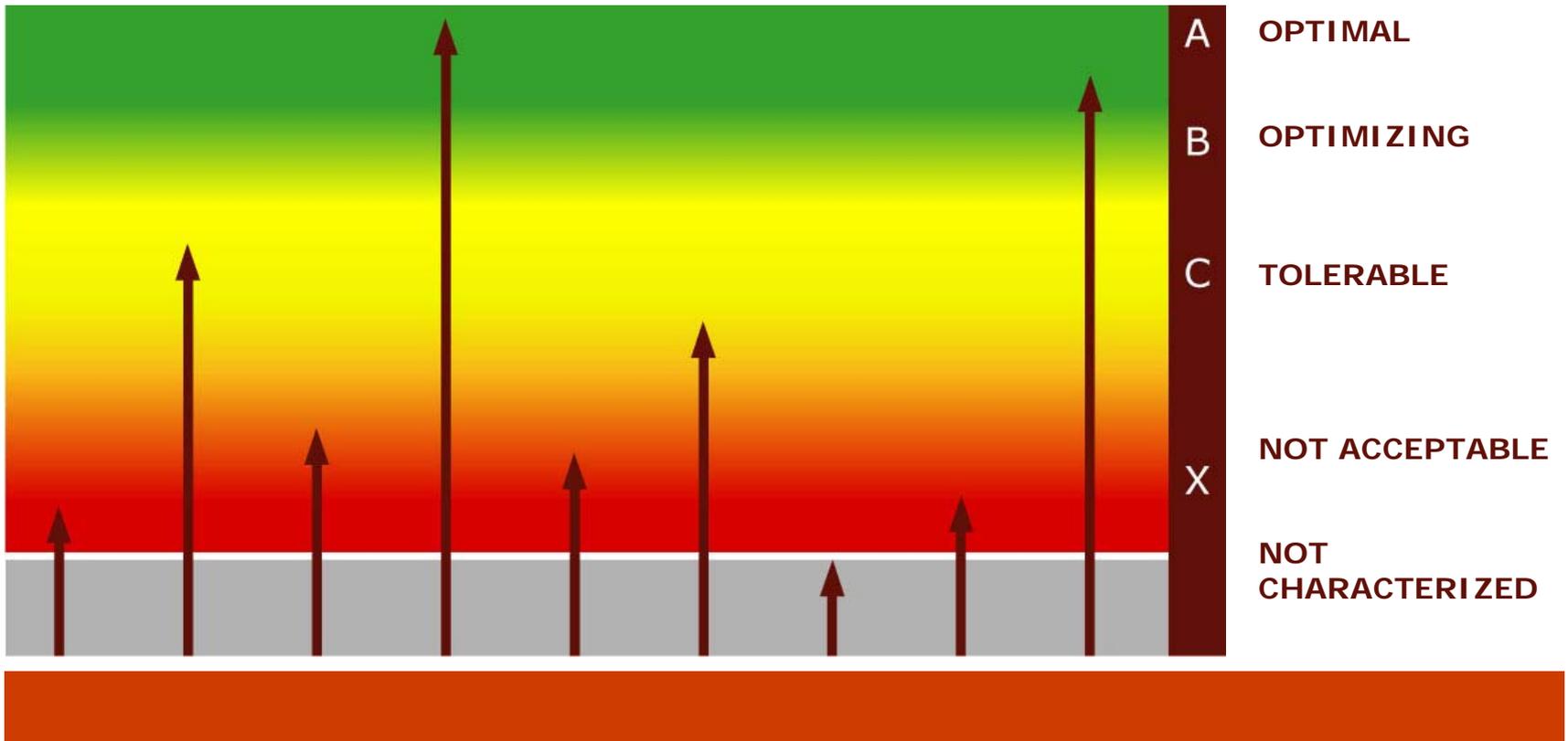


**ECO-EFFECTIVENESS**

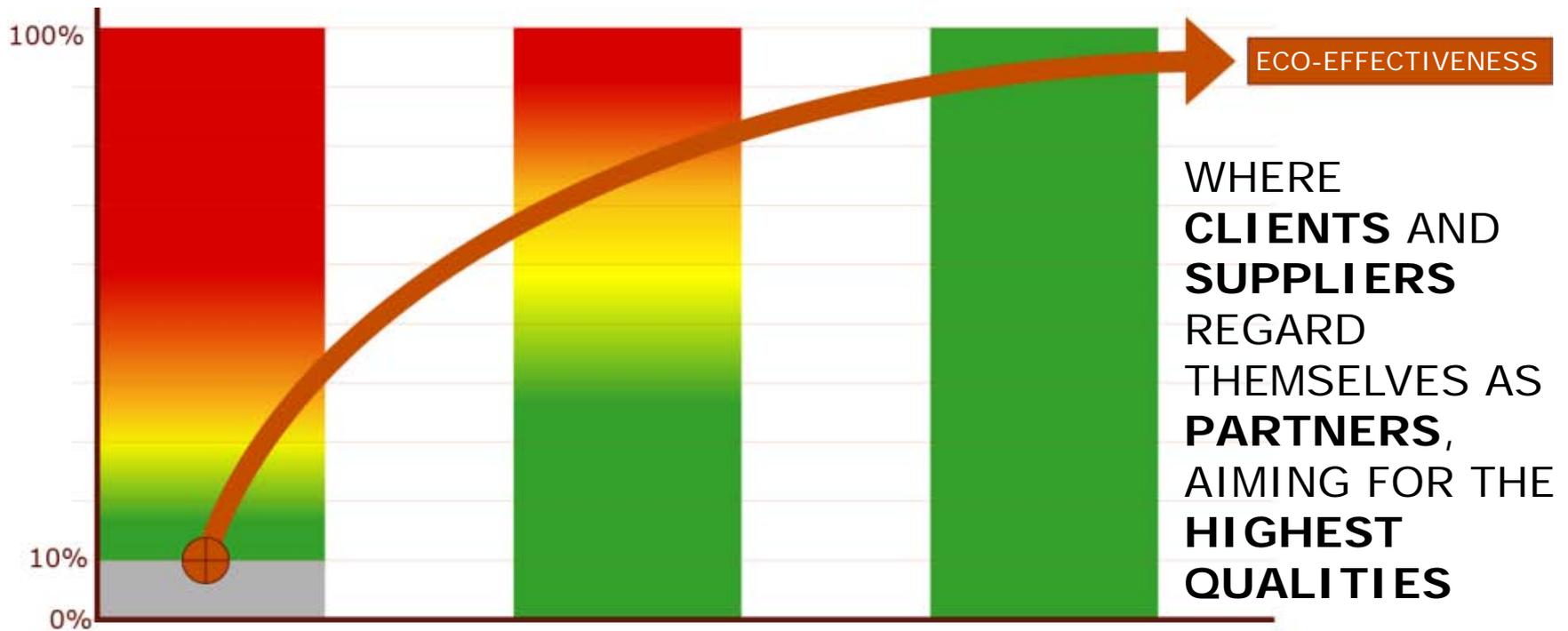
DEFINE,  
INCREASE,  
SUPPORT,  
OPTIMIZE

ECO-EFFICIENCY

## IDENTIFY THE BEST: ABC-X CATEGORIZATION



## PROGRESS OF QUALITY FROM *CRADLE TO CRADLE*® WITH TIME



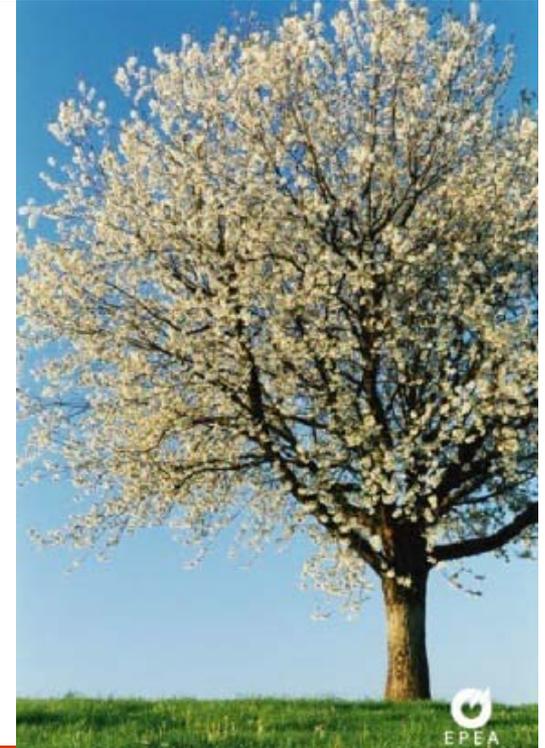
**CRADLE TO CRADLE®: DOING THE RIGHT THINGS!**

DOING THINGS  
RIGHT

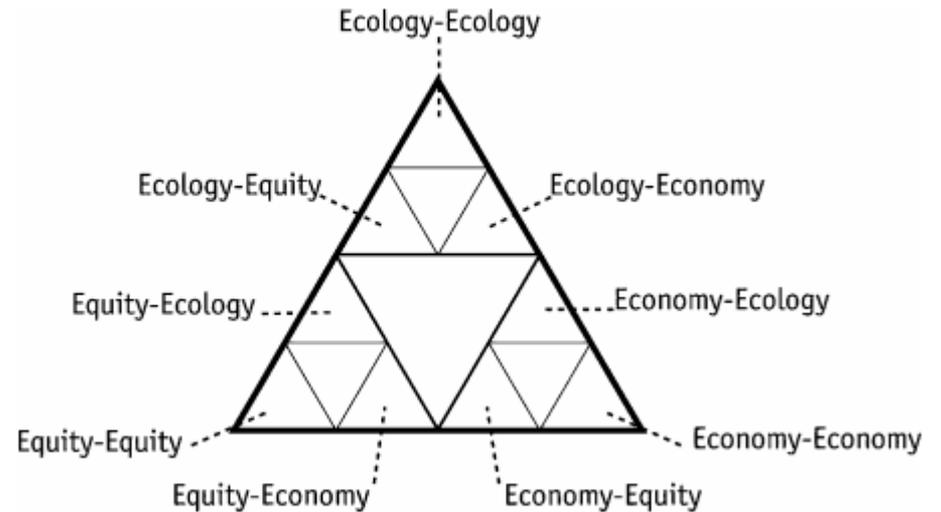
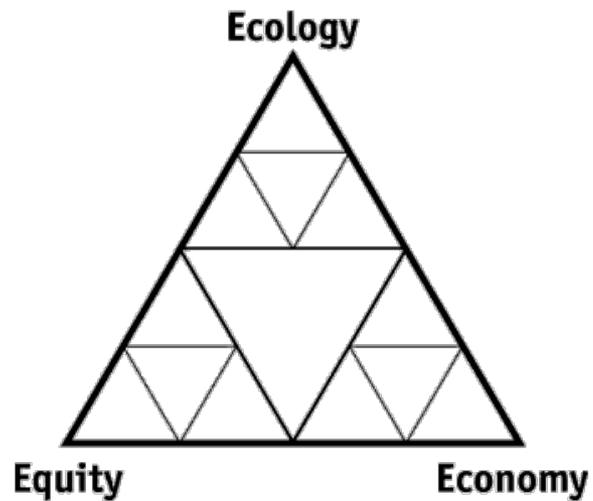


## **CRADLE TO CRADLE® DESIGN PARADIGM**

- **WASTE EQUALS FOOD**  
**(NUTRIENTS ARE NUTRIENTS)**
- **USE CURRENT SOLAR INCOME**
- **CELEBRATE DIVERSITY**



## TRIPLE TOP LINE



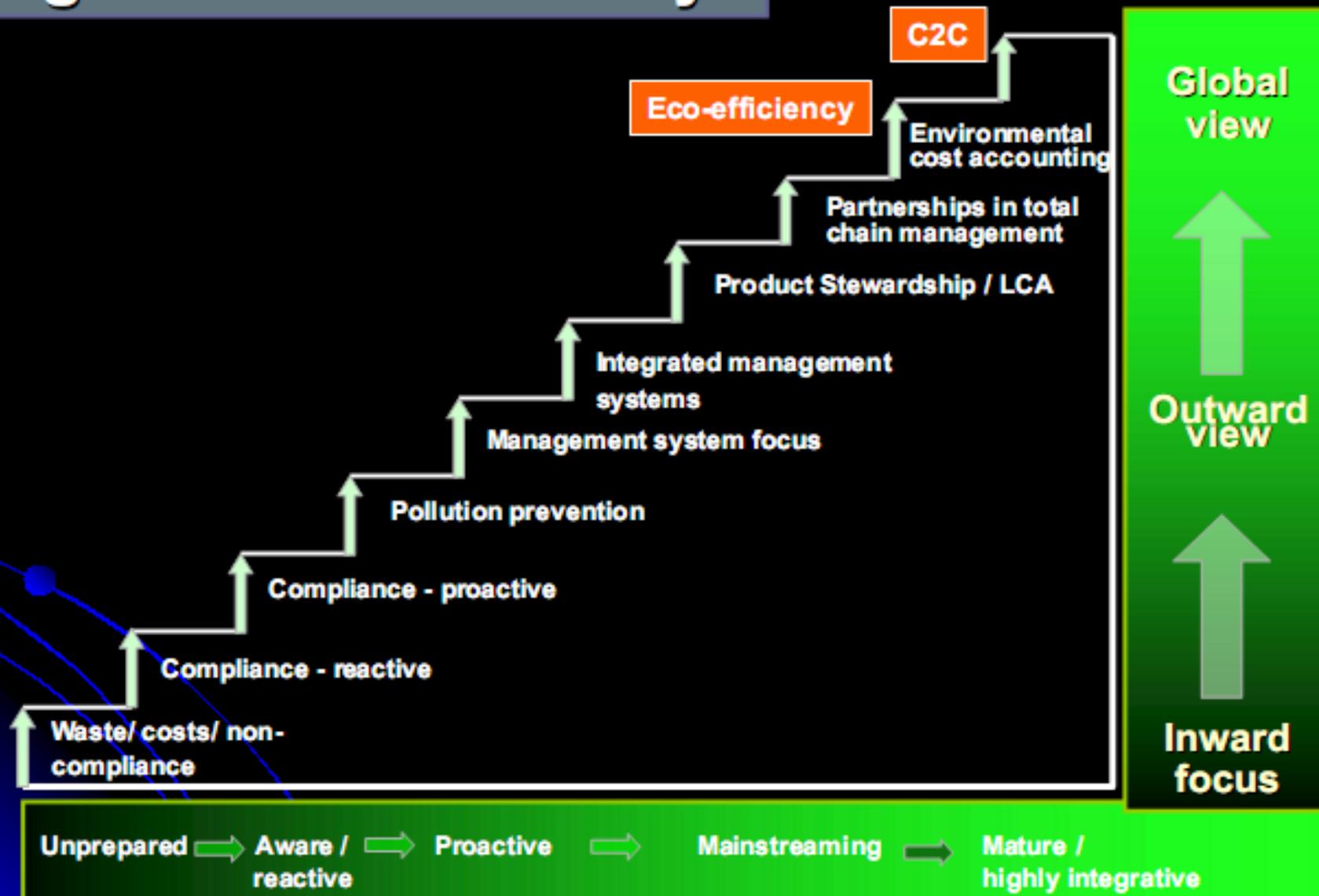
## DEVELOPMENT OF A *CRADLE TO CRADLE*<sup>®</sup> PRODUCT

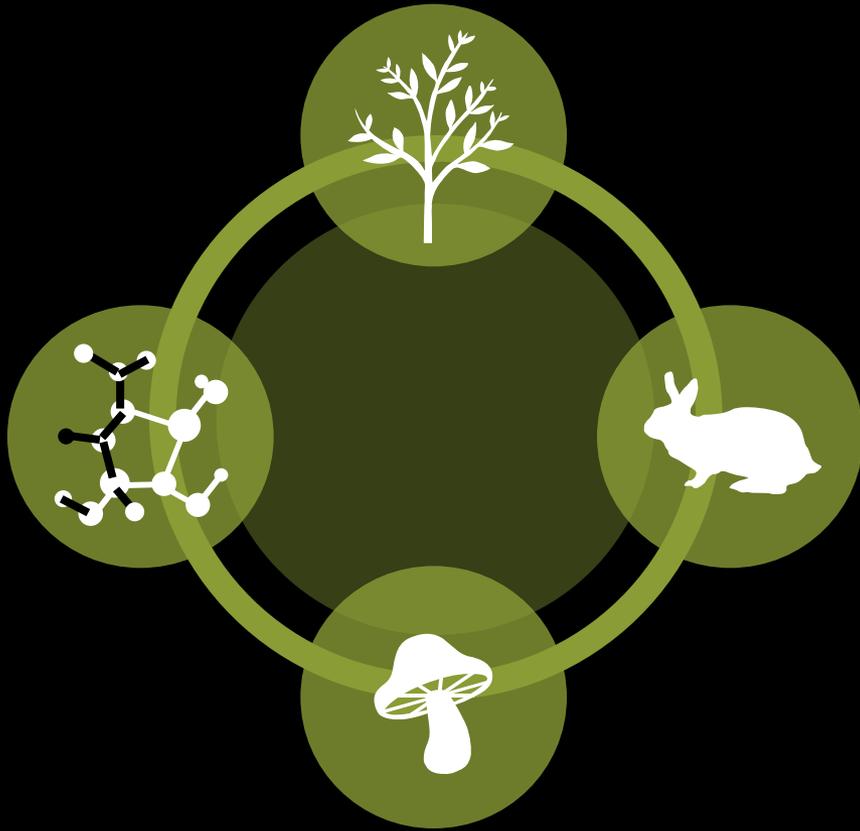
Target



7. Production / Implementation
6. Product design
5. Development of Positive Lists
4. ABC-X-categorization of ingredients with respect to criteria
3. Selection of criteria to be met by the product
2. Which metabolism: biological or technical?
1. Analysis of product utilization: consumption or service product?

# Design for Sustainability



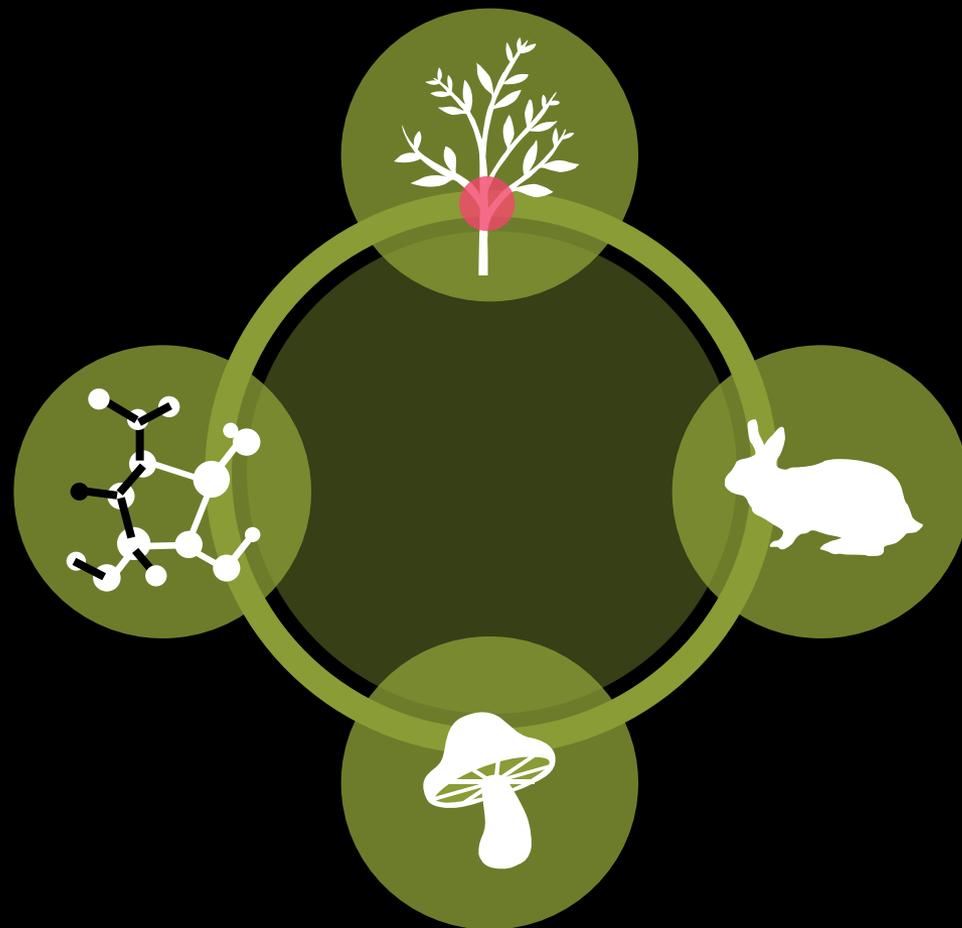


Biological  
Metabolism



Technical  
Metabolism

# Biological Nutrient



# CLIMATEX® LIFECYCLE™ : *BIOLOGICAL NUTRIENT*



## KLM - COMPOSTABLE AIRPLANE SEAT PROTOTYPE

# 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.

# TRIGEMA BIODEGRADABLE T-SHIRT

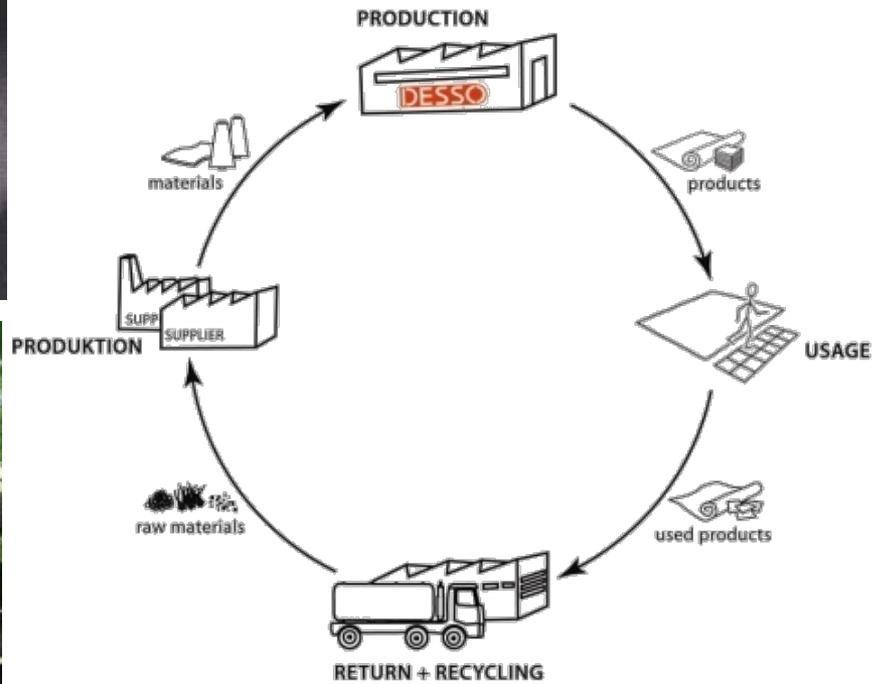


**NEW DIMENSIONS OF QUALITY FOR APPAREL GOODS**  
- User's Health  
- Safe for the Environment

# Technical Nutrient



# DESSO: CRADLE TO CRADLE® FLOOR COVER



## TECHNICAL NUTRIENT

32 seconds



# MIRRA CHAIR- HERMAN MILLER: TECHNICAL NUTRIENT



## SHAW CARPETS: *TECHNICAL NUTRIENT*



## CRADLE TO CRADLE MATERIALS INNOVATION PLATFORM



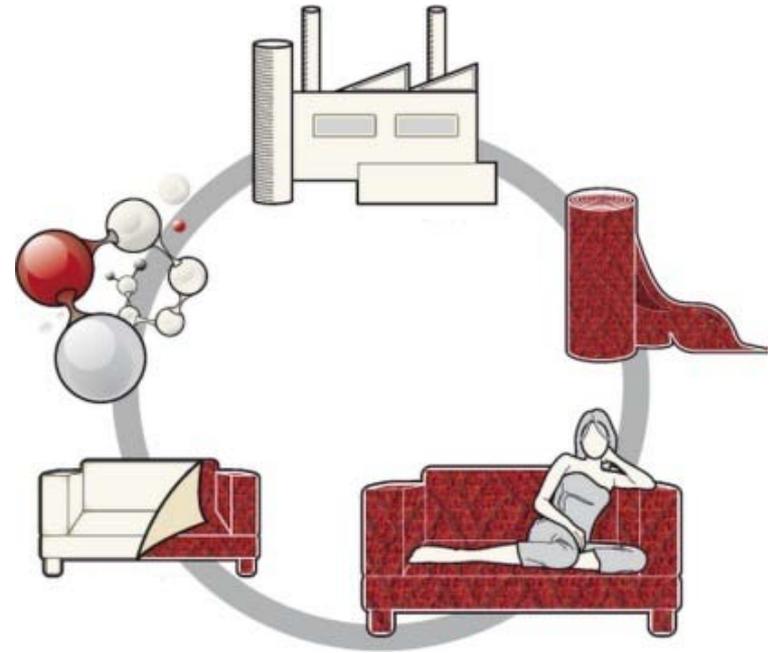
## CRADLE TO CRADLE® MATERIALS PLATFORM



FROM ECO-EFFICIENCY TO  
ECO-EFFECTIVENESS

DSM AT NUTEC 2008

## RETURNITY: THE FABRIC OF MANY LIVES





MANAGING NUTRIENTS, NOT WASTE

van Gansewinkel Groep 

# COPPER

# MATERIAL CYCLES



## TAKE-BACK, AND THEN ...?

**Responsibility for subsequent Material Cycles ultimately lies with Producer**

- Design for dis-assembly – integral to any take-back system
- Purveying further nutrient flows
- Fostering partnerships for Material pooling



**Help keep electronic waste from growing.**

## BIOMASS NUTRIENT RECYCLING



[www.hamburger-umweltinst.org](http://www.hamburger-umweltinst.org)

*Improve fertility by treating wastewater*



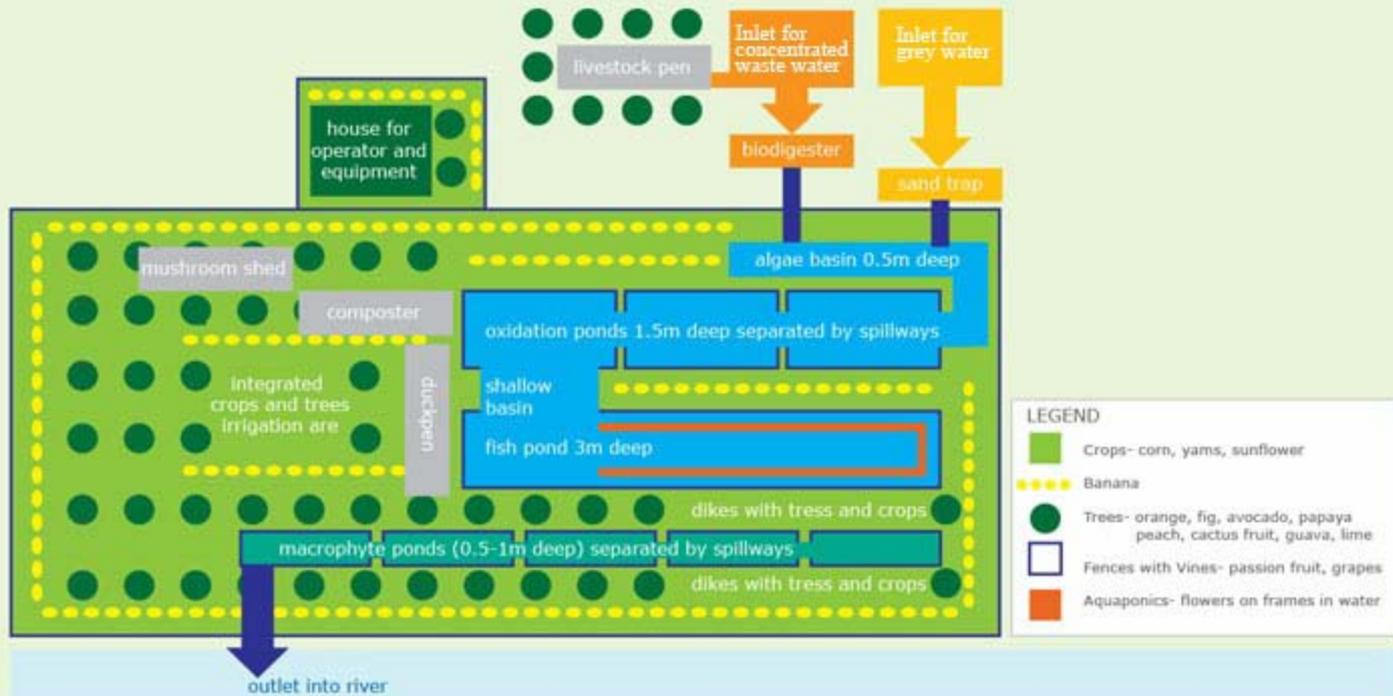
## OIA INSTITUTO AMBIENTAL LATIN AMERICA

- Soil recovery
- Nutrient recycling
- Energy from Biomass
- Social justice
- Economic profitability

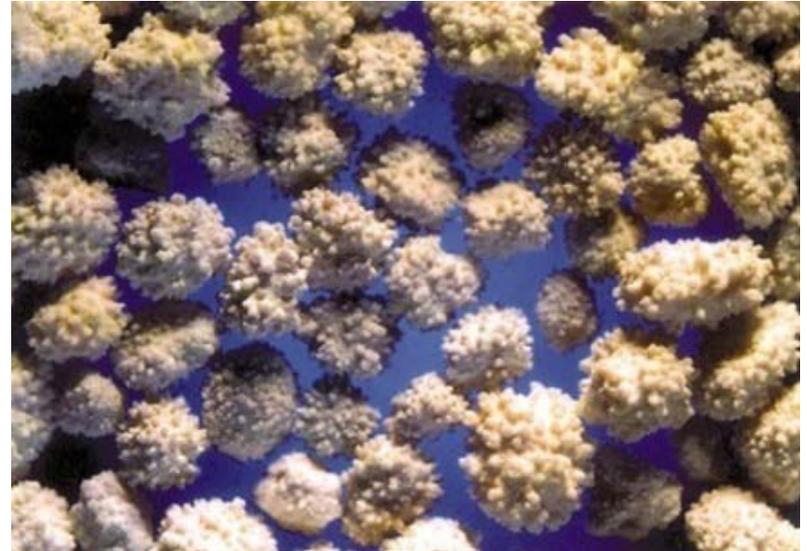


[www.oia.org.br/new/](http://www.oia.org.br/new/)

# BIOMASS NUTRIENT RECYCLING: SEWAGE TREATMENT



## PHOSPHATE RECOVERY



## „HORIZONTAL CHIMNEYS“

USING CO<sub>2</sub> & HEAT TO GROW e.g. ALGAE - *HAPPY SHRIMPS & E-ON,*  
ROTTERDAM



# Bionorica: Building like a tree

HEIDELBERGCEMENT

DESSO  
The Floor is Yours

backhau<sup>en</sup>  
interior textiles



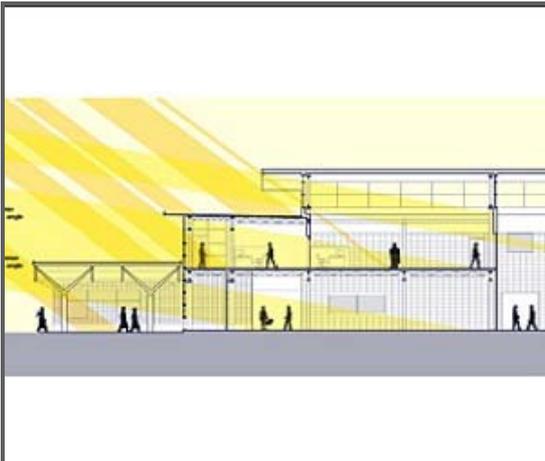
SCHÜCO

Xero floor®

Herman Miller

Building: BIONORICA NEUMARKT

# HERMAN MILLER "GREEN HOUSE" FACTORY





SCHÜCO

KEEPING  
MATERIALS  
WHILE  
SELLING THE  
USE OF  
SERVICES

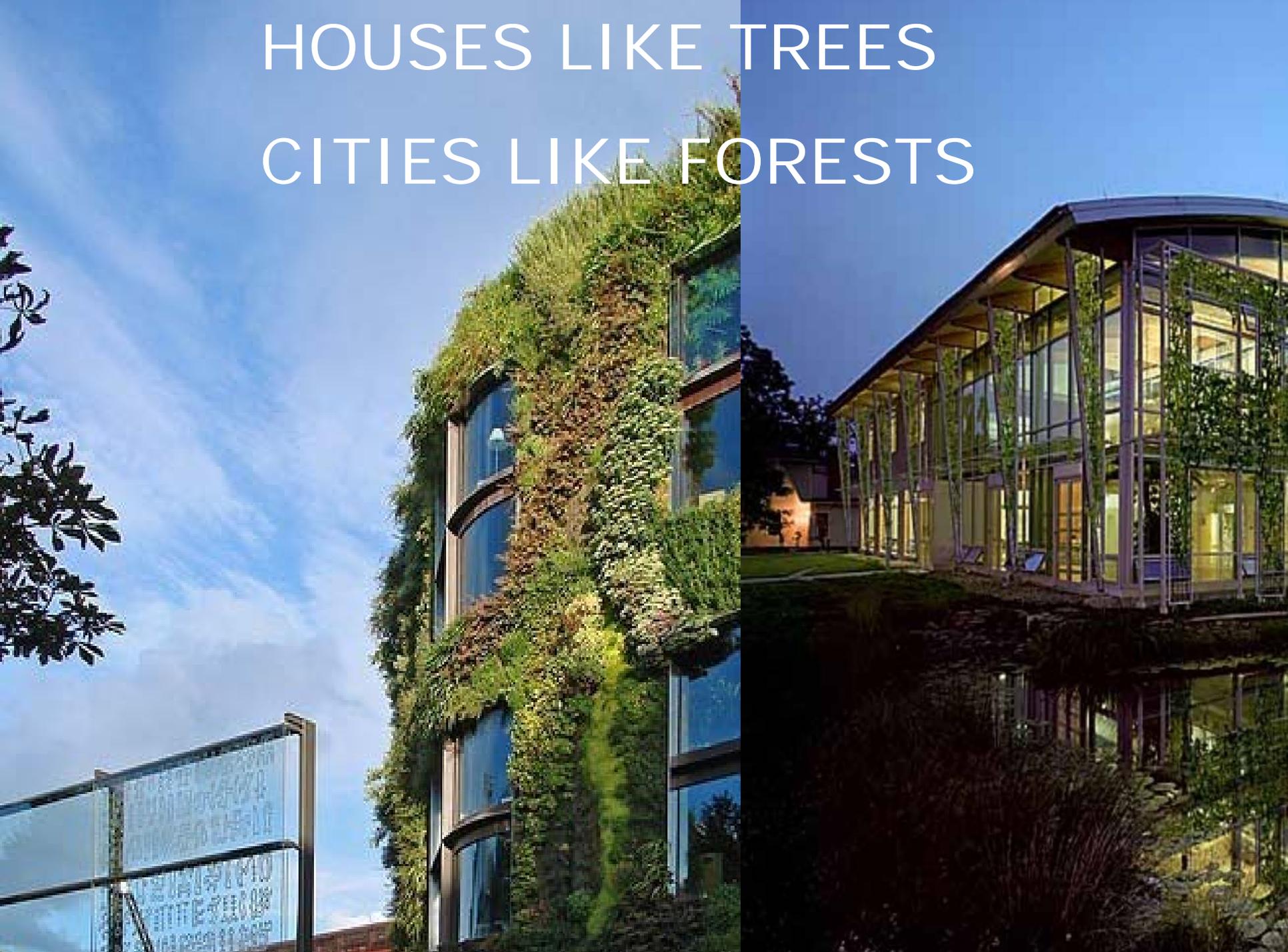


"The greenest house  
is the one that never  
gets built."

— Whit Faulconer, [GreenBlue](#)



# HOUSES LIKE TREES CITIES LIKE FORESTS



# WILLIAM MCDONOUGH: HOUSES LIKE TREES, CITIES LIKE FORESTS



FORD ROUGE CENTER



ADAM JOSEPH SMITH CENTER FOR ENVIRONMENTAL STUDIES OBERLIN, OH

## FORD RIVER ROUGE LIVING ROOF DESIGN



XEROFLOR: „RAISED FLORA“

### FORD ROUGE CENTER LIVING ROOF DESIGN

#### Sedum plants

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

#### Vegetation blanket

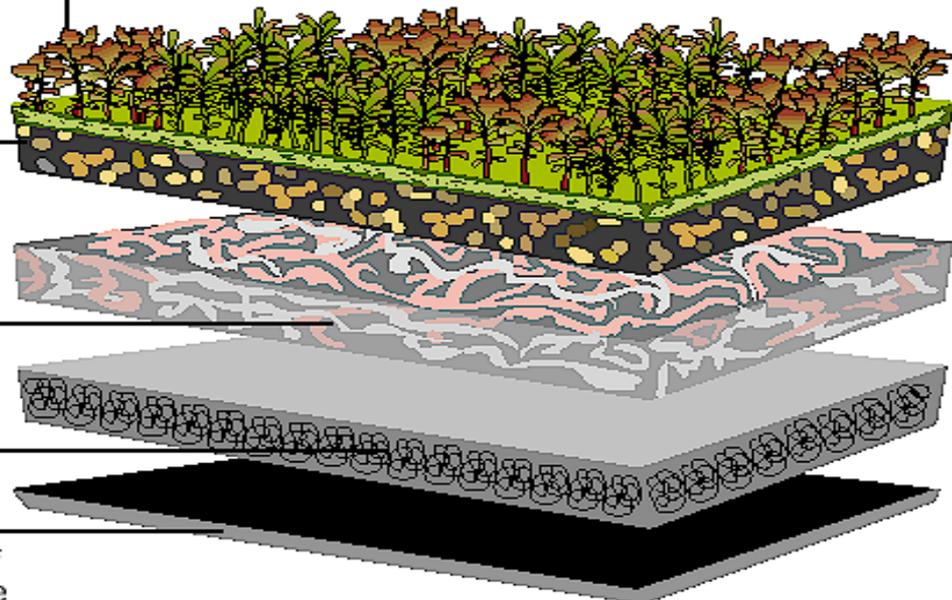
A semi-organic material containing shale, sand, peat, compost and dolomite

#### Fleece

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

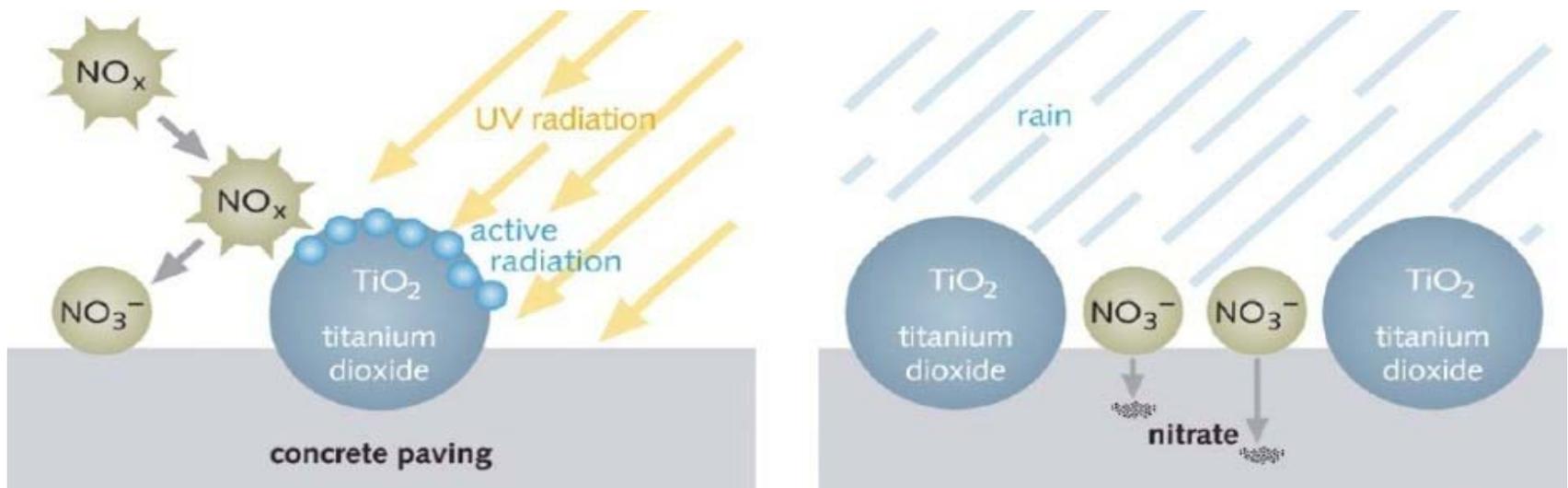
#### Drainage layer

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



2.5" to 3"

## AIR POLLUTANTS CAPTURE VIA CONCRETE: TioChem



Nitrate monoxide from the surrounding air is being transformed into Nitrate ( $\text{NO}_3^-$ ) which is then being washed down by rain and serves as nutrients to the soil

## WHO CAN CONTRIBUTE TO SOLUTIONS?

Producer of Chemicals

Recycler

„Filler“, Retailer



Quality Community



Producer

Logistics

Organisations

## van Gansewinkel – 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!“

van Gansewinkel Groep



Ruud Sondag – CEO  
Van Gansewinkel Group



**DESSO**



**Carpets for cleaner indoor air.**

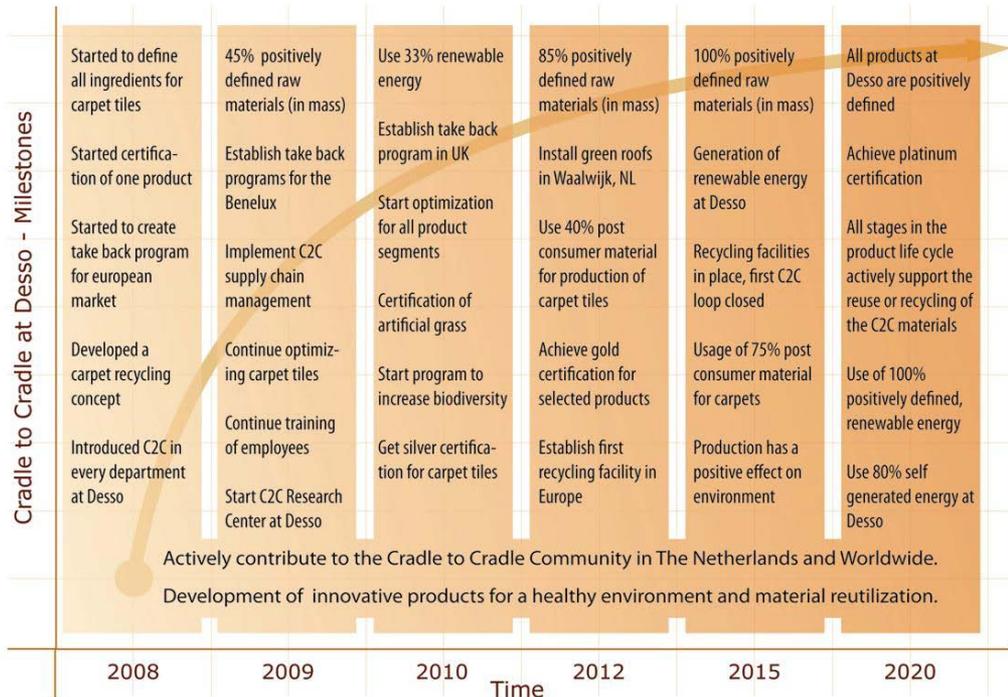
Stef Kranendijk, Desso  
CEO



## CEO of Desso

With Cradle to Cradle, Desso is in it for the long haul. It's a challenging task which will involve the creation of entirely new products and technologies.

But it's a task we're proud to undertake, for the betterment of our products, our brand, the people and our planet.



# The BEL-AIR Bio Filter



LEDs:  
LIGHT BULBS  
with  
no mercury



SPOTLIGHT

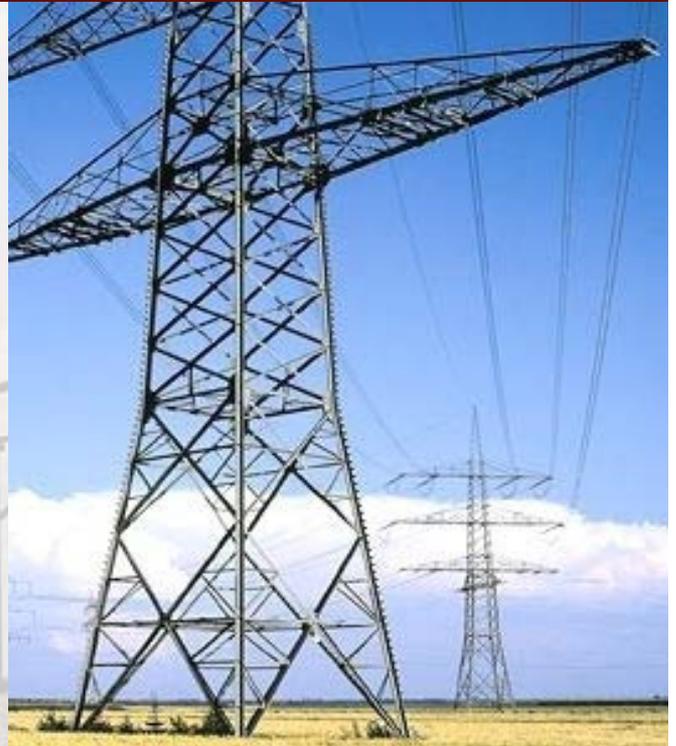


VIVID



VIVID PLUS

## WINDMILLS ON TRANSMISSION TOWERS



# ***Vestas***<sup>®</sup>

No. 1 in Modern Energy

**39,000 WINDMILLS WORLDWIDE**





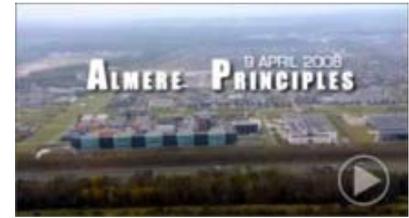
## EXAMPLE OF A CRADLE TO CRADLE® PLATFORM



cradle to cradle islands



THE NETHERLANDS



The International Center for Sustainable Excellence

Park 20|20



A2 Tunnel Maastricht

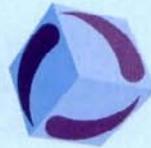




# Partners in the Netherlands



# cradle to cradle islands



## The partnership



The C2CI project is funded within the Interreg North Sea Programme



The Interreg IVB  
North Sea Region  
Programme

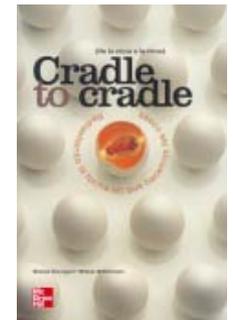
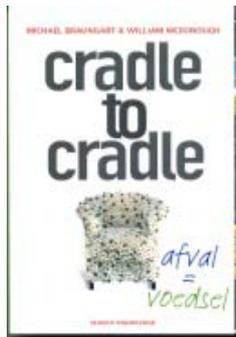
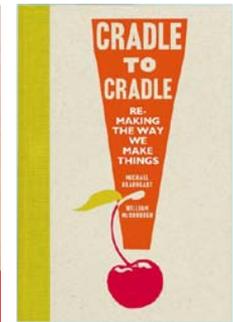
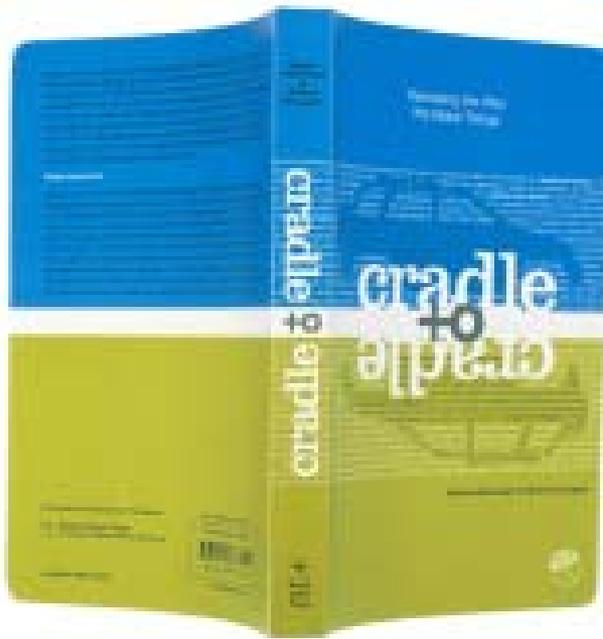


provinsje fryslân  
provincie fryslân

## BENEFICIAL ECOLOGICAL FOOTPRINT



# CRADLE TO CRADLE®: REMAKING THE WAY WE MAKE THINGS





## NUTEC - Gateway to Industrial Change

### International Congress and Exhibition for Innovation and Intelligent Design



Join Us for the next Nutec, November 2010  
FRANKFURT, GERMANY

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cradle to cradle

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