

Royal Society of Chemistry Symposium

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Budapest, Hungary

Waste Not
ENVIRONMENTAL
PROGRESS EFFICIENCY
PROCESS OPTIMISATION
RECOVER REUSE
REUSE RECYCLE
GREEN RECYCLE
REUSE RECOVER
RENEW GREEN
ENVIRONMENTAL
RECYCLE
PROCESS OPTIMISATION
Want Not

Profit from Sustainable Chemistry

Holistic evaluation of processes to create more sustainable solutions

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BASF
The Chemical Company

Our sustainability understanding

Key aspects



Human beings consume more than the Earth can regenerate.



Balancing economic, environmental and social needs to find the best available solutions.



On this journey, we need to act decisively together with and for our customers and other stakeholders.



Contributing to meet society's needs more sustainably is the growth driver for our business.

Answering questions about the use of Sustainability Evaluation tools

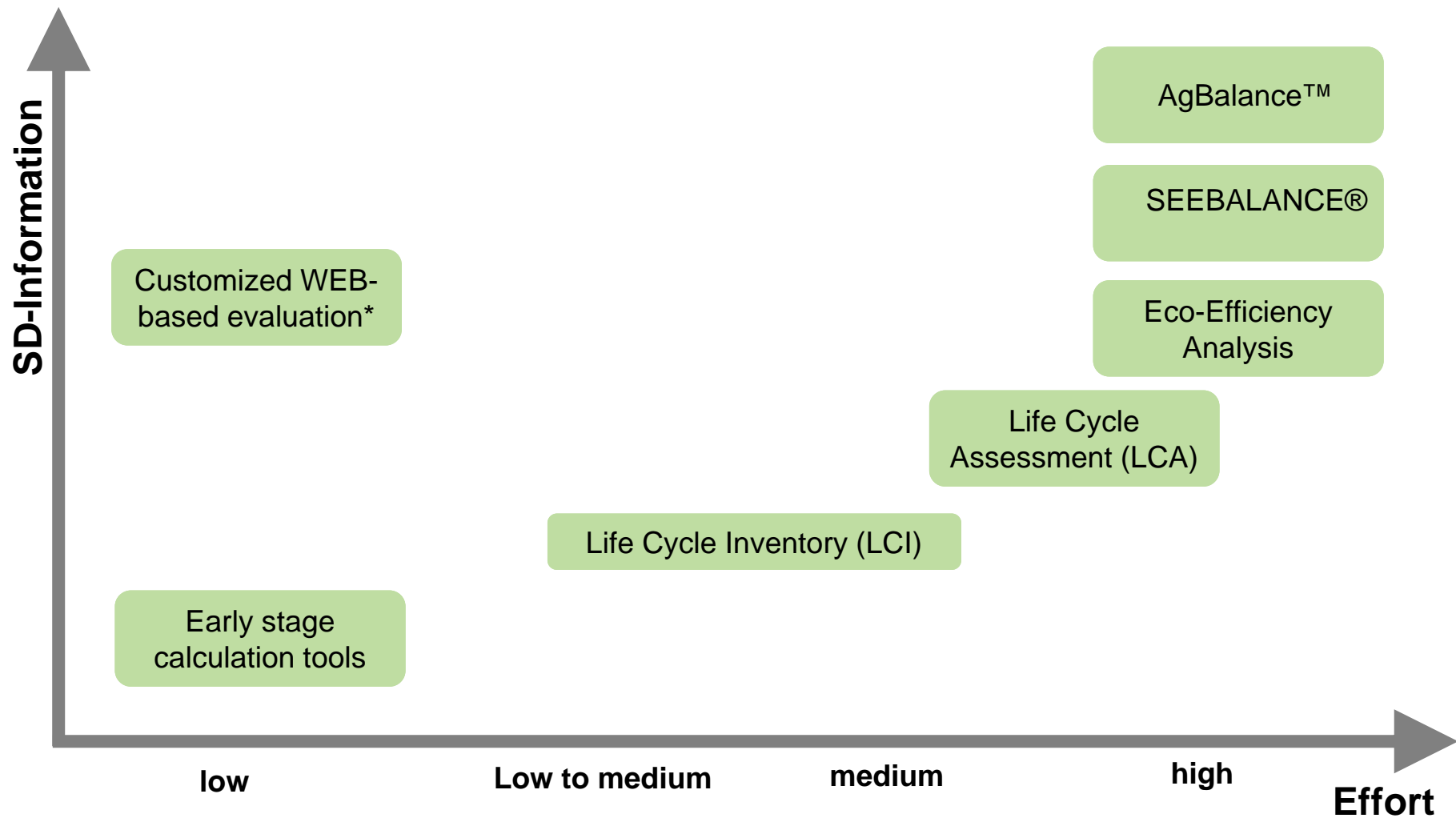
- Integrating sustainability in innovation support
- Calibrating the advantages of collaborative approaches to champion sustainability innovations
- Different tools and systems are available to spread sustainable approaches throughout the product portfolio and processes

We create chemistry
for a sustainable future



Overview of information and effort requirements

Tailor-made solutions from simple to sophisticated



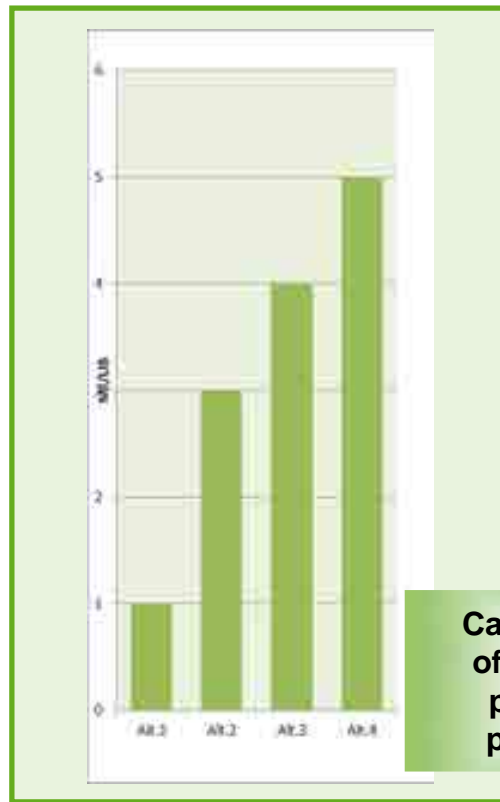
* based on exiting studies

Environmental Assessment

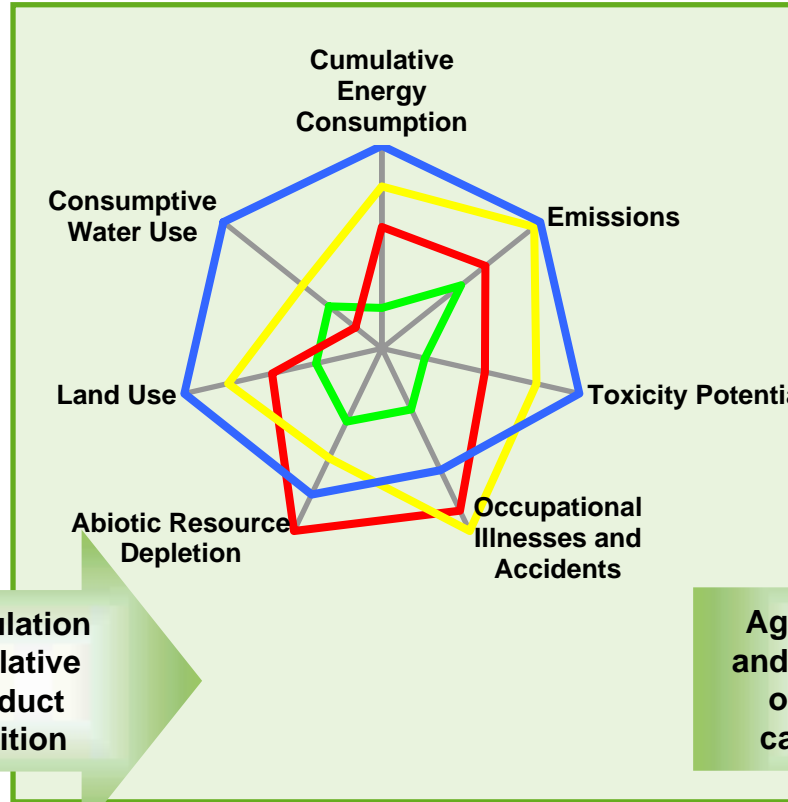
Effect Categories

Ecological Fingerprint

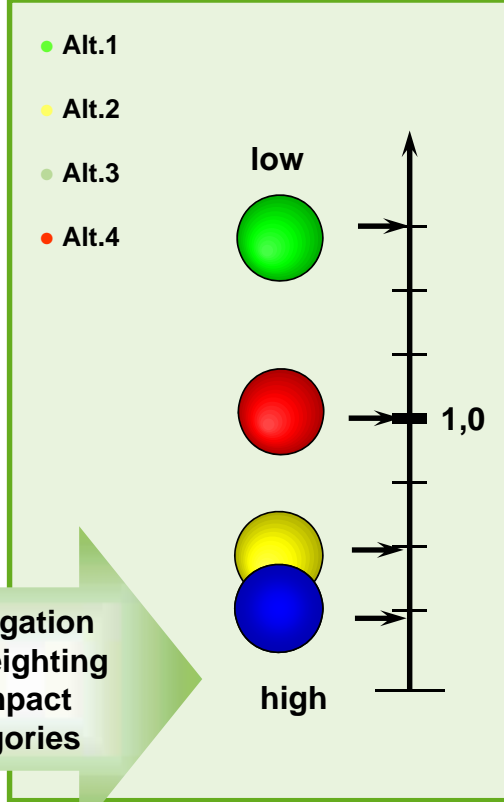
Environmental Burden



Calculation of relative product position



Aggregation and weighting of impact categories



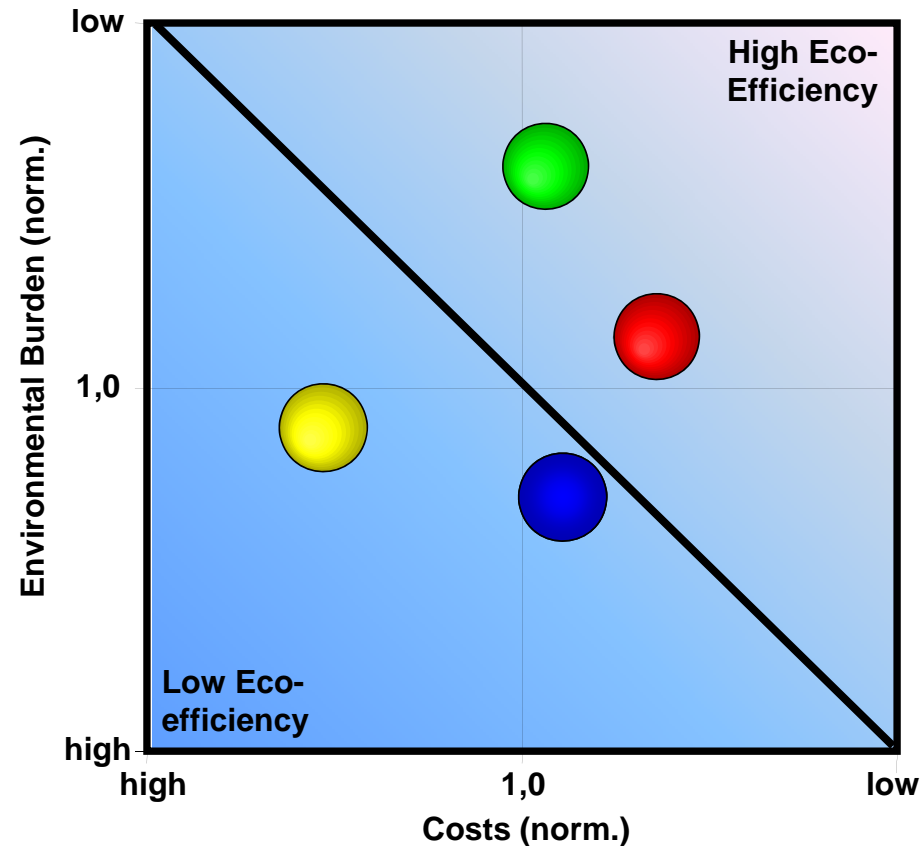
Calculation

Normalization

Weighting and aggregation

Eco-Efficiency Portfolio as final outcome and summary for decision-making

Customer Benefit:
Production, Use and Recycling of ...



- Alt.1
- Alt.2
- Alt.3
- Alt.4

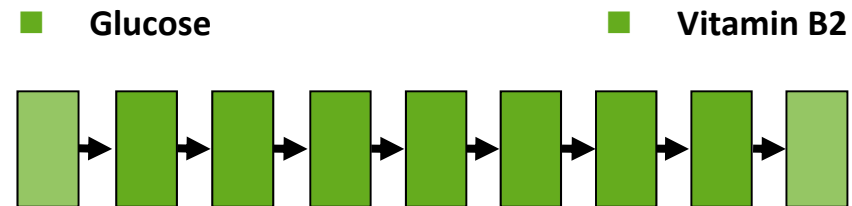
Portfolio graph offers a quick but comprehensive overview of final results

Eco-Efficiency Analysis supports development of new processes

Biotechnology of Vitamin B2



Conventional process



Biotechnological process (BASF)



Reduced:

- Purification steps
- By-products

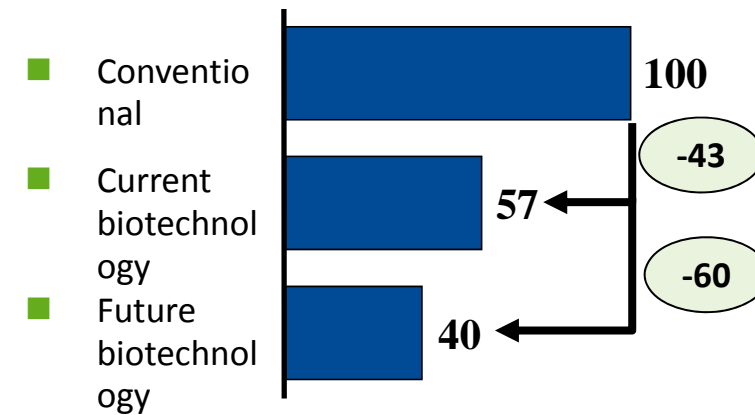
Impact

Environmental

- Reduction of CO₂ emissions by 30%
- Reduction of hazardous substances

Economic

Costs in percent



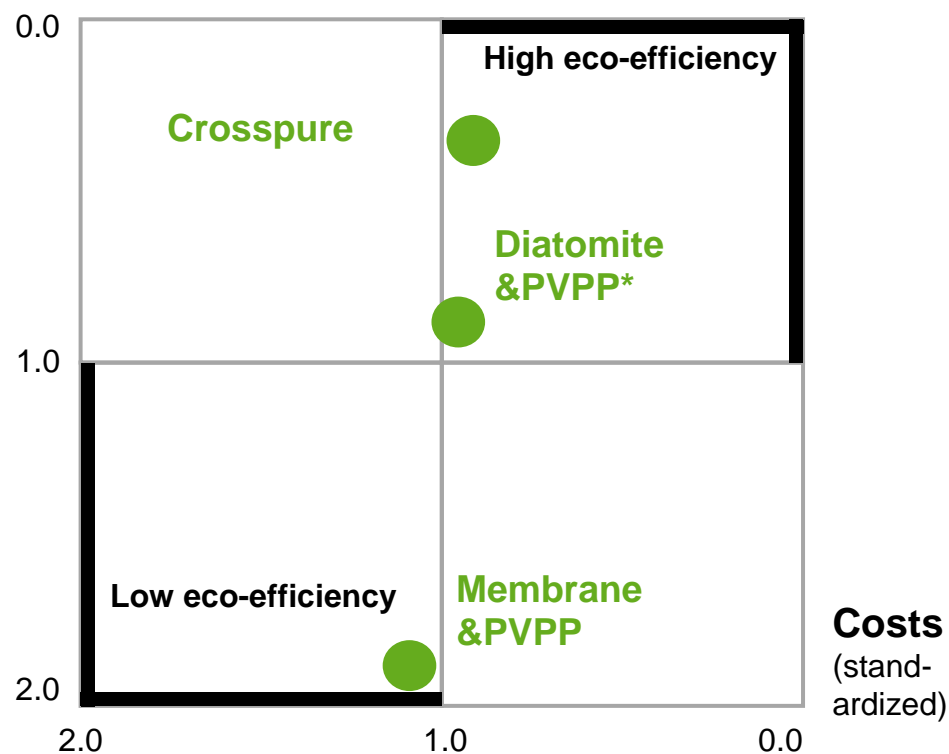
Eco-Efficiency Analysis supports development and launch of new products and processes

Beer filtration and stabilization



- Customer benefit from using filtration and stabilization technologies for 2 million Hl of beer
- Crosspure is the most sustainable solution
- Reviewed by DEKRA, Germany.

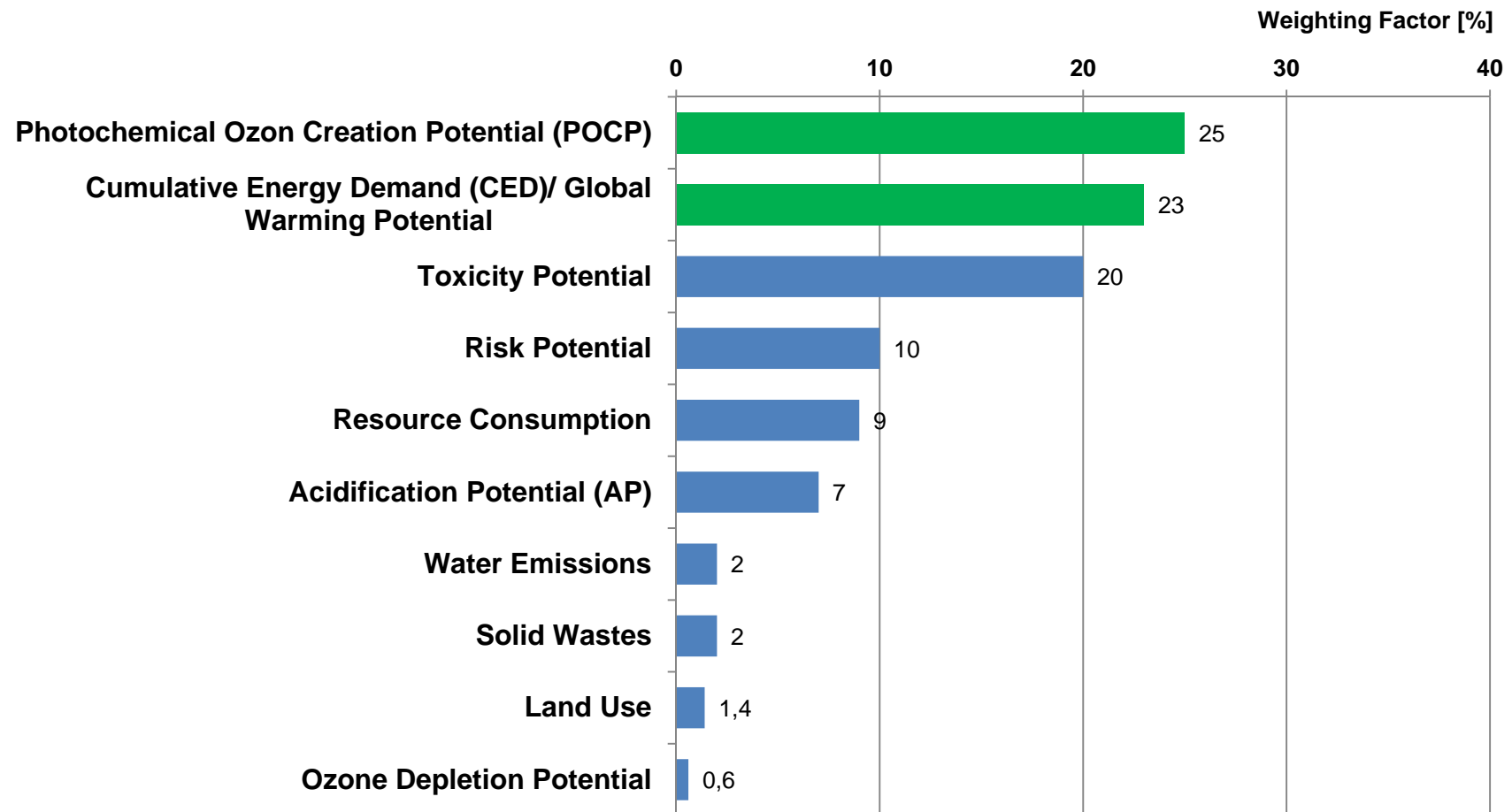
Environmental impact (standardized)



*polyvinylpolypyrrolidone

Modern car coating processes avoid wastes and emissions

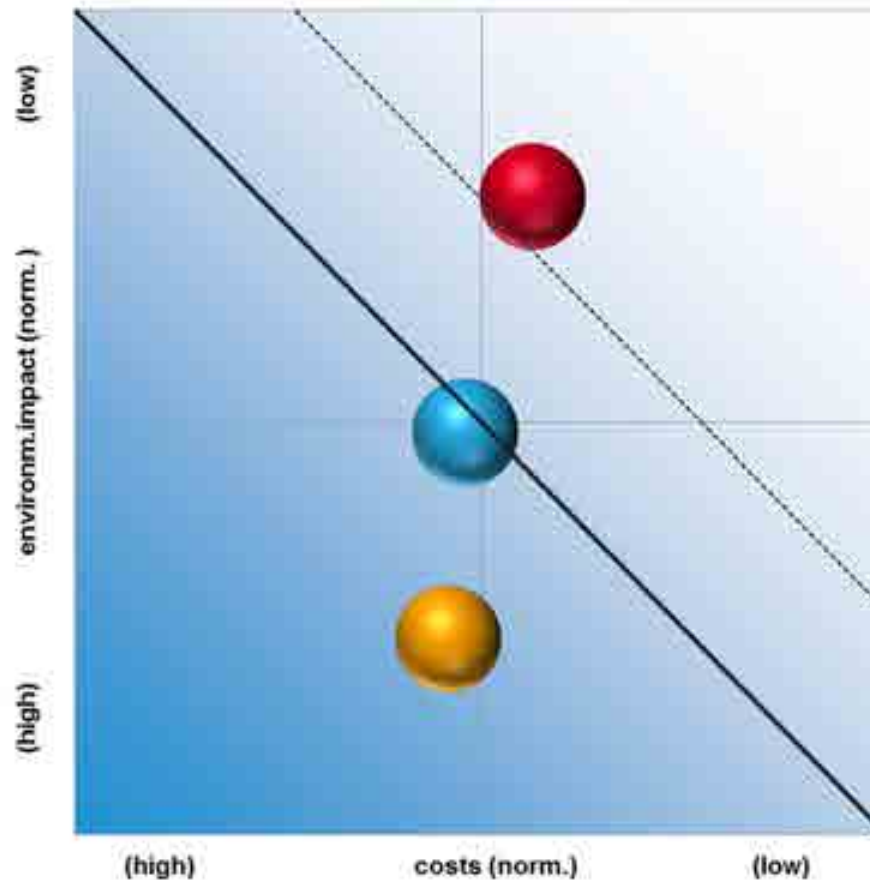
Weighting scheme



Modern car coating processes avoid wastes and emissions

Portfolio of solvent based systems

- 3-Wet HS, Germany ■
- HS, Germany ■
- MS, Germany ■



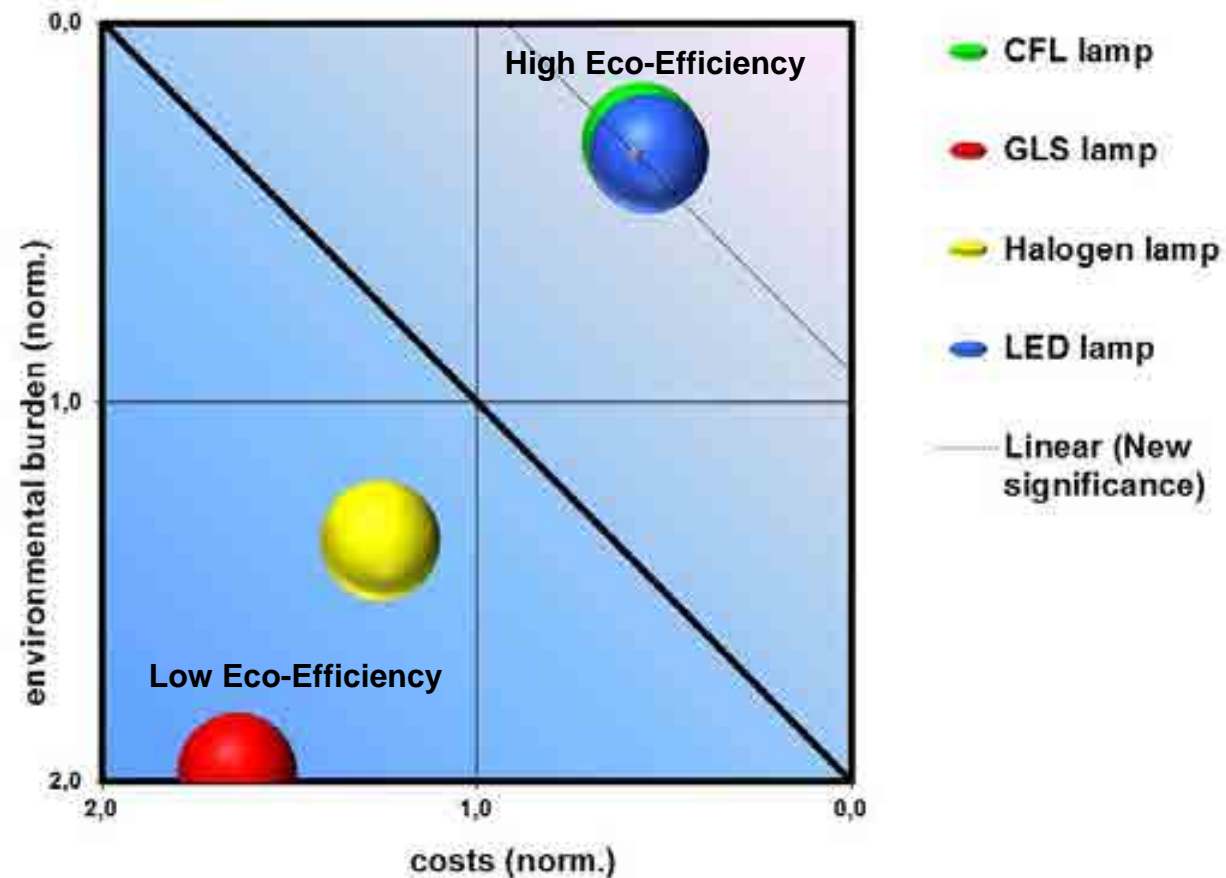
Eco-Efficiency Portfolio of Lighting Systems in cooperation with Siemens

(based on Siemens/Osram basic data)



Customer Benefit:

Lighting for private houses for 25.000 h in Germany



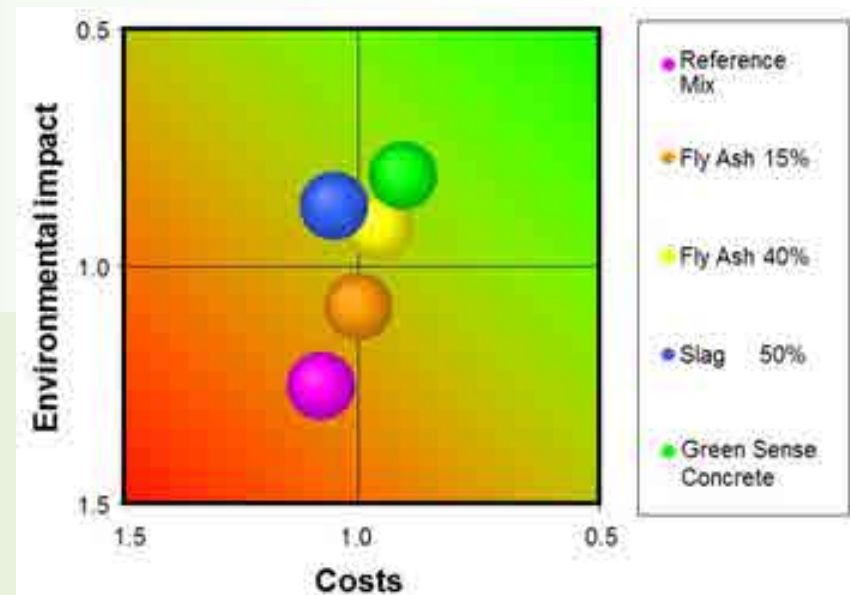
The CFL and LED systems have the highest Eco-Efficiency, the GLS the lowest

WEB-based Eco-Efficiency

Tailor-made tools for automatic calculations



- Supporting decision-making processes
- Can be used by inexperienced users
- High number of scenarios possible
- Suitable for communication in the value chain



Example: Green Sense concrete

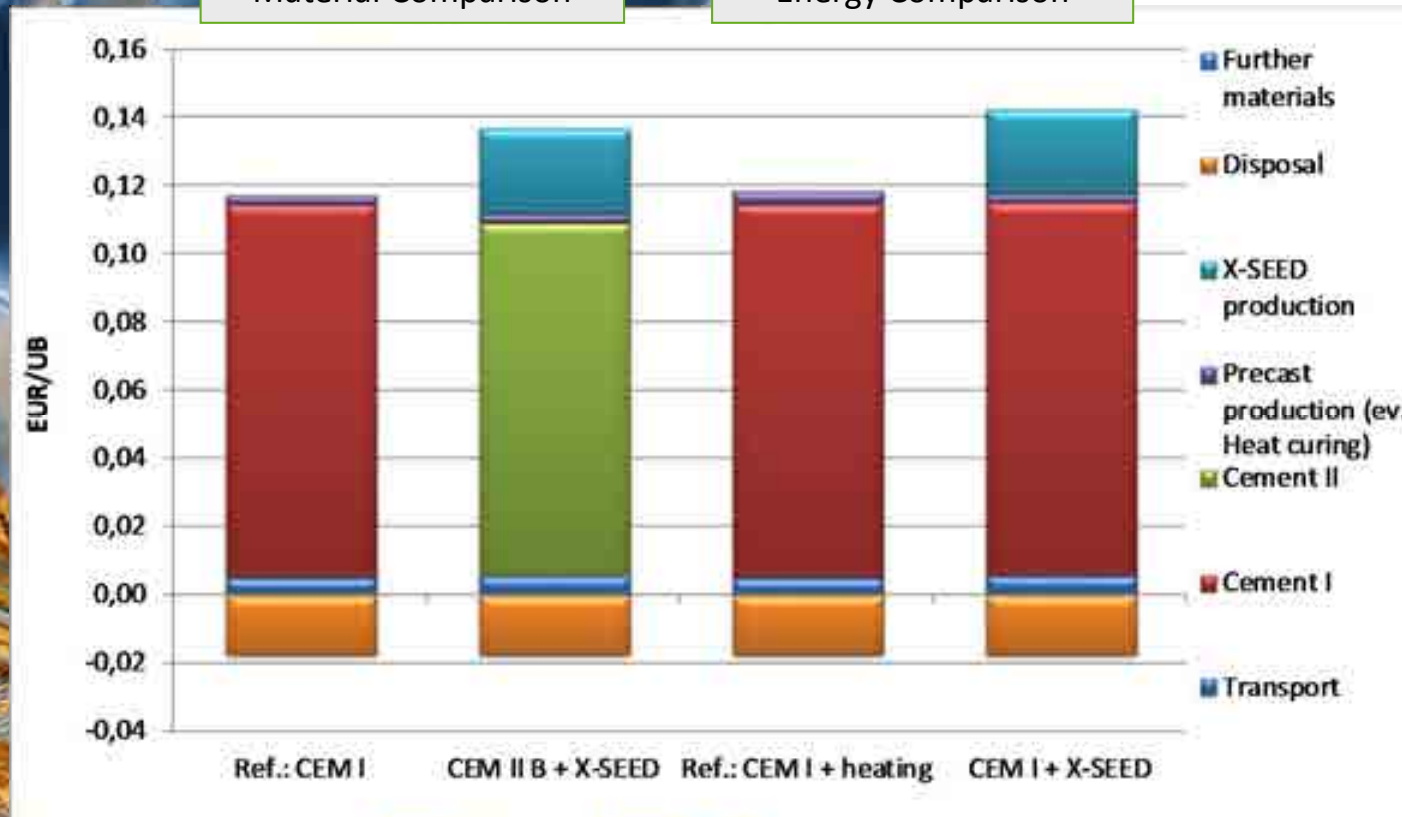
Social dimension included in SEEBALANCE

X-SEED has advantages in concrete

Professional Training

Material Comparison

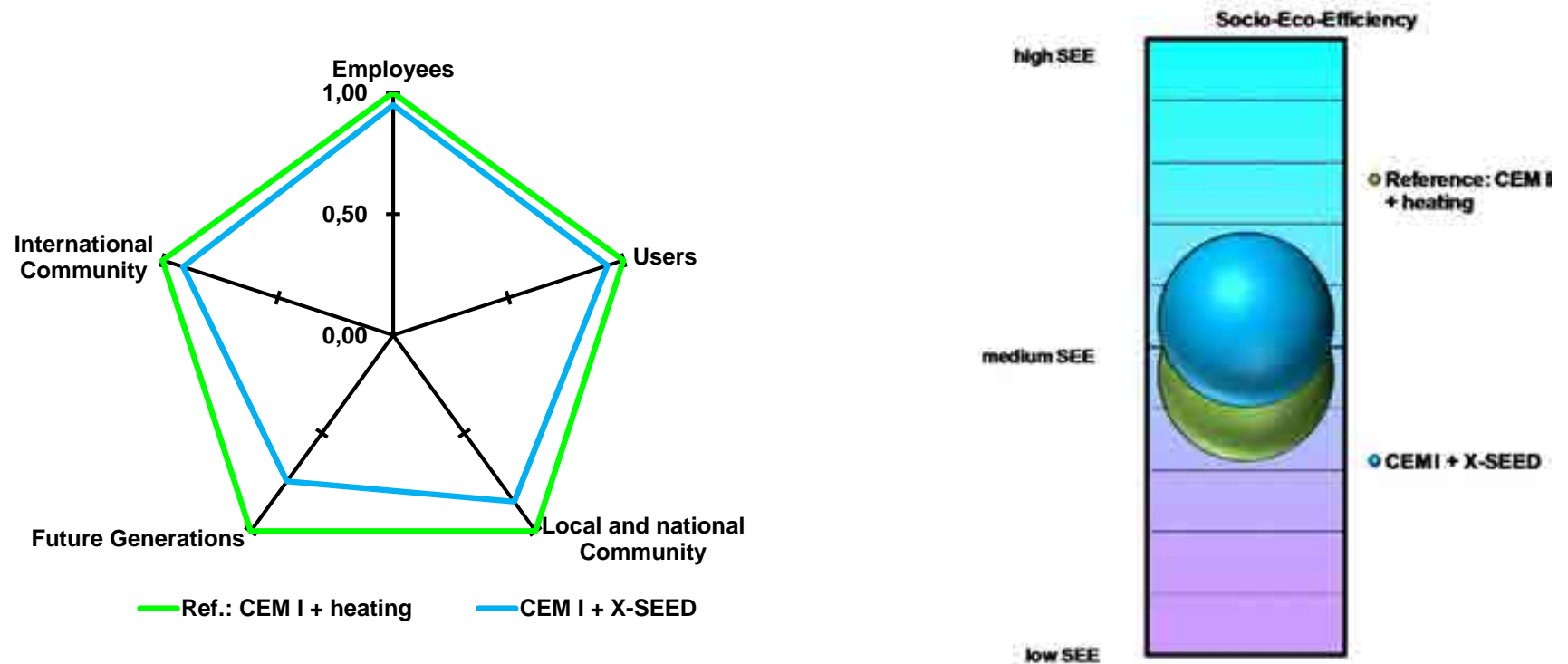
Energy Comparison



positive

SEEBALANCE for cement additives X-SEED

Nano-particulates are more sustainable



- The X-SEED mix design has economical, ecological and social advantages
- Further information: <http://www.basf.com/group/corporate/de/news-and-media-relations/science-around-us/concrete-components/info-box>

Sustainability Activities can support product development, marketing and business



- The ecological calculation follows the ISO rules ISO 14040, 14044, 14045 and was validated by TÜV and NSF.
- **Specific data and factors** can be introduced depending on the needs of the particular analysis.
- The whole process is transparent, calculates all three dimensions of sustainability.
- The stability of results is verified by means of (Future) scenarios.
- Research projects can be supported at all stages of the development
- Business activities can be supported by intense partnerships with customers, supported by detailed sustainability information
- Products with negative impacts can be identified in early stages, alternatives can be developed, supported by sustainability analysis



Validation
with external
partners for
Eco-Efficiency



The Chemical Company