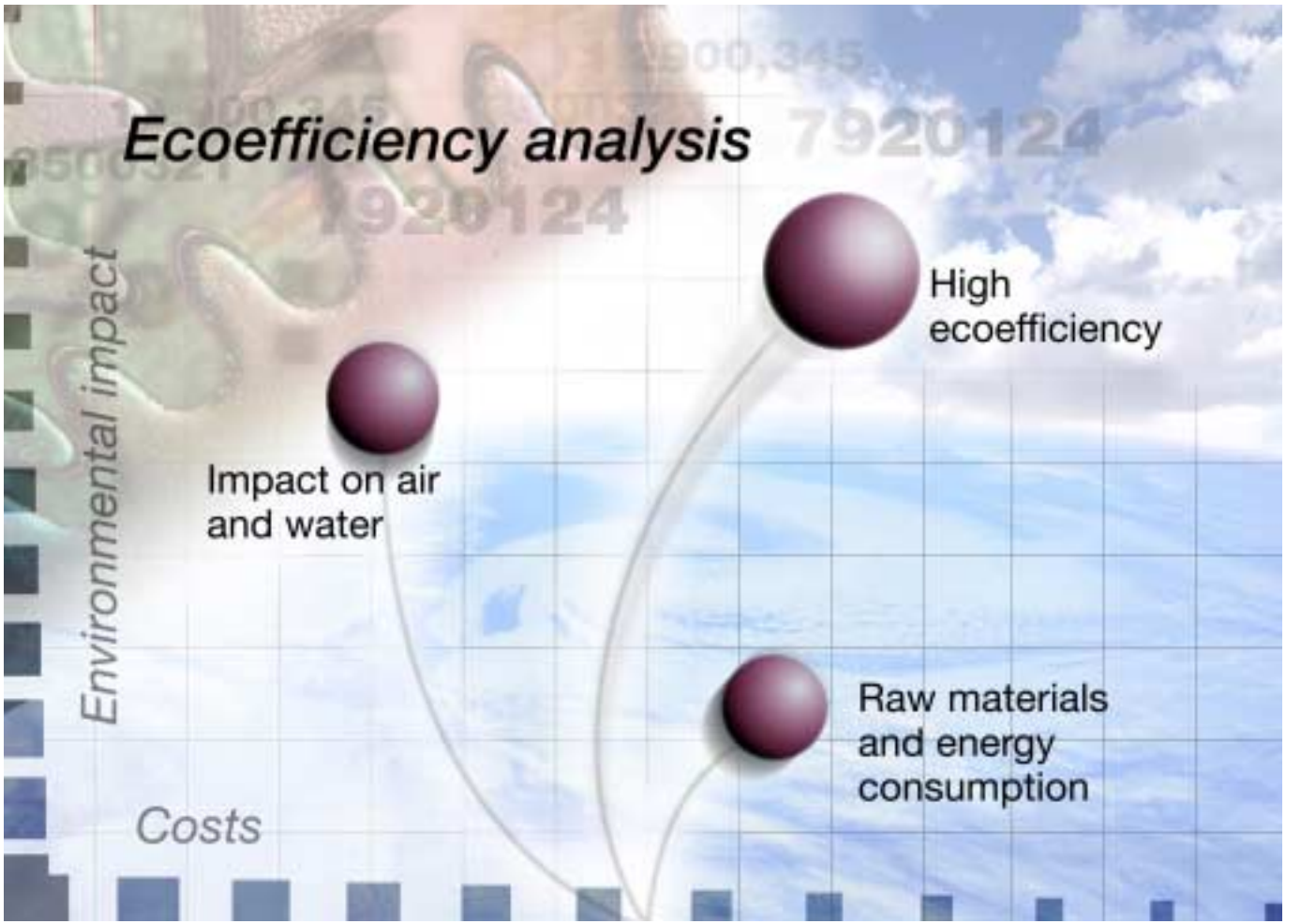
Eco-efficiency: Inside BASF and Beyond…

Charlene Wall, BASF Corporation, Mount Olive, New Jersey



Eco-efficiency: Inside BASF and Beyond…

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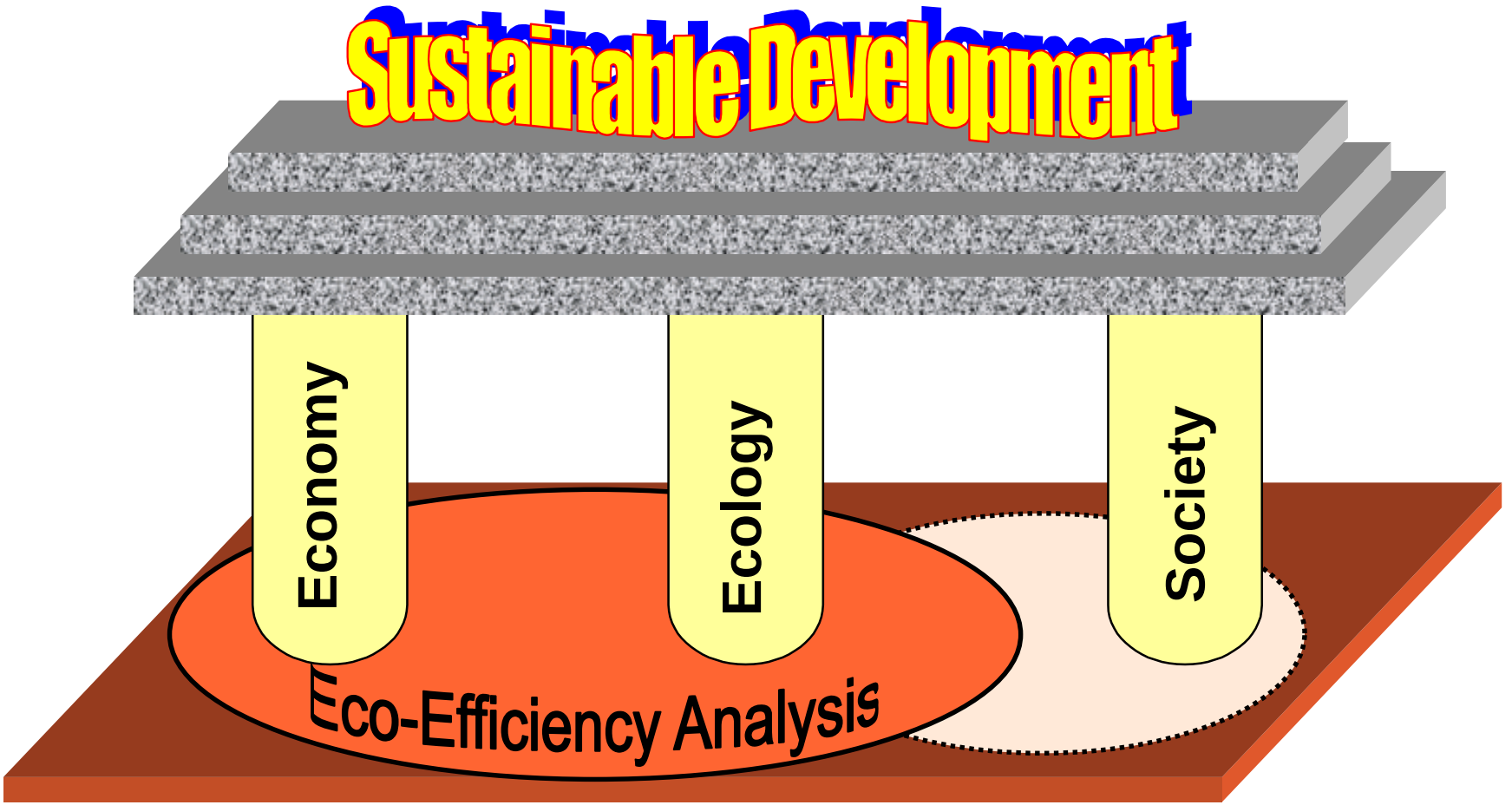
- **Introduction to Eco-efficiency**
- **Eco-efficiency Decision Tool Case Studies:**
  - Textile dyeing
  - Logistics
  - Refrigerators

Sustainable Development is based on three Pillars

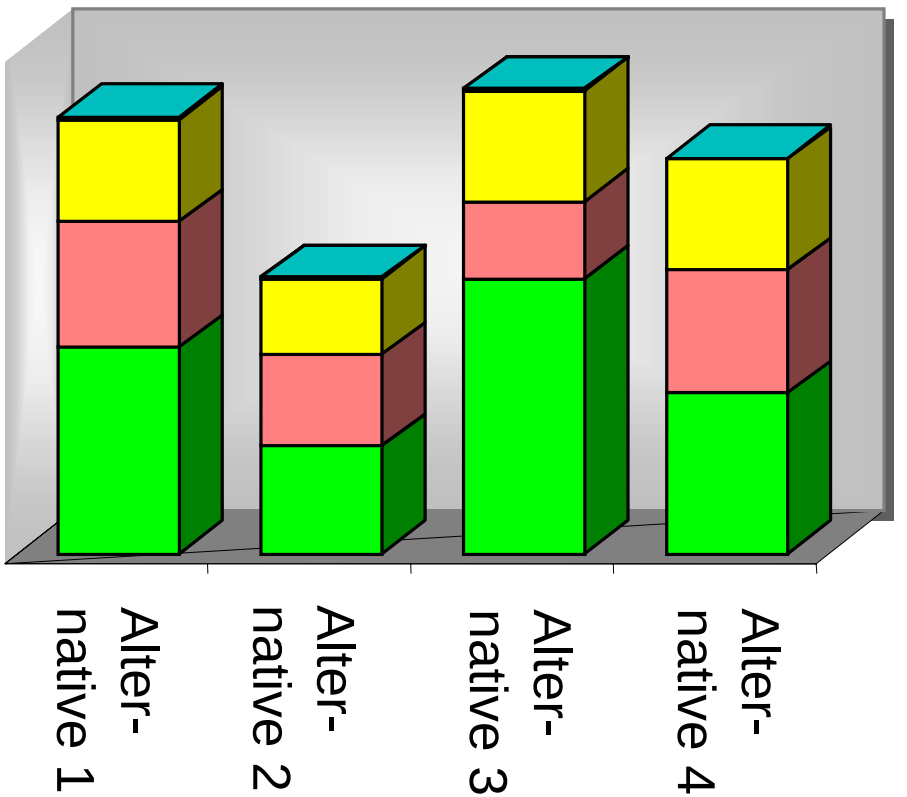


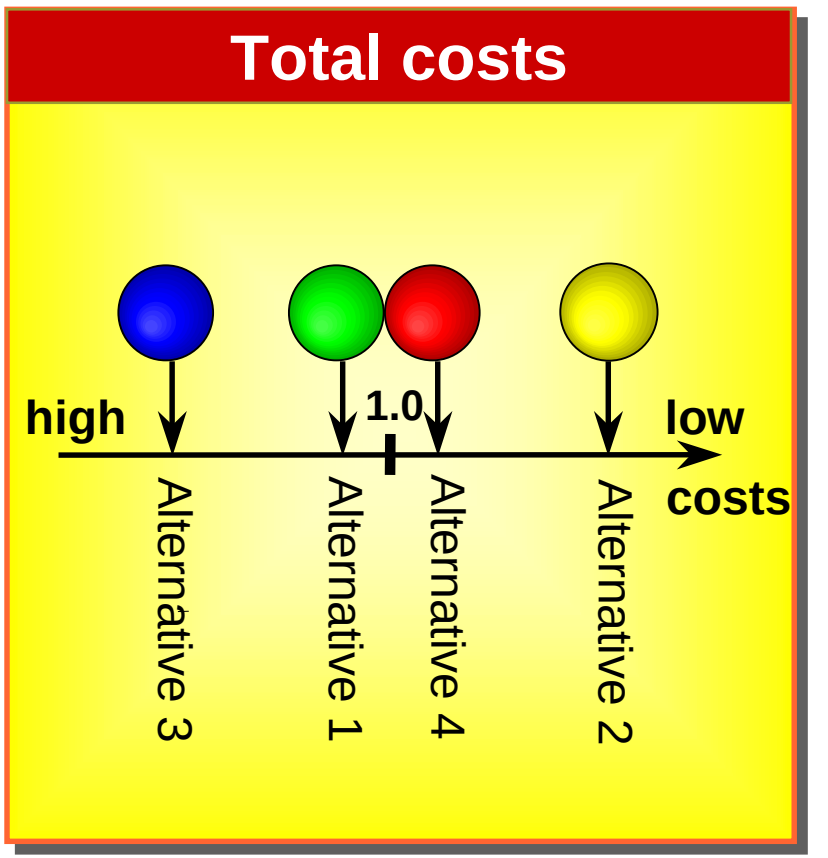
What is Eco-Efficiency Analysis?

- A comprehensive assessment of products and processes.
- Ecological and economic aspects are equally weighted.
- The products are analyzed from the end customers‘ perspective.
- Potential scenarios and their effects are evaluated.
- Eco-efficiency analysis is a standard tool in the BASF Group: more than 150 analyses have been carried out.

Costs Analysis

Costs in $ per functional unit



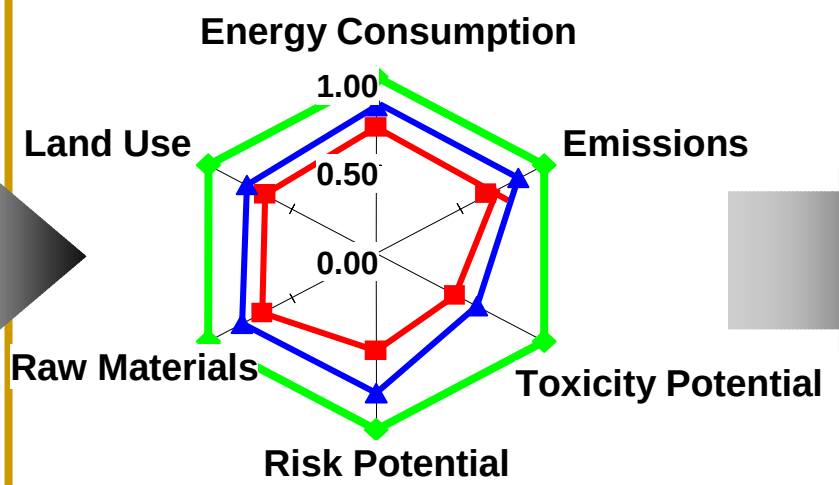


Development of Ecological Value

Parameters considered

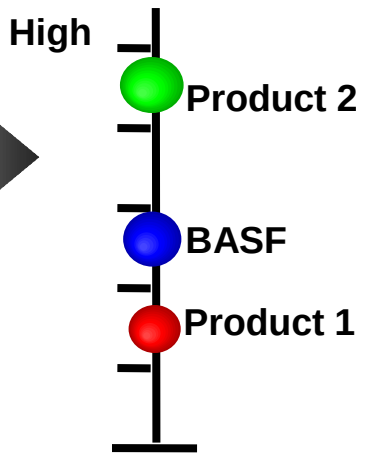
- Raw Materials
- Energy consumption
- Land Use
- Emissions
- Toxicity
- Risk potential

Ecological fingerprint



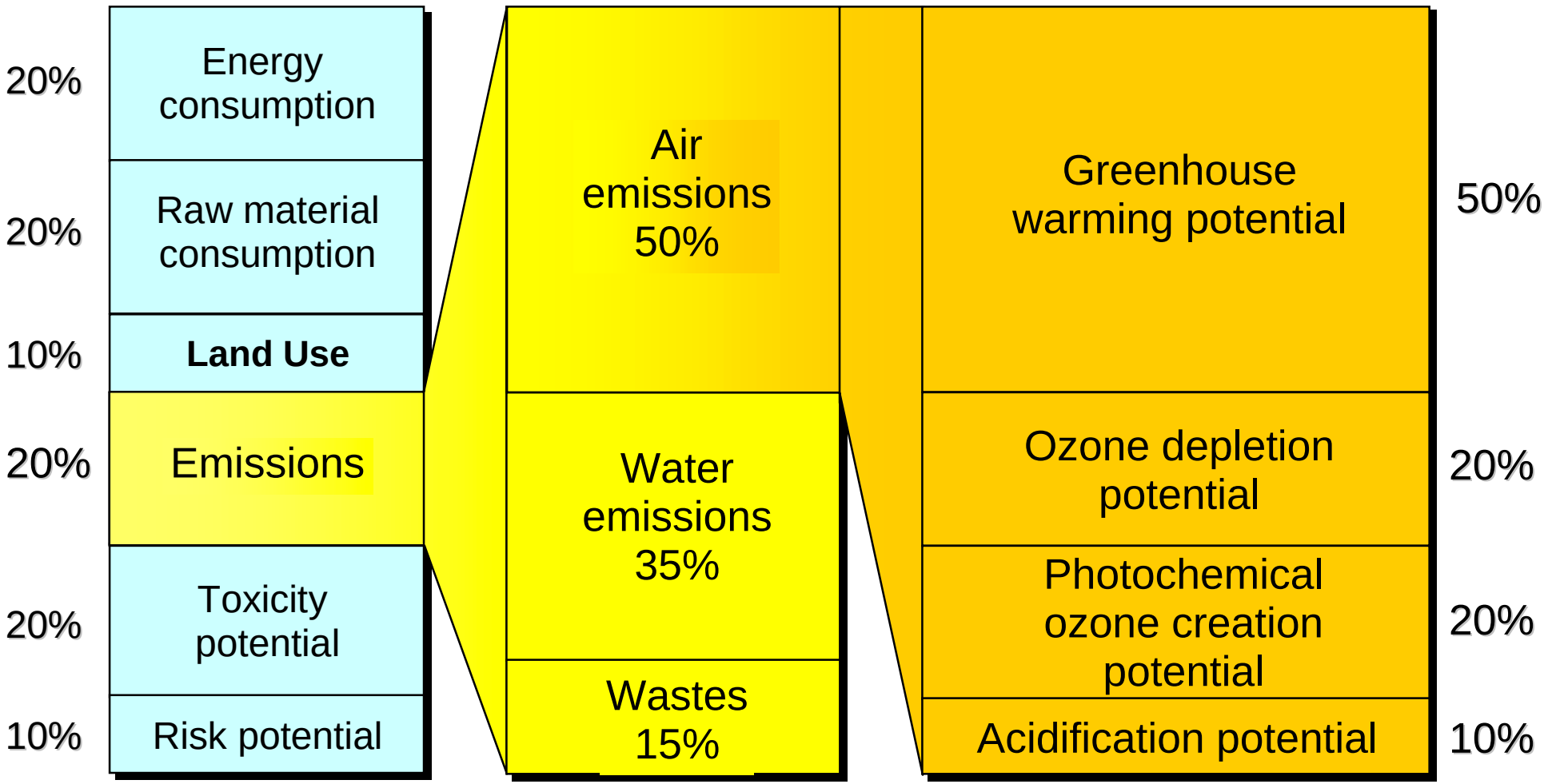
Ecological advantage

Relative environmental impact



1 = greatest effect on the environment
0 = smallest effect on the environment

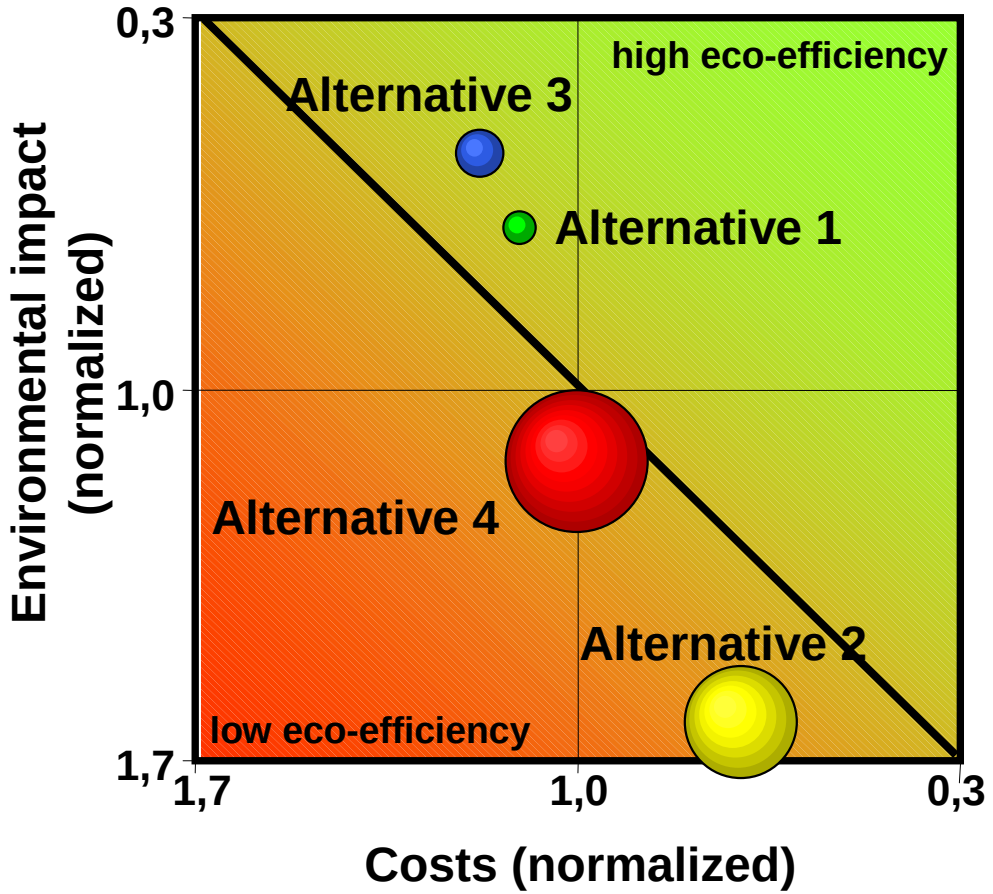
Social Assessment Factors



Ecoefficiency Portfolio: Links Costs and Environmental Impact

Customer - related benefit:

1 unit of ….



Alternatives investigated

relative market position

- Alternative 1 x %
- Alternative 2 z %
- Alternative 3 y %
- Alternative 4 t %

The circle area is equal to the relative market position.

Dyeing Eco-efficiently:

Helping small and medium enterprises make the best decisions

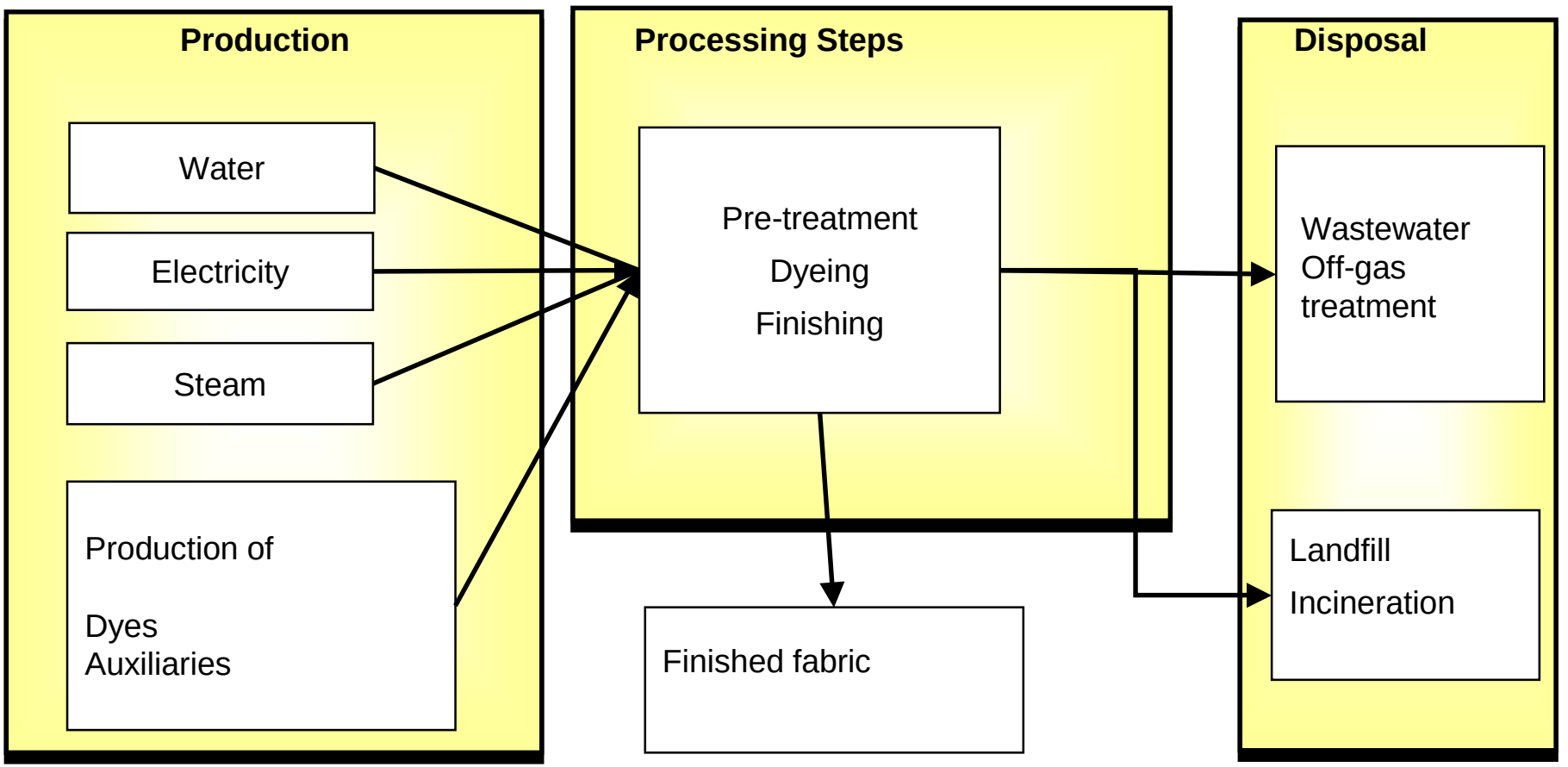
- Pilot project with UNIDO and UNEP as part of the United Nations - Global Compact initiative
- A software tool which allows the user to assess the eco-efficiency of various processing methods

BASF

UNIDO

UNEP

Dyeing Eco-efficiently: System Boundaries

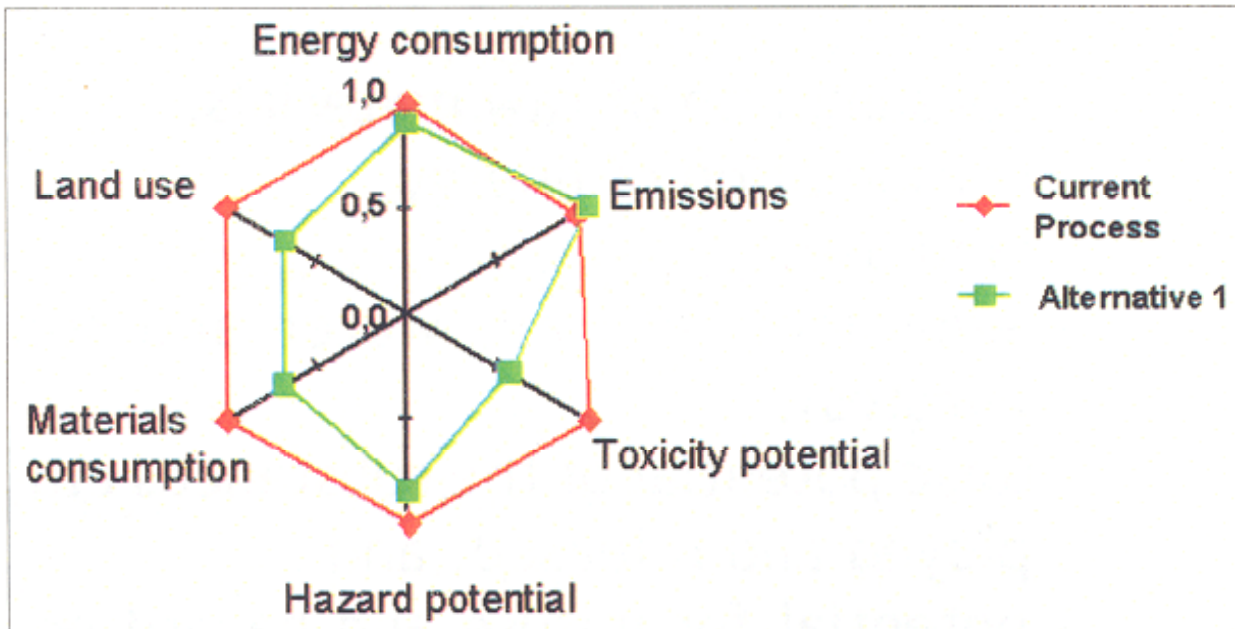


Dyeing Eco-efficiently: Inputs and Outputs

- **User Inputs:**
  - Fabric quantity, number of processing steps, processing time
  - Chemicals
  - Utility consumption
  - Process emissions
  - Costs
- **Eco-efficiency Manager Outputs:**
  - Portfolio: which alternative is the most eco-efficient?
  - Environmental Fingerprint: what are the impacts of each?
  - Relative comparisons for each of the categories: Emissions, Energy and Raw Material Consumption, Land Use, Toxicity and Risk Potential

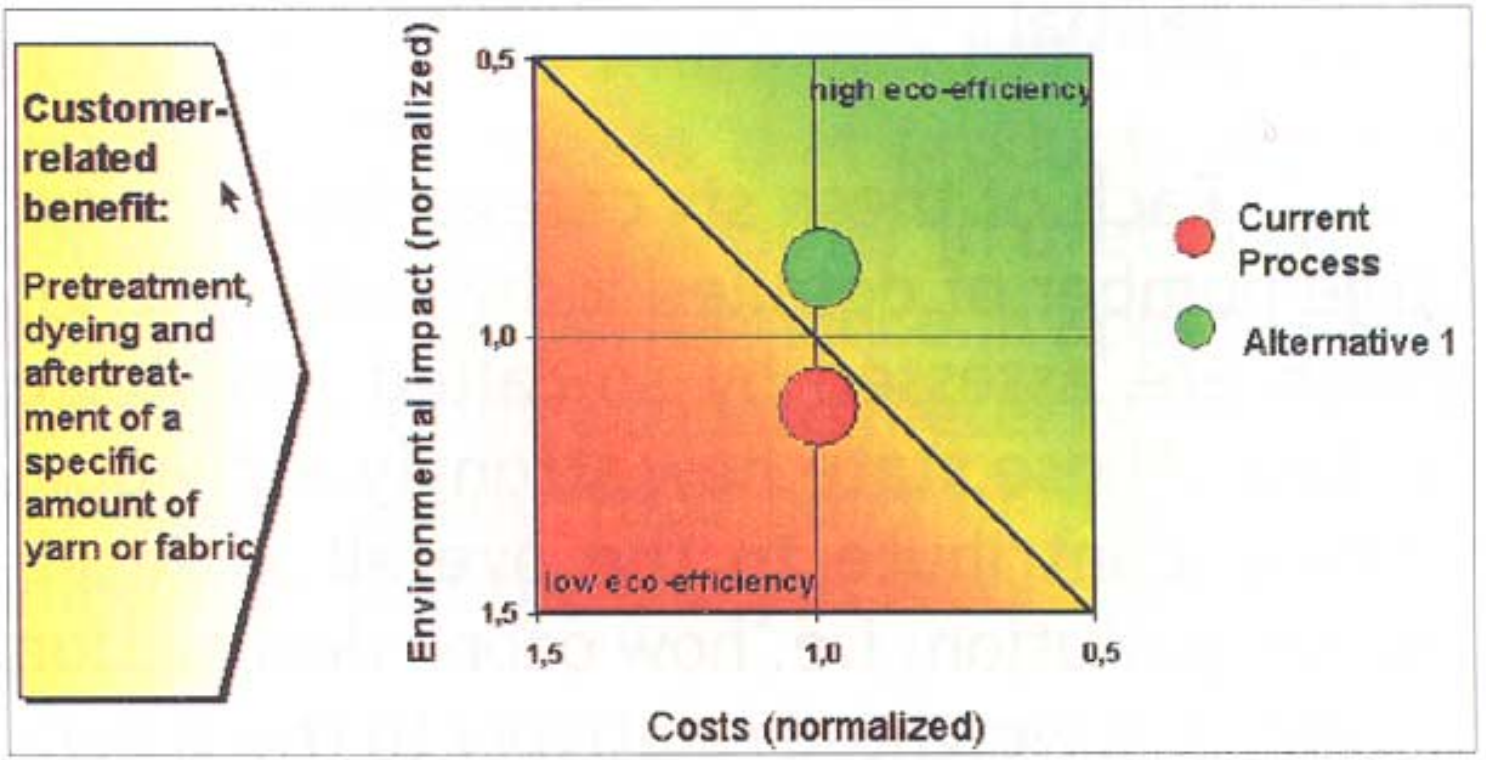
Process Improvements

- **A two-step dyeing process for mixed fabric was changed to a one-step process, by using a new chemical.**



- **Decreased energy and water consumption resulted in improvements in almost all environmental categories.**

Process Improvements



- **The new chemical provided environmental benefits at the same overall costs, even though the chemical price was more expensive.**

Getting from here to there eco-efficiently

Ecologistix - a Software developed by BASF

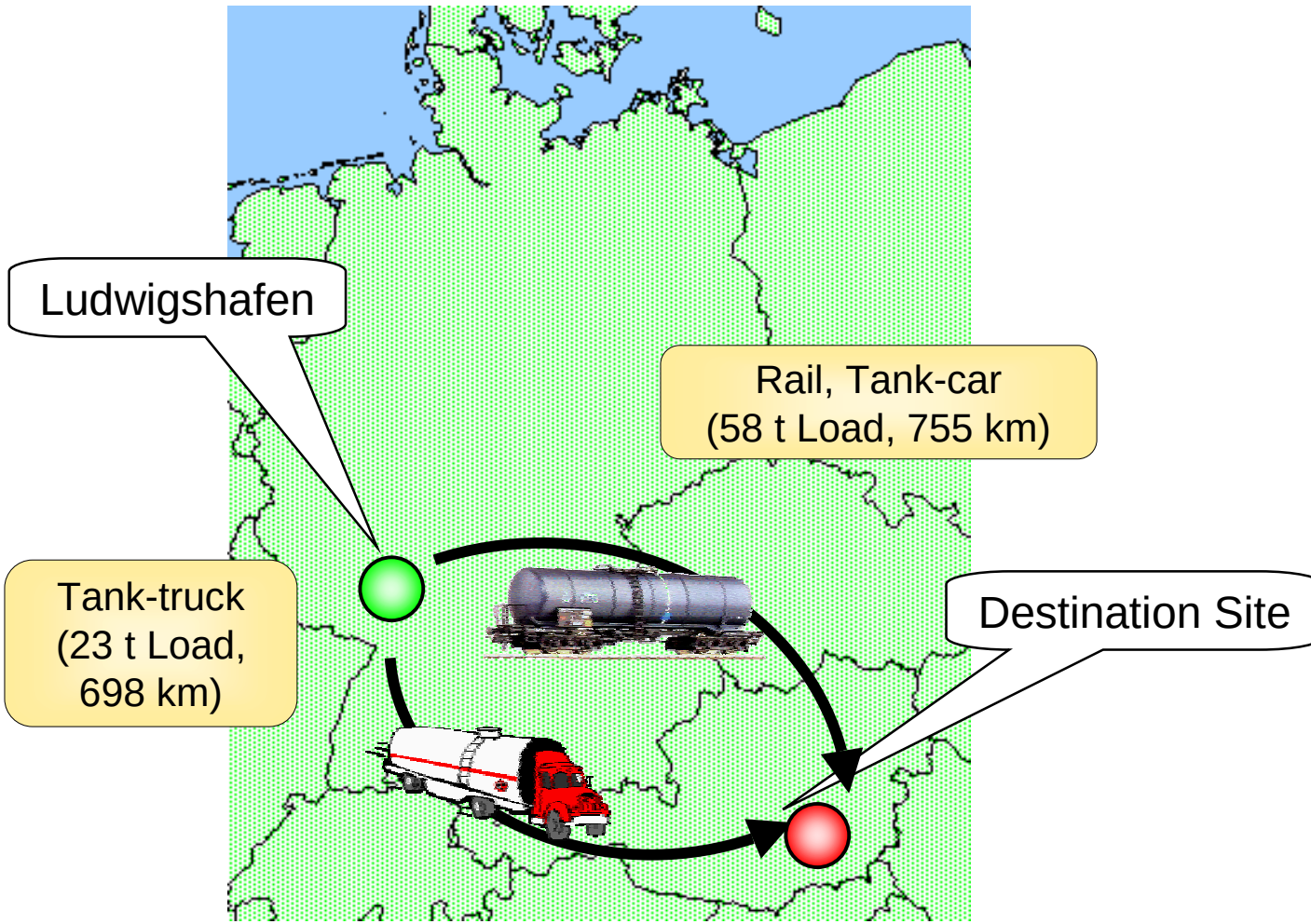
The goal of this software is:

- to compare economics, environmental impact and responsible care for transporting products
- to offer innovative and responsible solutions to our customers

Getting from here to there eco-efficiently

- **User Inputs:**
  - Payload
  - Chemical hazard class
  - Shipping fees
  - Distances for land, sea
  - Number of transfers
  - Open/closed filling systems
- **Eco-efficiency Manager Outputs:**
  - Portfolio: which alternative is the most eco-efficient?
  - Environmental Fingerprint: what are the impacts of each?
  - Relative comparisons for each of the categories: Emissions, Energy and Raw Material Consumption, Land Use, Toxicity and Risk Potential
  - CO_2 savings potential

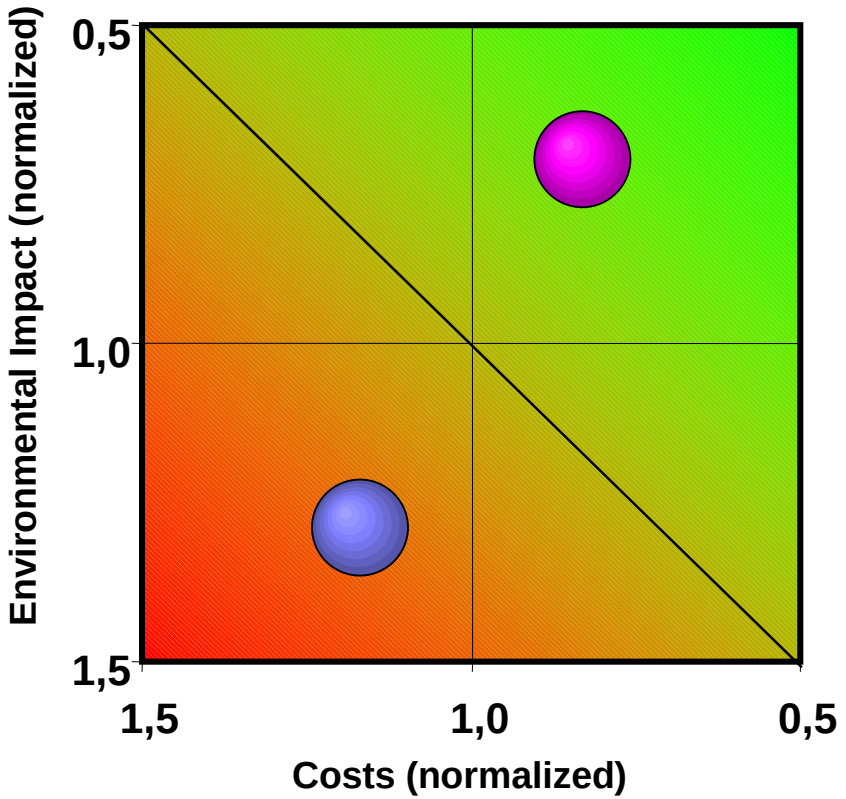
Logistic alternatives for supplying product to another site (14.000 t pro Jahr)



Getting from here to there eco-efficiently

Customer Benefit:

Transport of 14.000 t of product from Ludwigshafen to a customer



Alternatives

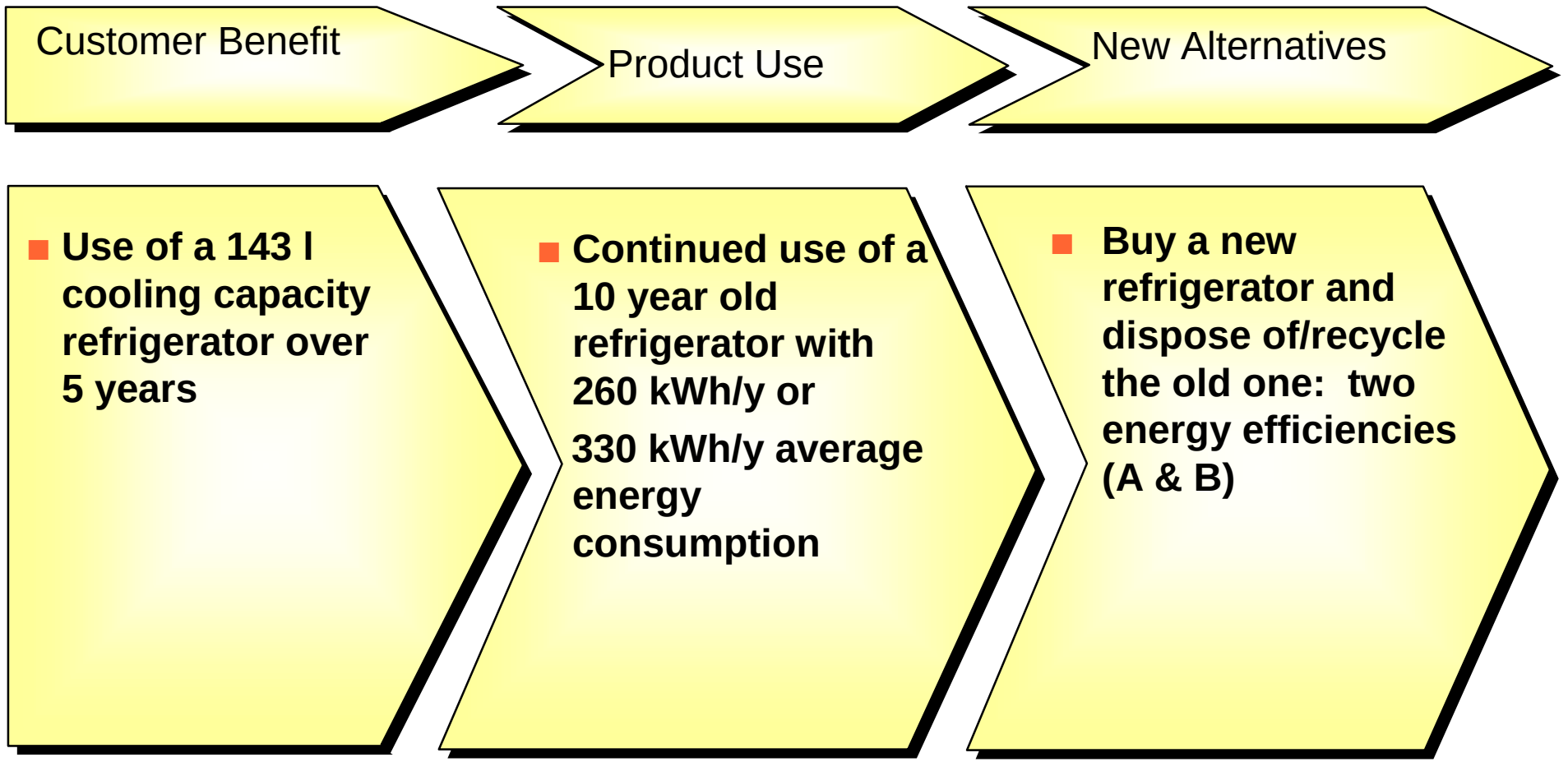
- Road transport, conventional tank-truck 23 t Load
- Rail, Tank-car, 58 t Load

Cooling Eco-efficiently: Refrigerators

- **A project done by BASF for the German Green Party and the Wuppertal Institute**
- **Helps the consumer decide:**

  "Should I buy a new refrigerator or continue to use my old one?"
- **Considers production and disposal of the appliance itself, as well as energy consumption**

Refrigerators: the Customer Benefit

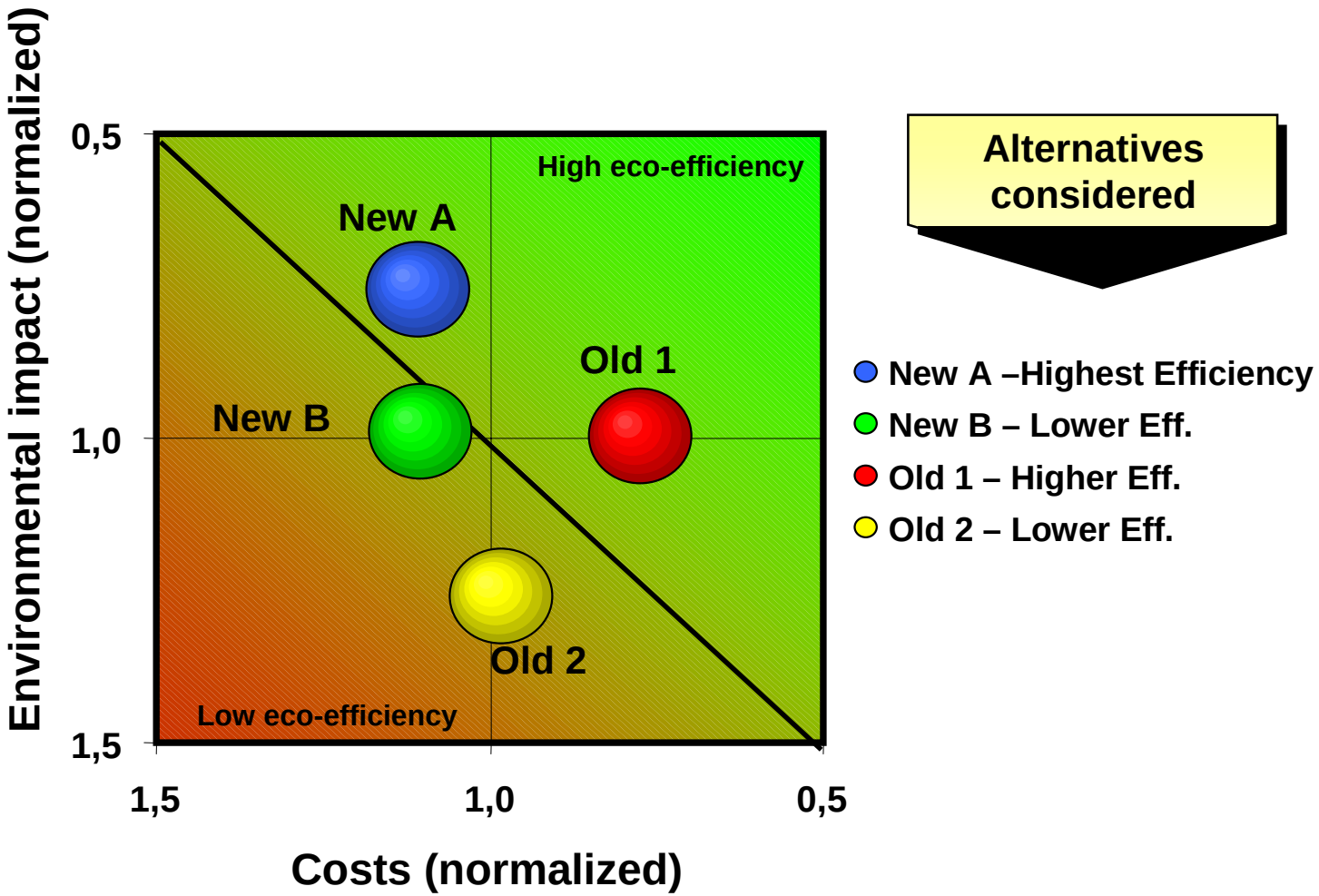


Cooling Eco-efficiently: the Portfolio

Base case

Customer benefit:

Use of 143l of cooling capac over 5 years



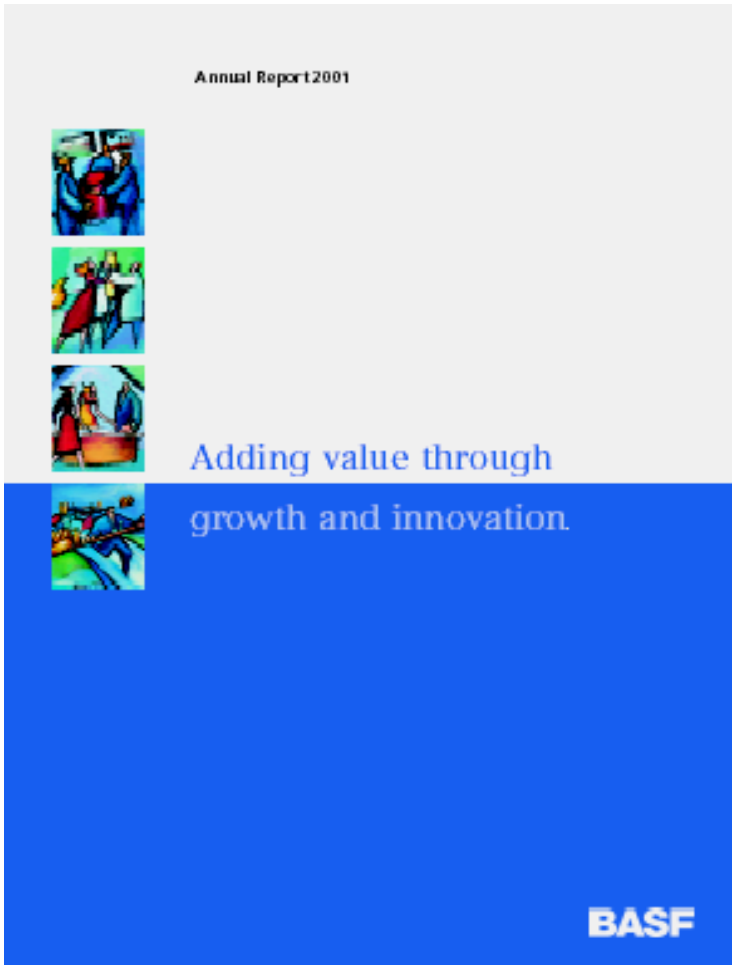
Alternatives considered

- New A –Highest Efficiency
- New B – Lower Eff.
- Old 1 – Higher Eff.
- Old 2 – Lower Eff.

Cooling Eco-efficiently: Refrigerators

- **Buying a new more energy-efficient appliance brings the greatest environmental benefit…**
- **…at only slightly higher cost**
- **Energy efficiency is key!!!**

Eco-Efficiency Analysis:
Our Innovative Instrument for better Products



With an eye to the markets of the future, we believe that it is prudent to consider the environmental friendliness of one's own products. That is why we felt it was important to develop an effective means of monitoring ecological and economic performance.

Eco-efficient products and processes give BASF and our customers a competitive edge.

For more information:
www.basf.de/en/corporate/sustainability/oekoeffizienz/
or send an email to wallc1@basf-corp.com