Lupranol BALANCE 50

High Performance. Naturally.

UTECH Europe 2009 Conference

MECC, Maastricht, The Netherlands

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Agenda

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1. BASF Sustainability
2. Lupranol BALANCE 50
3. Eco-Efficiency Analysis
4. Results

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BASF Sustainability
High-level commitment

"For us, sustainable enterprise means combining economic success with environmental protection and social responsibility, thus contributing to a high quality of life for coming generations."

CEO, Jürgen Hambrecht

BASF 2015
Four strategic guidelines for long-term success

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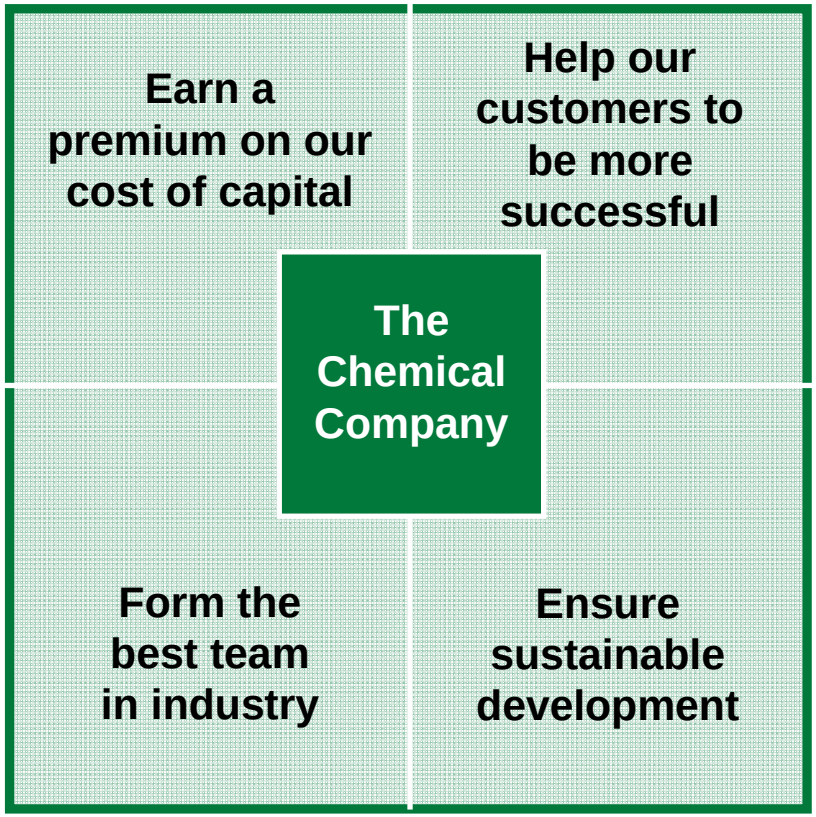
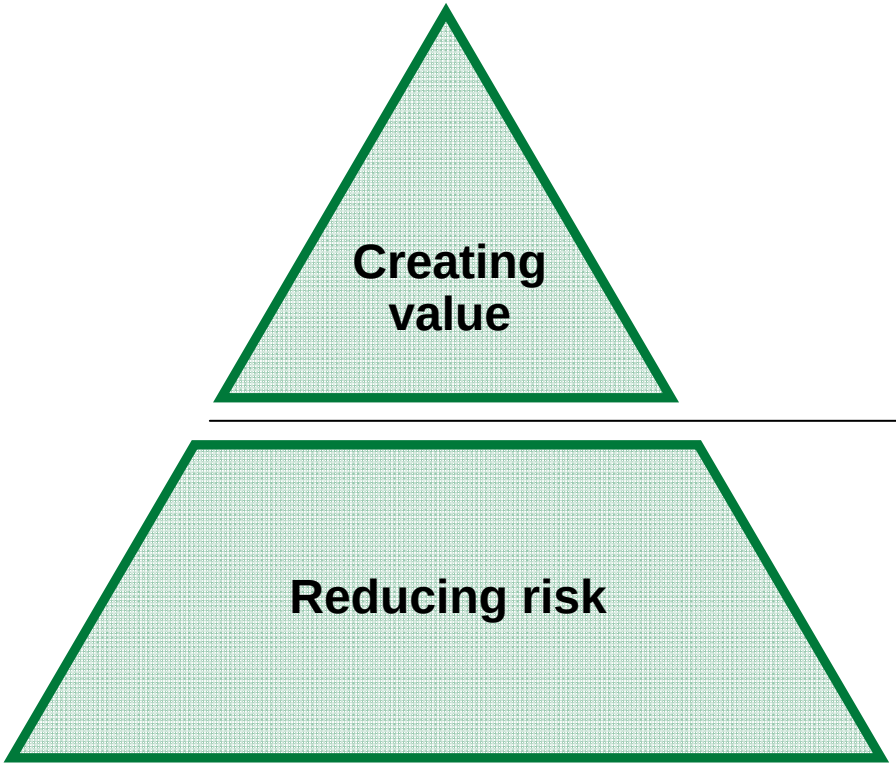


Sustainable development
Long-term economic success

BASF 2015:
“Ensure sustainable development”



- Integrate sustainability in customer relationships
- Develop new target groups and markets

- Identify relevant sustainability issues
- Develop tailored solutions
- Reduce reputational risks
- Transparent communication

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Castor Oil
Basics

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fast growing plant

40 – 50 % oil content

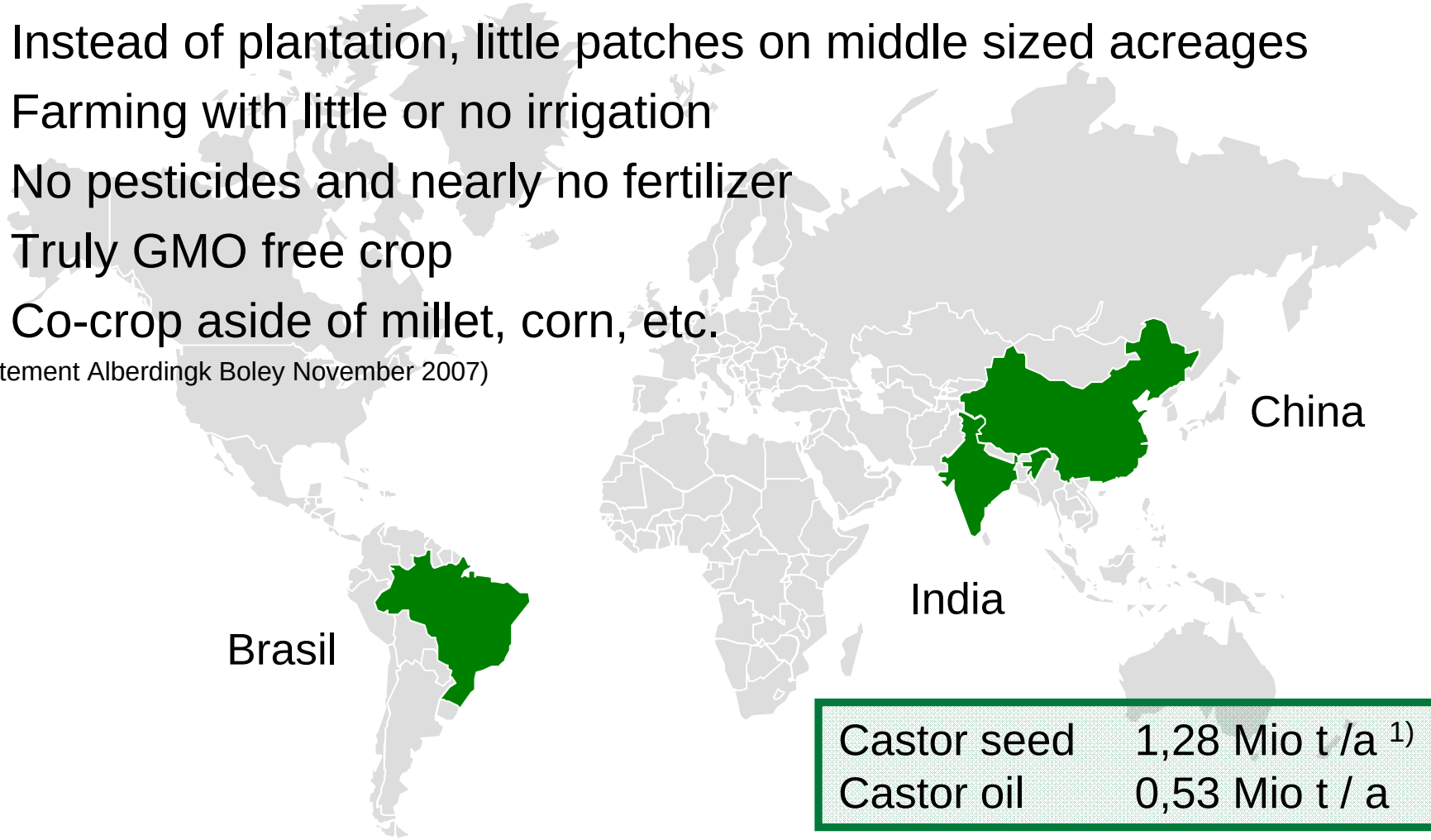
application in medicine, cosmetic and industry

OH-functional non-edible vegetable oil

Castor Oil
Cultivable Area

- Instead of plantation, little patches on middle sized acreages
- Farming with little or no irrigation
- No pesticides and nearly no fertilizer
- Truly GMO free crop
- Co-crop aside of millet, corn, etc.

(Statement Alberdingk Boley November 2007)



Castor seed	1,28 Mio t /a [1)]
Castor oil	0,53 Mio t / a

[1)] Alberdingk Boley: Rizinussaaternten Februar 2008

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DMC: Double-metal cyanide catalysis

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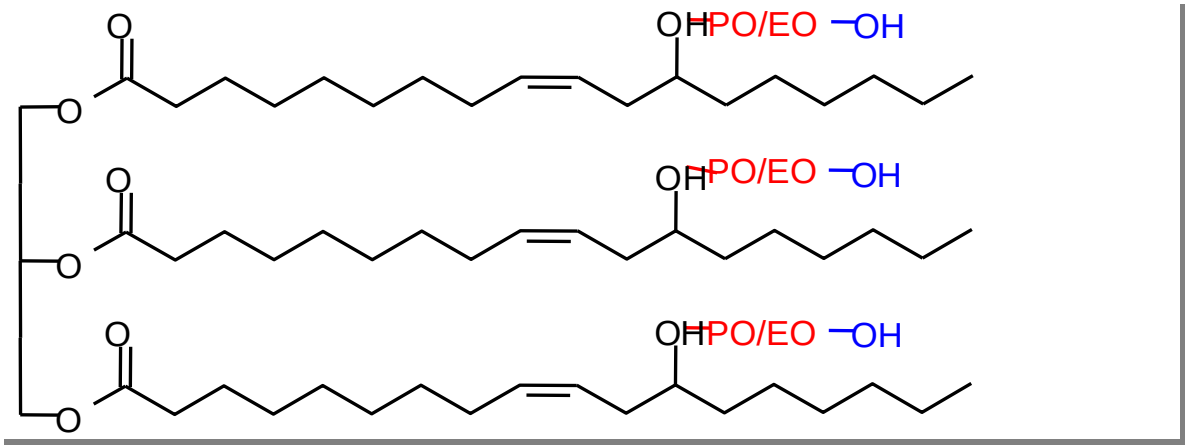
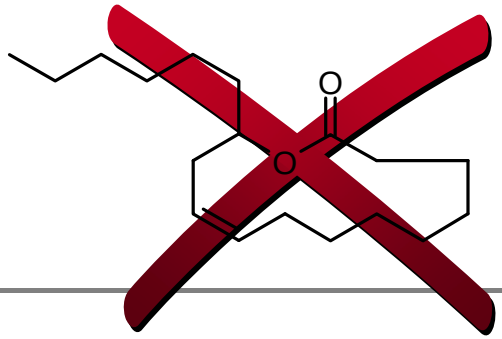
Castor oil —DMC→ PO/EO



- Neutral
- No saponification
- No ring-formation of ricinoleic acid
- Low in odors



Odor!

Lupranol BALANCE 50
Polyol Properties

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- OH-Number 50 mg KOH/g
- Functionality 2.7
- Viscosity 725 mPa·s
- Excellent Odor 1.2
- Biomass 31 %

Lupranol®
BALANCE

Lupranol BALANCE 50

- Good processing profile
- Good mechanical properties
- Low emission – Low odor
- 25 % of renewable raw material in the foam

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Environmental Profile
„From the Cradle to the Workgate“

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Environmental impact over the entire life cycle*

Consumption of Energy	Emissions	Toxicity Potential	Risk Potential	Consumption of Raw Materials	Land Use
• Described by Primary Energy • Fossil and renewable resources are included before production or harvest	• Described by categories - Air - Water - Solids	• Definition for hazardous materials used by EU law • Maximum possible hazard used	• Risk assessment approach • Based on published statistical data (e.g. insurance associations)	• Materials are weighted according to reserves and global consumption	• Index calculated by assessment criteria and impact factors

**Data acquisition and calculation is done according to ISO 14040 and 14044 (ecological part)*

System boundaries
Compare Slab-Polyol vs. Lupranol BALANCE 50

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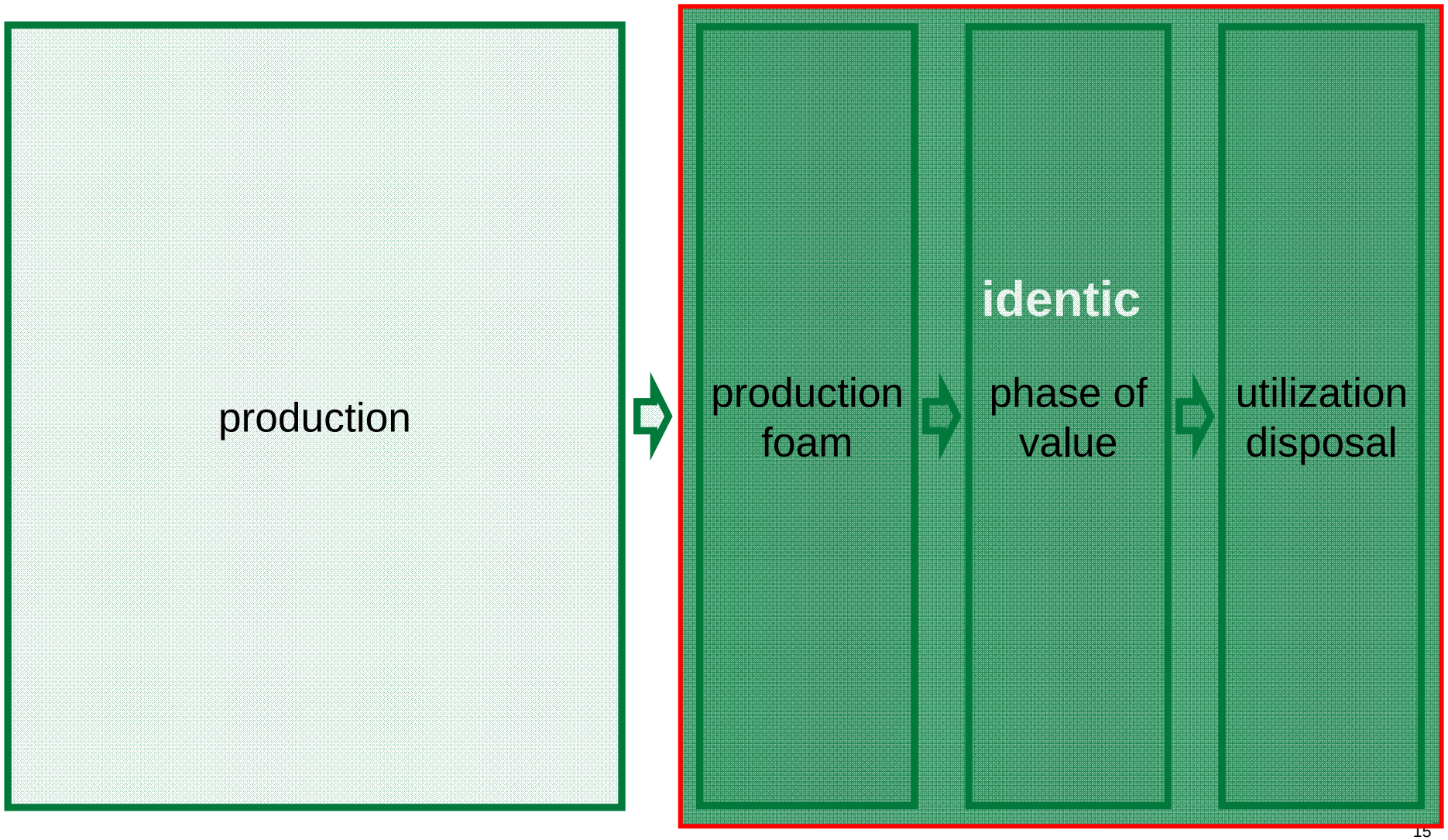
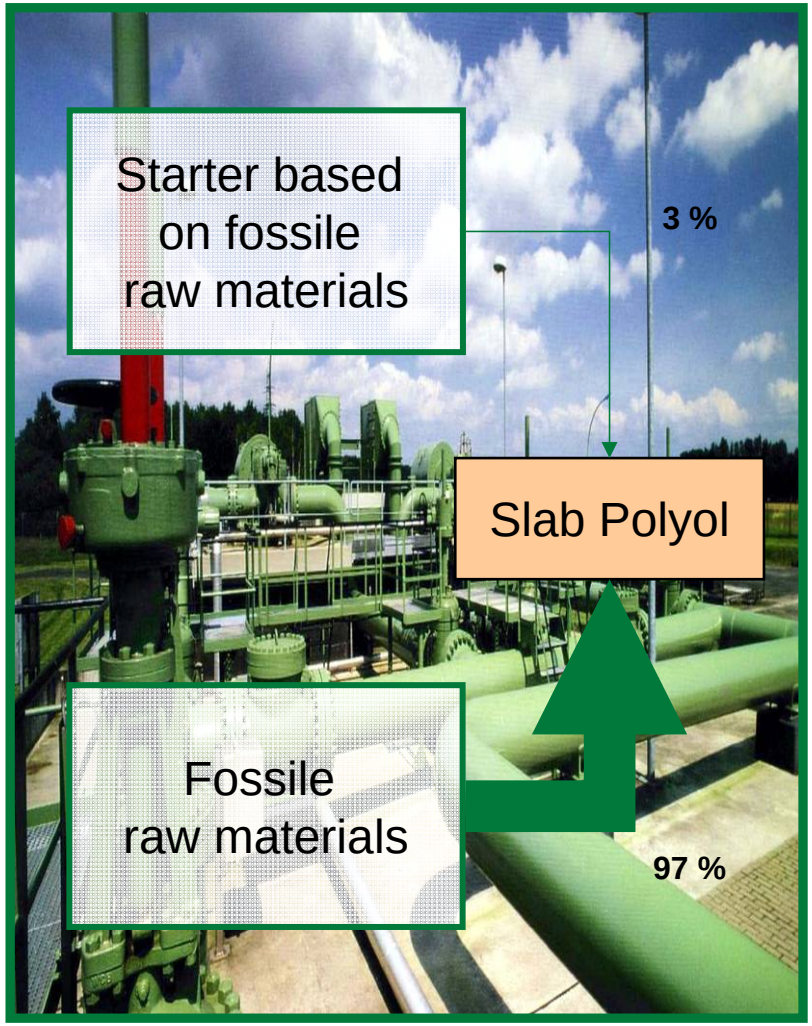


System boundaries
Production Slab Polyol



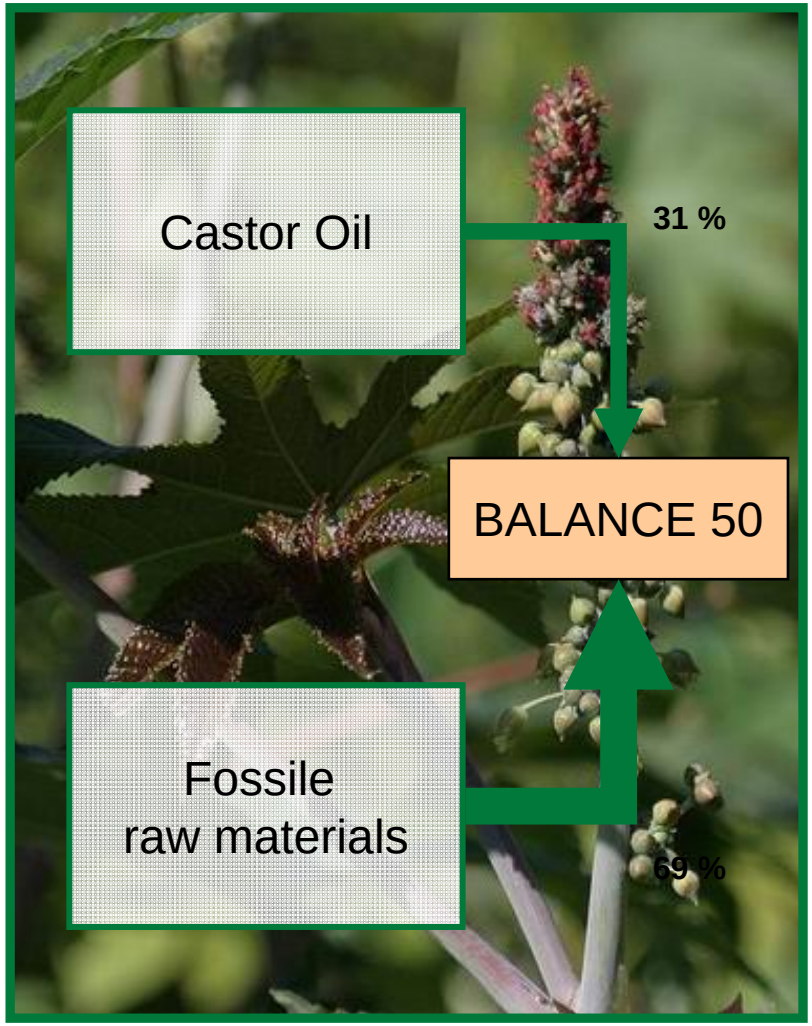
production foam

identic

phase of value

utilization disposal

System boundaries
Production Lupranol BALANCE 50



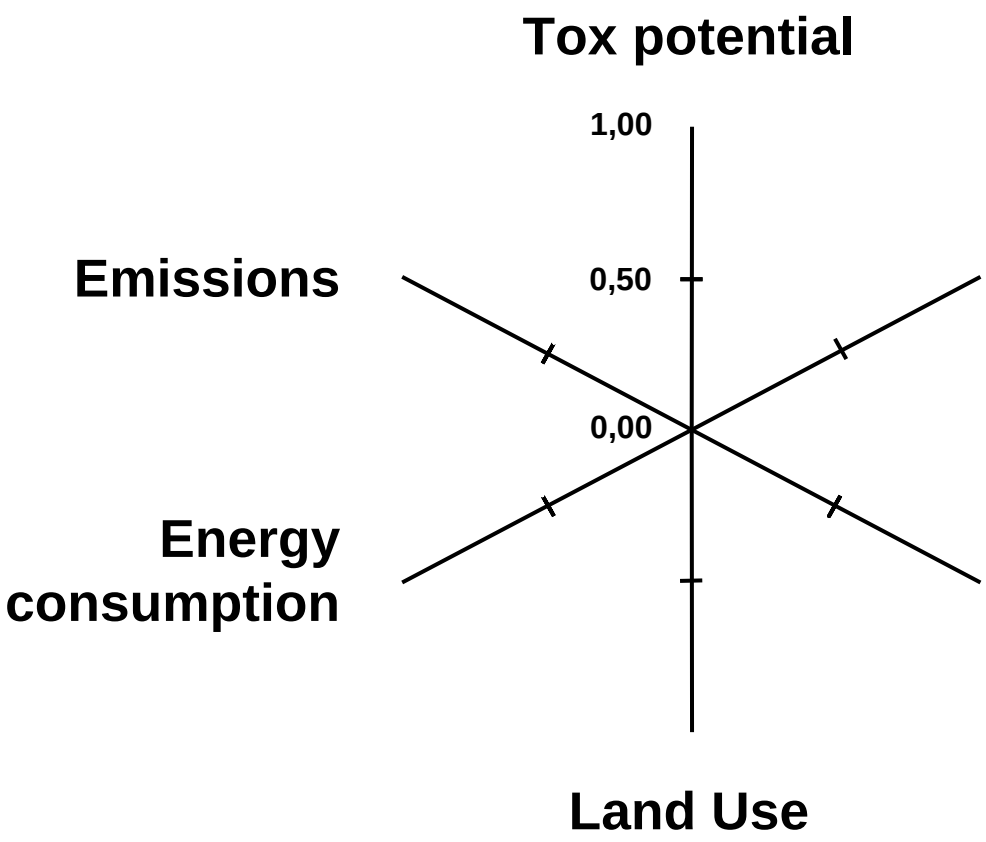
production foam

identic

phase of value

utilization disposal

Ecological Fingerprint



= Slab Polyol
= BALANCE 50

1 = max. environmental impact
0 = min. environmental impact

TOX potential

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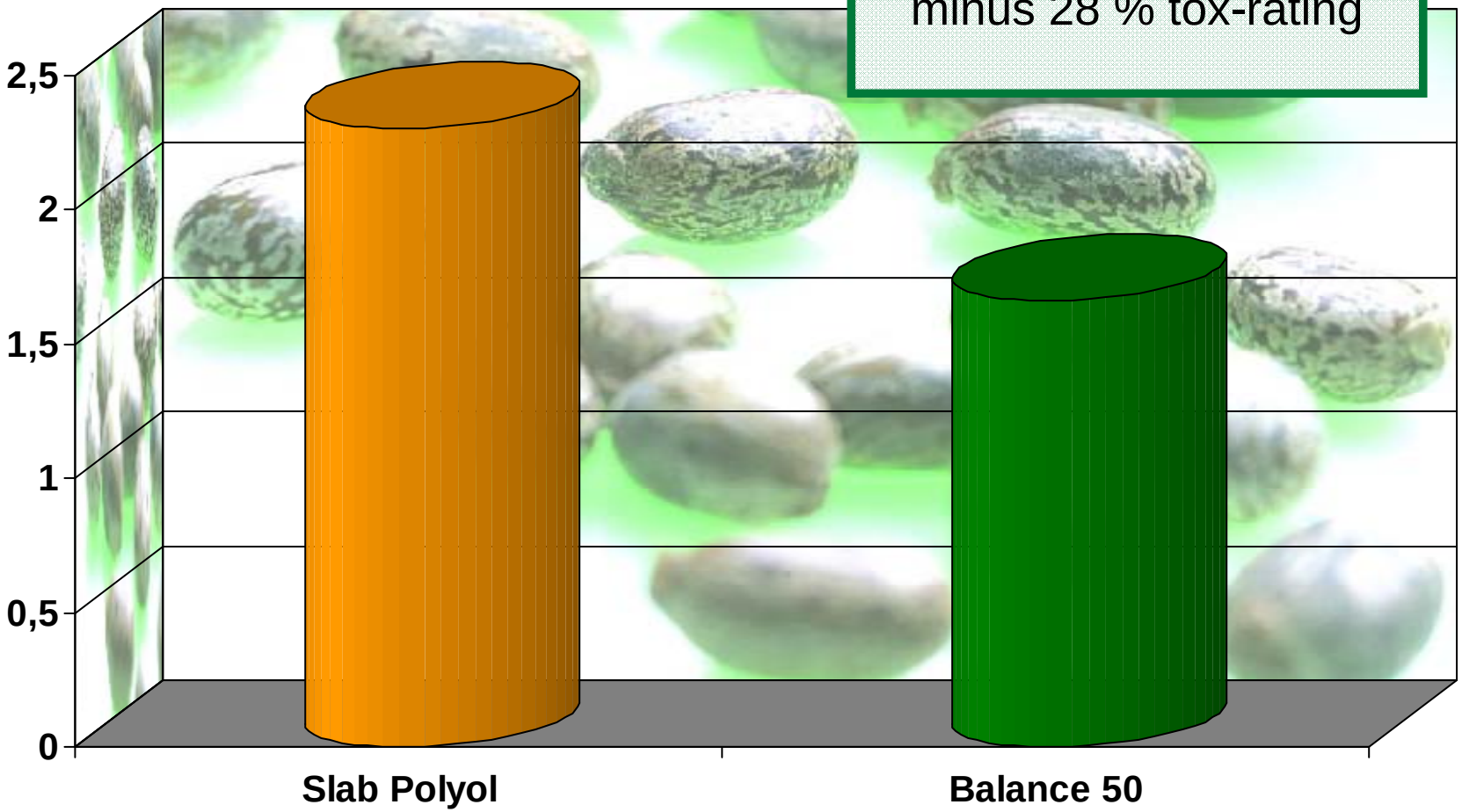
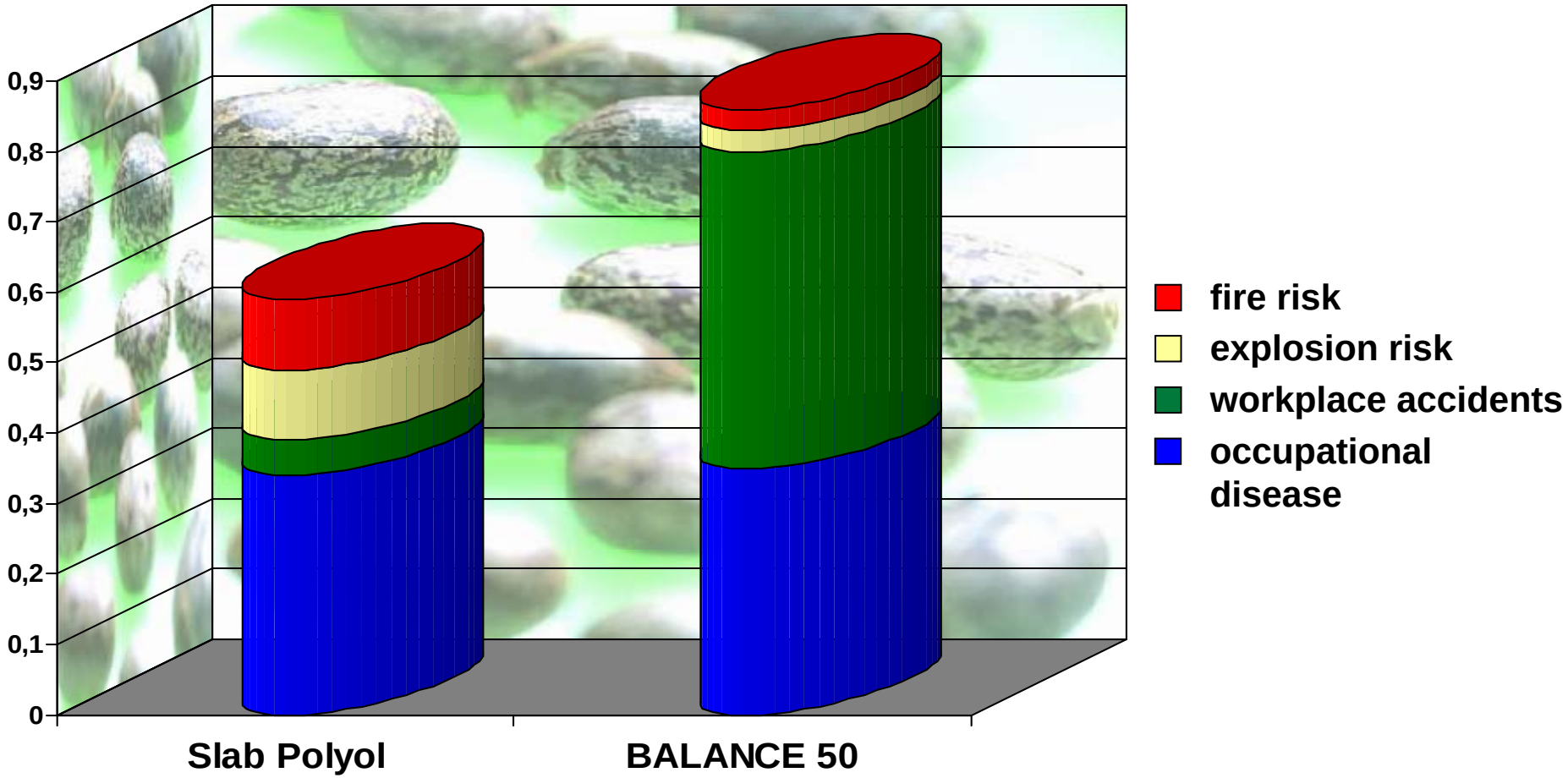
TOX Points calculated Mio / t

minus 28 % tox-rating



Risk potential

Risk Points calculated / t



Resource consumption

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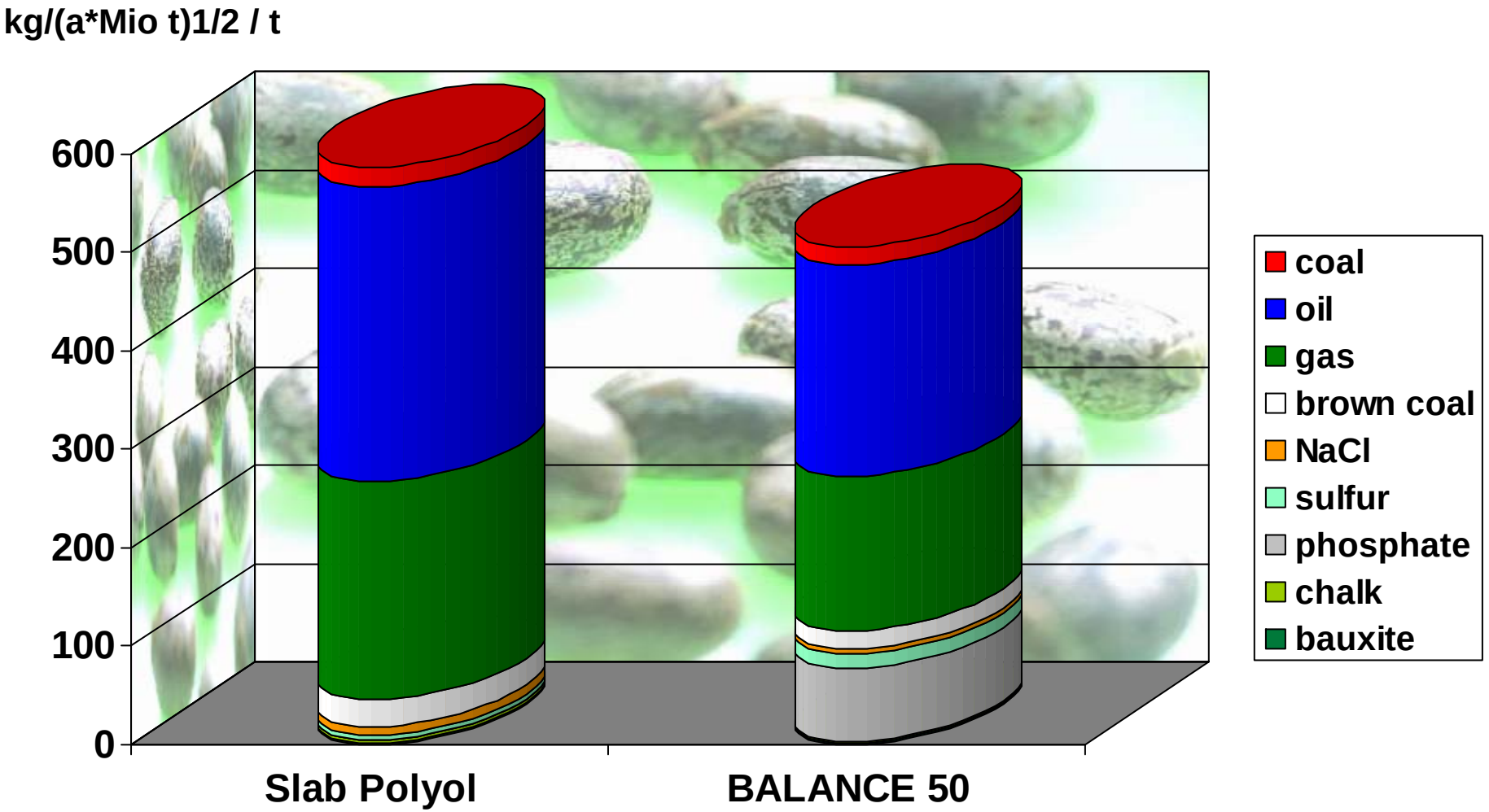
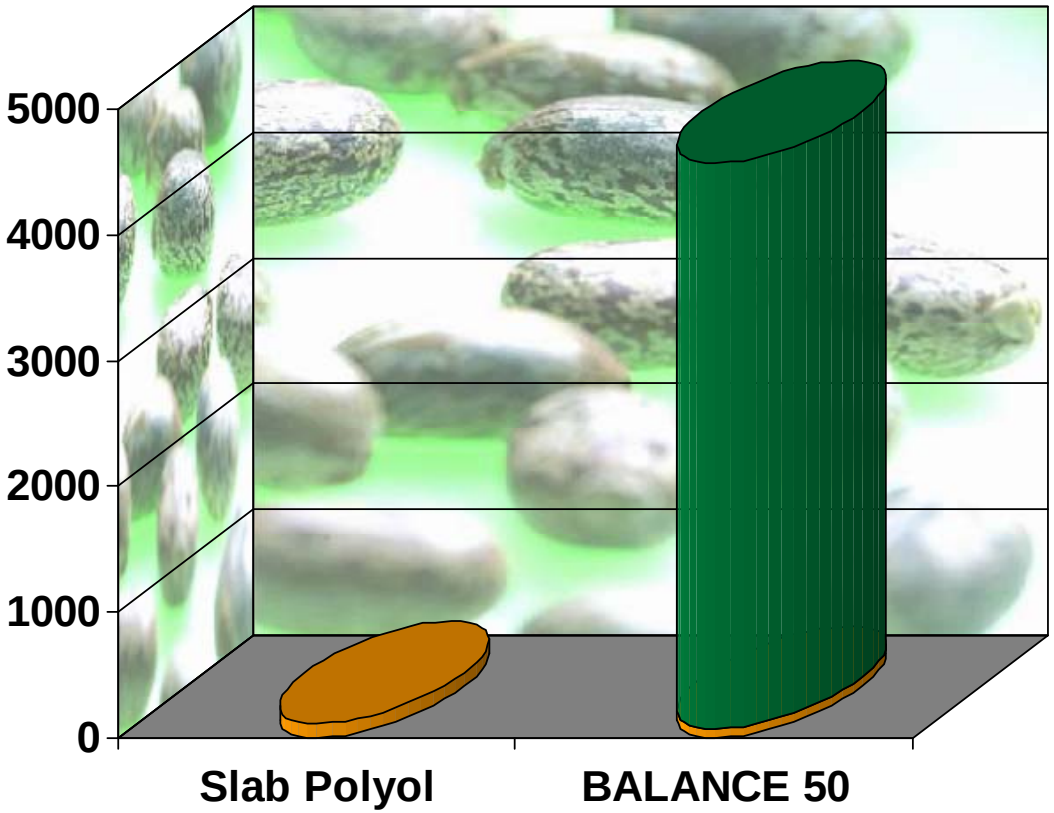
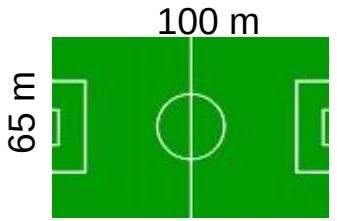


Land-Use

weighted Land-Use m²a / t

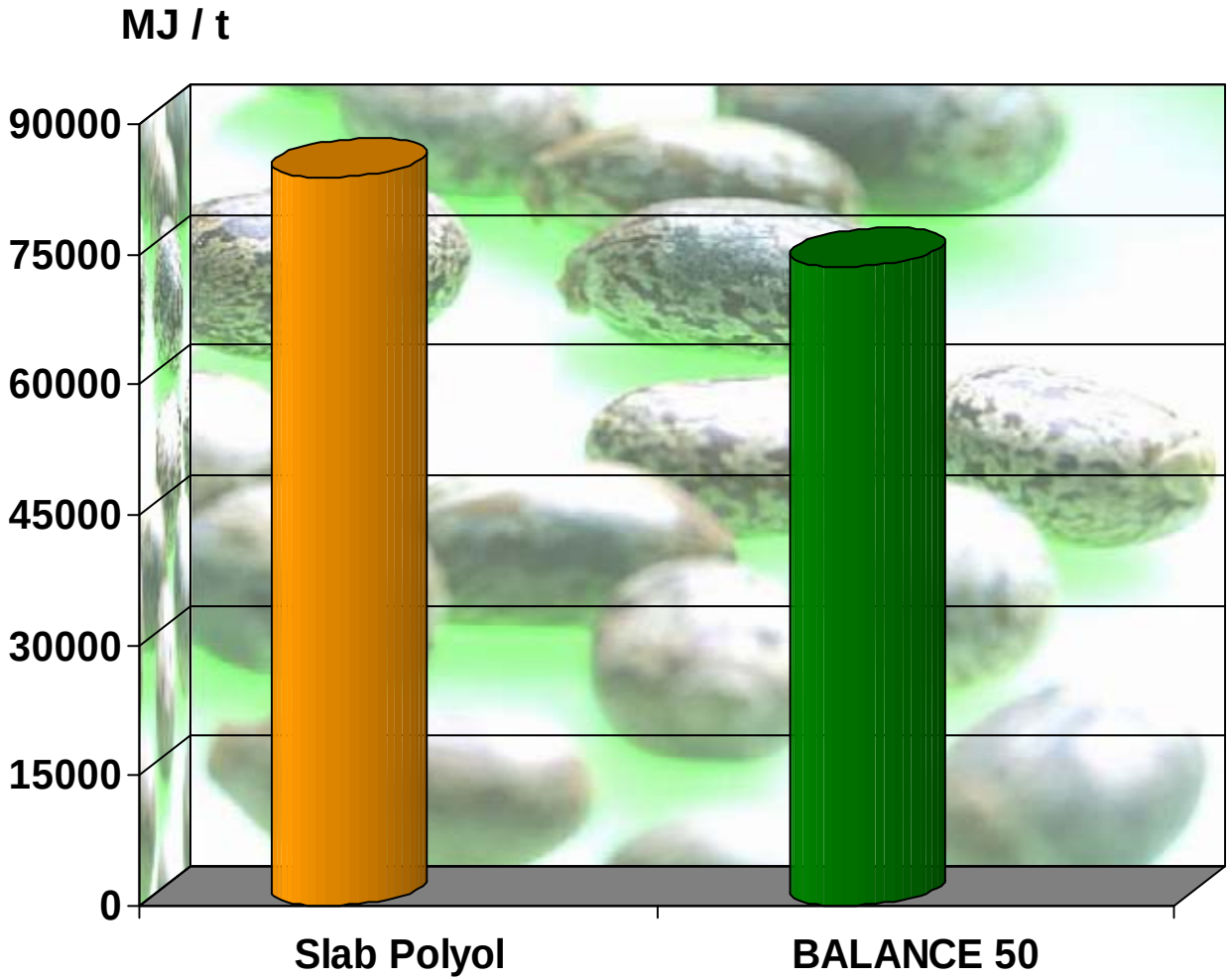


- Arid to semi-arid climates are ideal
- Improved yield via hybrid castor seeds
- Productivity 1087 kg/ha



= 1000 kg
Lupranol BALANCE 50

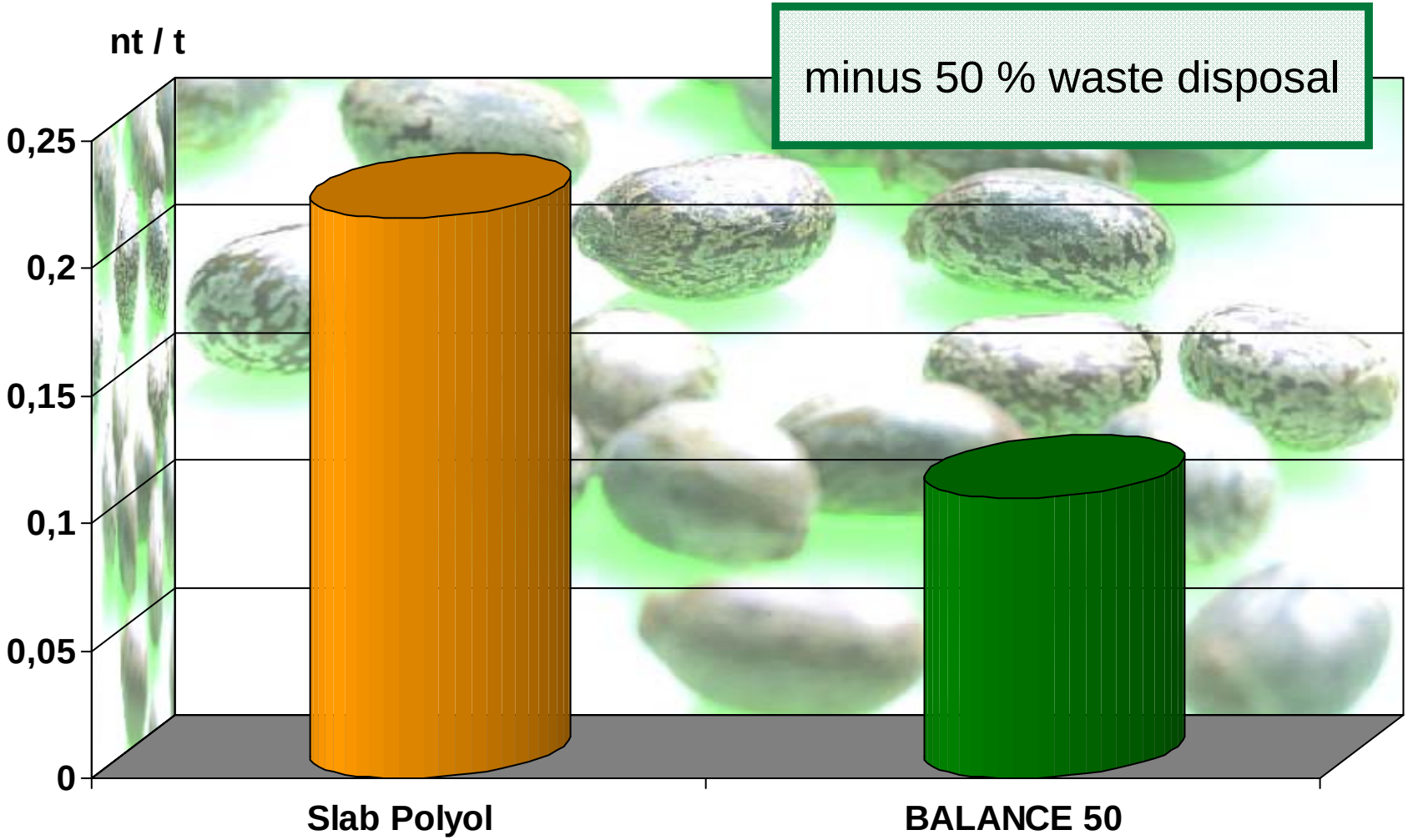
Energy consumption



delta:
10100 MJ / t
⇨ 2800 kWh

⇨ Equivalent to
98.000 homes
energy consumption/month
(US conventional polyols substituted by BALANCE 50)

Emissions
Waste accumulation



minus 50 % waste disposal

Emissions
Global warming potential

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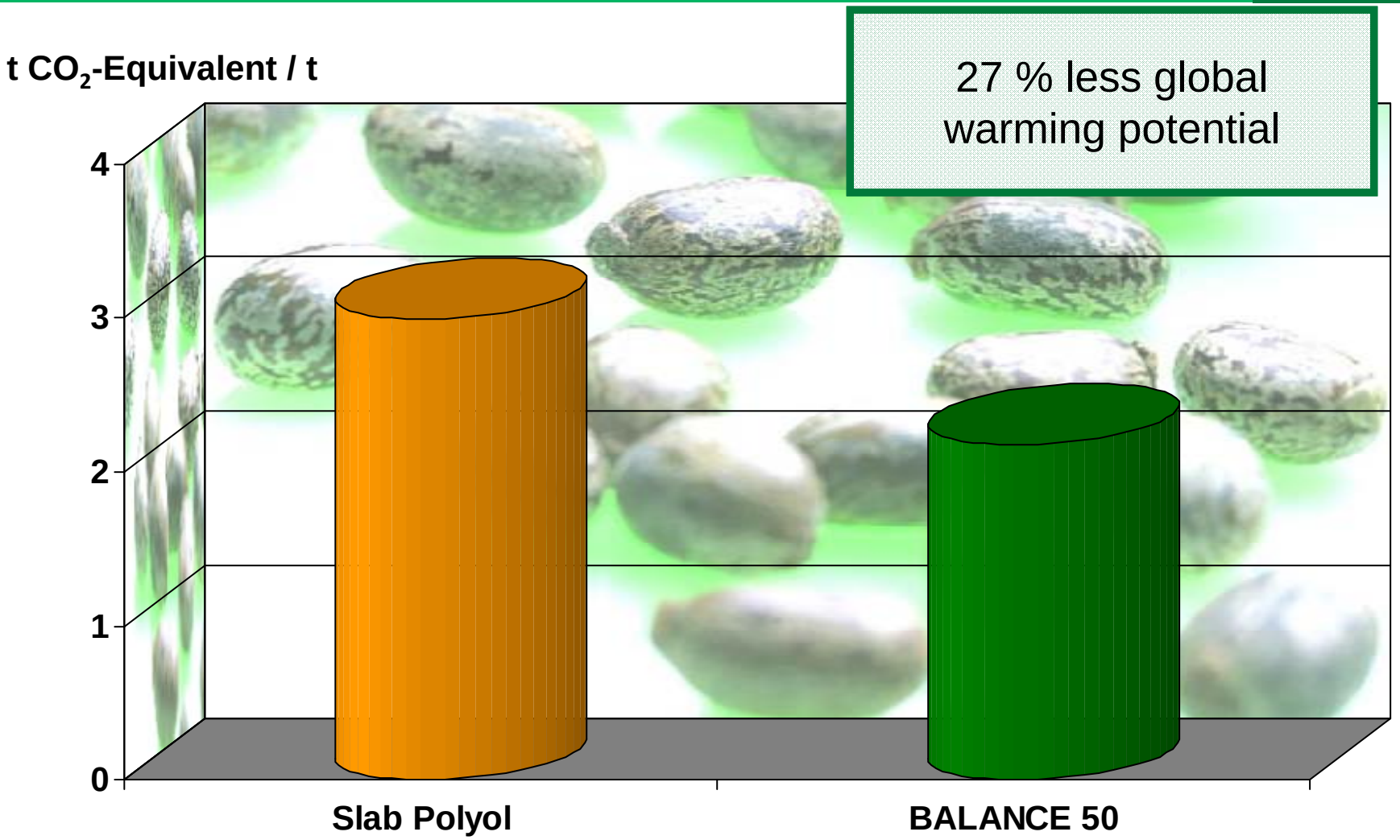

Emissions

„Acid Rain“ – SO_2-Emissions

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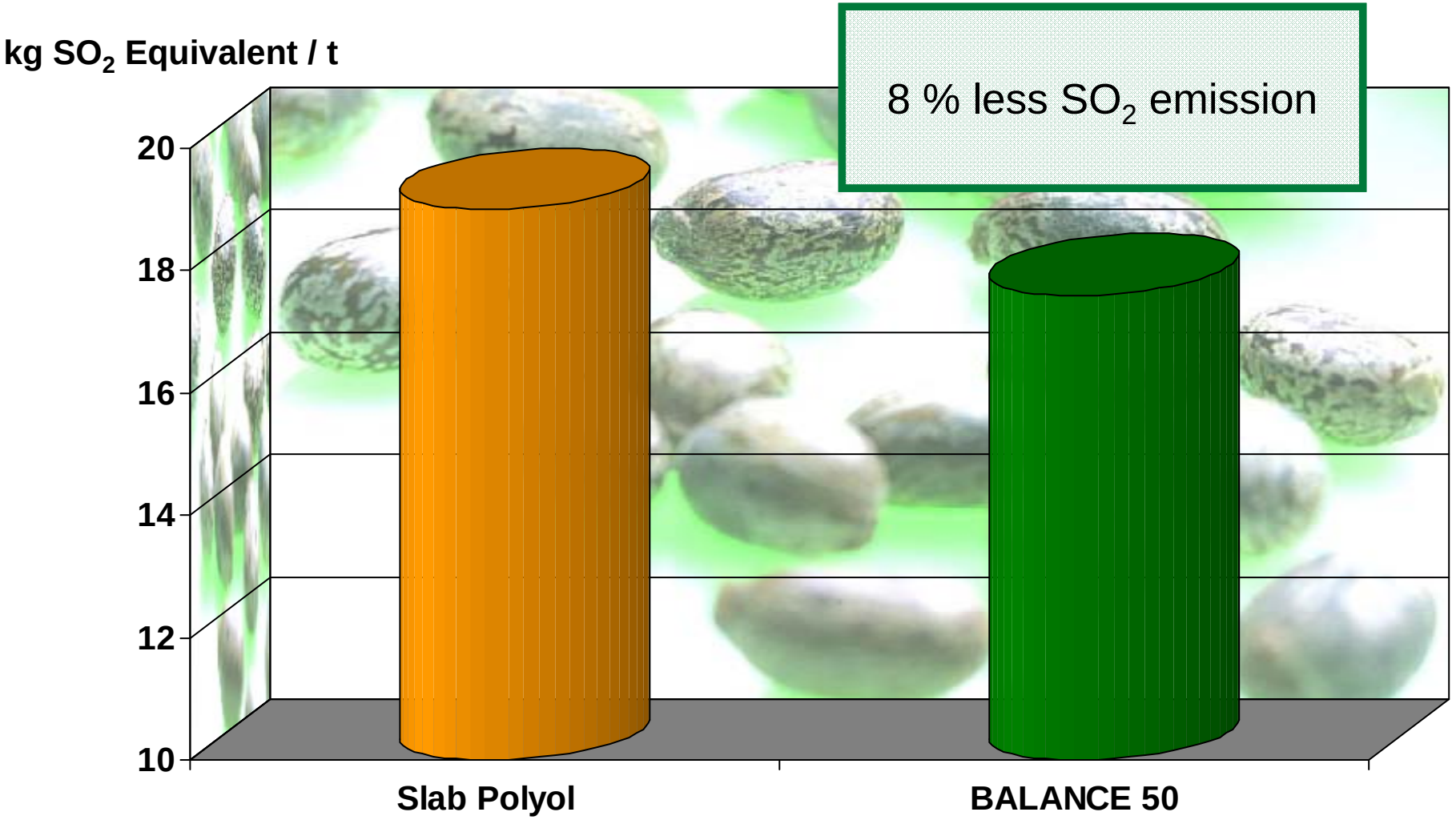
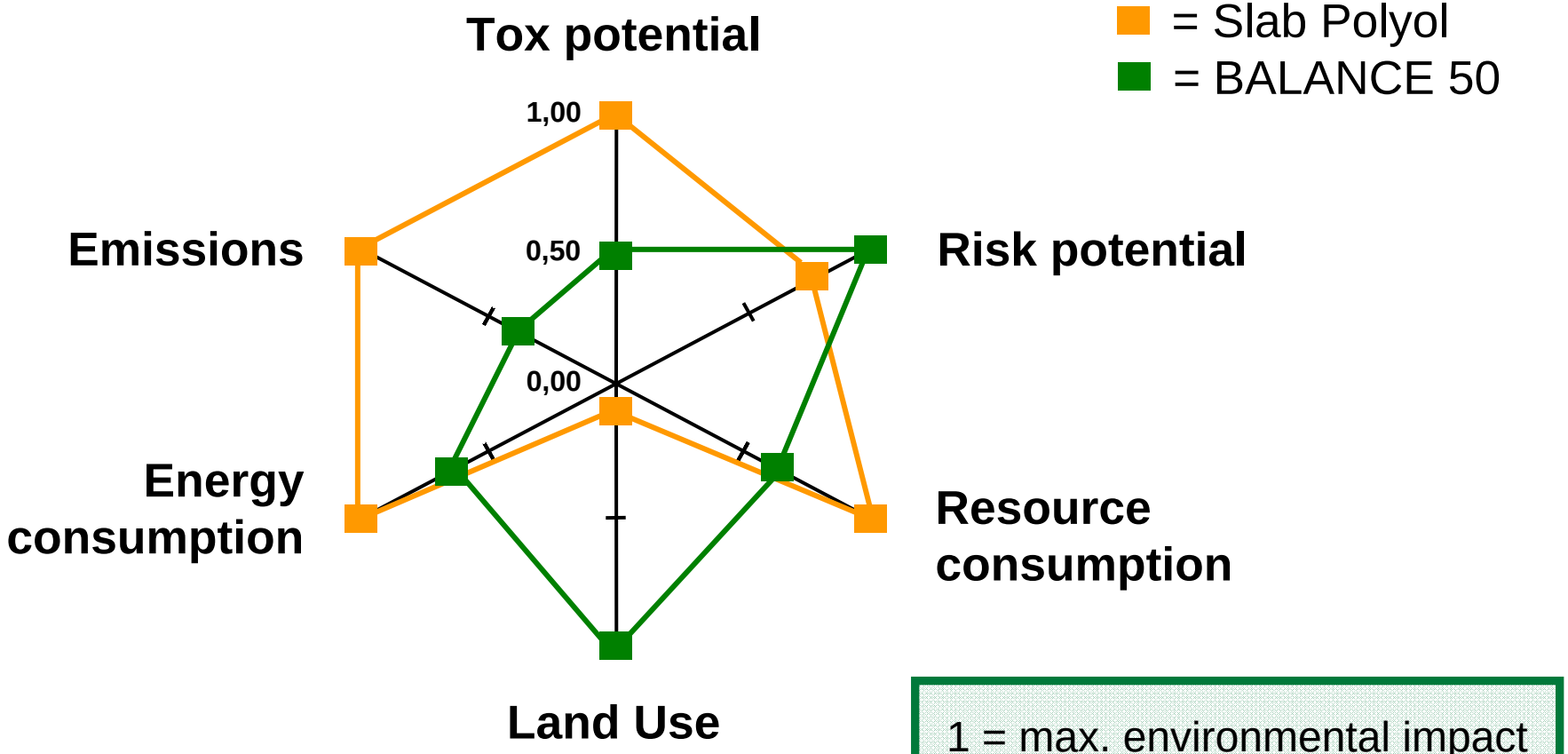


Ecological Fingerprint
Results



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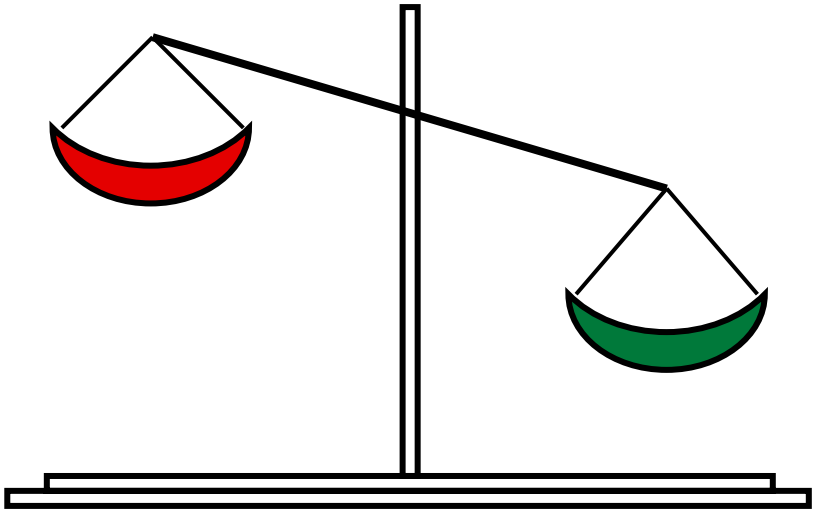
Results

- higher land-use
- limited competition with food chain

+ up to 25% of bio-mass in resulting PU foam
+ less energy consumption
+ less resource consumption
+ less global warming potential
+ less SO_2 emission („Acid Rain“)
+ more ecologically friendly



Results

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www.tuv.com
TÜV
Berlin
ID:5711150561

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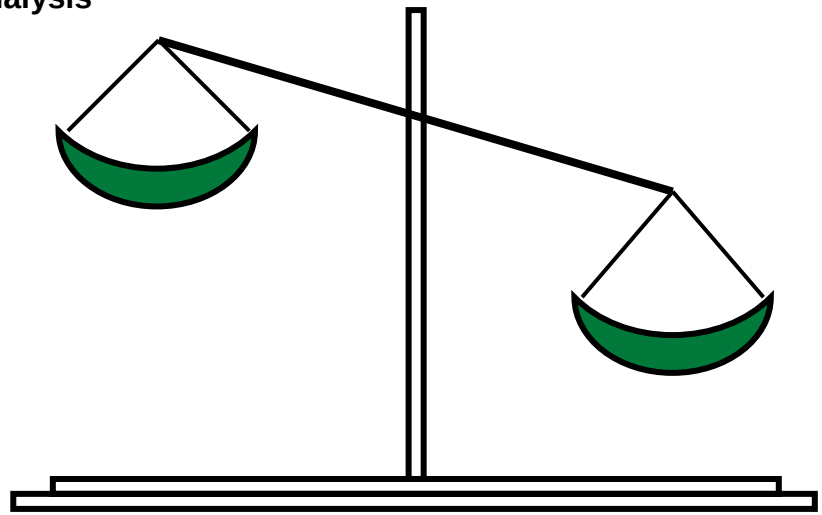
BALANCE

ÖKOEFFIZIENZ-ANALYSE
ECO-EFFICIENCY ANALYSIS
1st place
Leading in an environmental and economic evaluation according to the independently audited BASF method for use as slab foam polyols in mattresses and furniture
www.oeea.de

Validated Method
Eco-Efficiency Analysis



Thank you for your attention !