INNOMAT

LEARNING & TRAINING PACKAGES

Module 4: Eco-efficient Value Creation in product innovation

Block 1

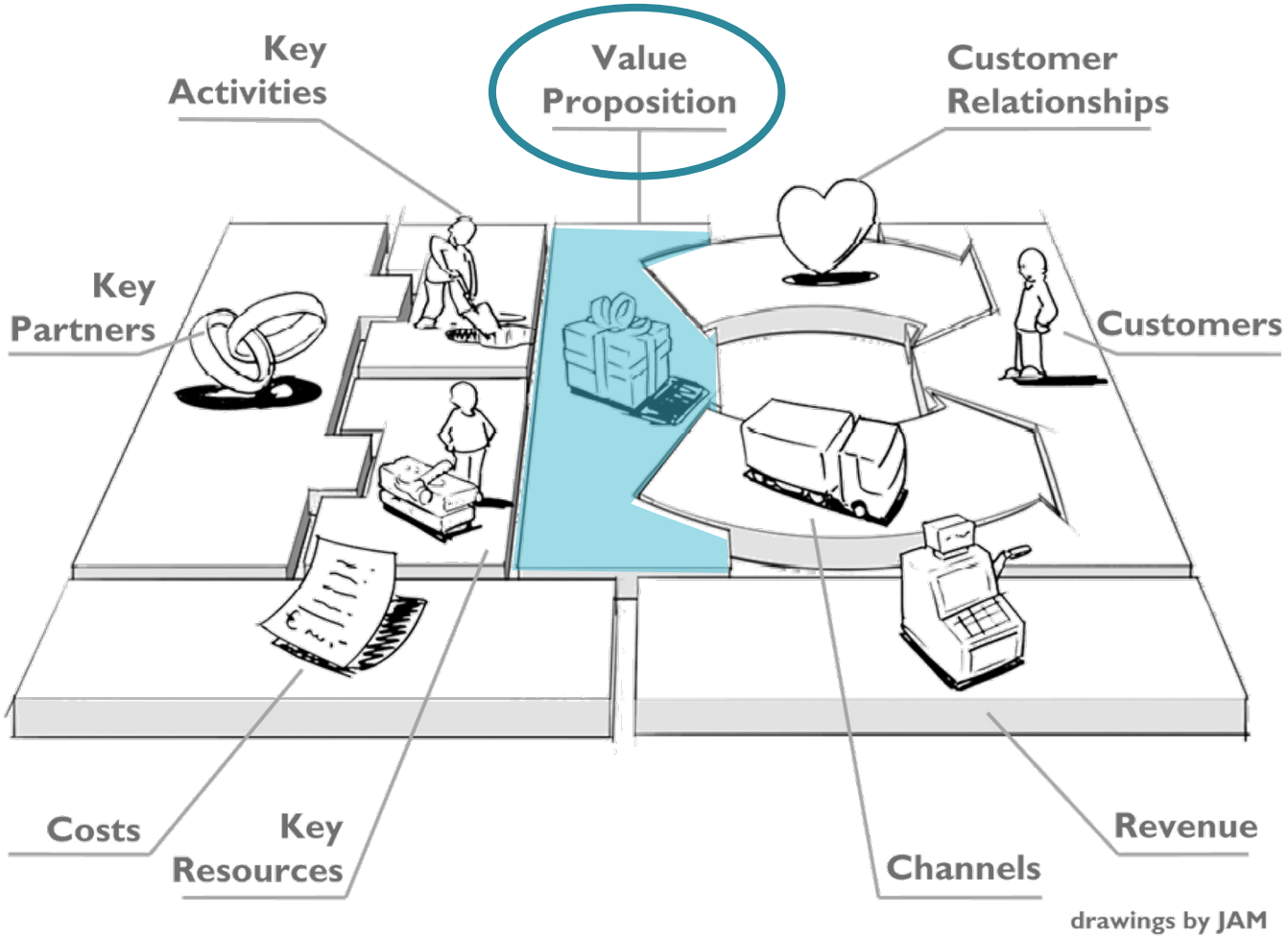
- Block 1:
  - Introduction
  - What EVC ?
  - EVC examples
  - Green Product Marketing
- Block 2:
  - Exercise and assignments

Authors:
David Sanjuan Delmás
Helmi Ben Rejeb
Janez Turk
Paul Suski
Editor:
Joost Vogtlander
Project Manager:
Jan-Henk Welink

eit RawMaterials ACADEMY

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Eco- Efficient Value Creation is the key to a successful sustainable business model



EVC is a method to develop products and services that have:

(1) a better value proposition

and at the same time

(2) a lower eco-burden

This is called the **double objective**

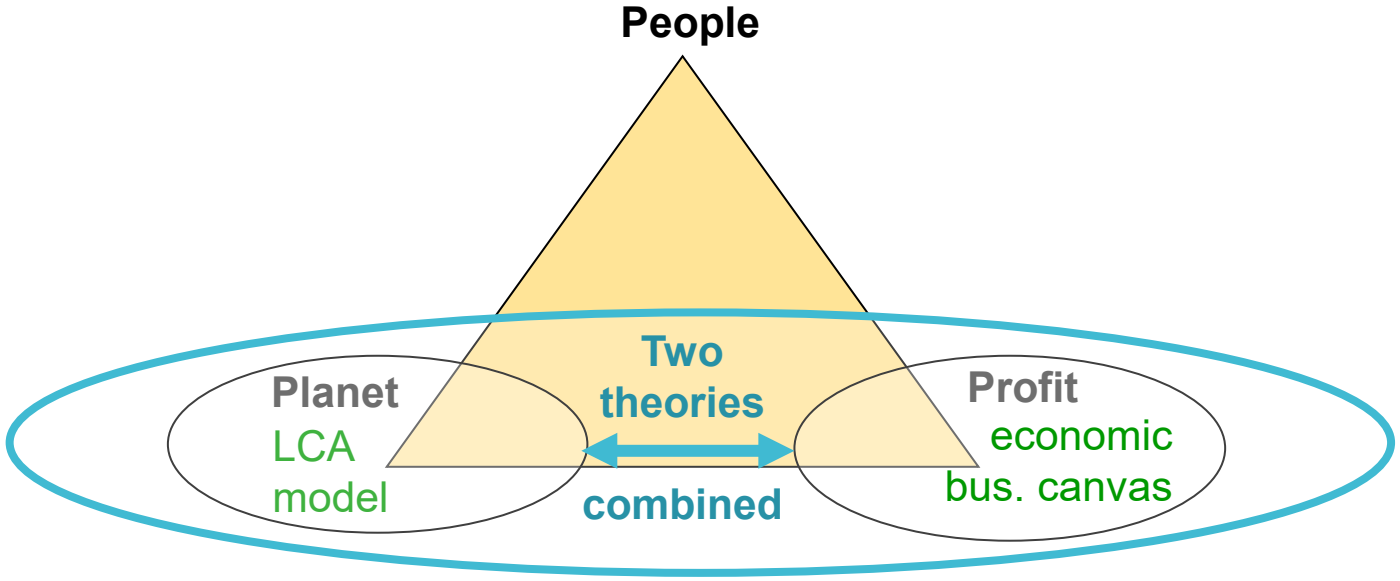
Eco- Efficient Value Creation (EVC) is related to the mission statement of the WBCSD (1995):

"The delivery of competitively priced goods and services that satisfy human needs and bring 'quality of life',

while progressively reducing ecological impacts and resource intensity, throughout the lifecycle, to a level at least in line with the earth's estimated carrying capacity"

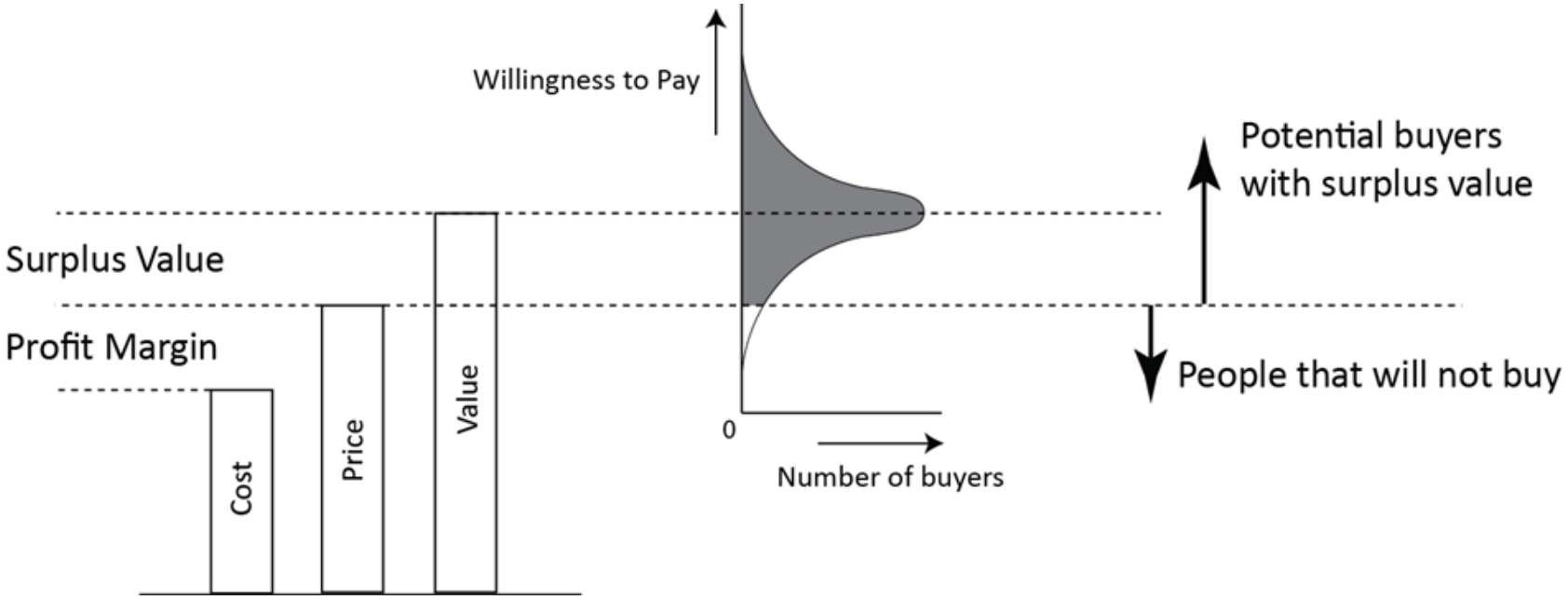
value 'profit'

eco-costs 'planet'



Circular business models and eco-efficient value creation

The value of a product: a complex, and sometimes confusing, issue in management science

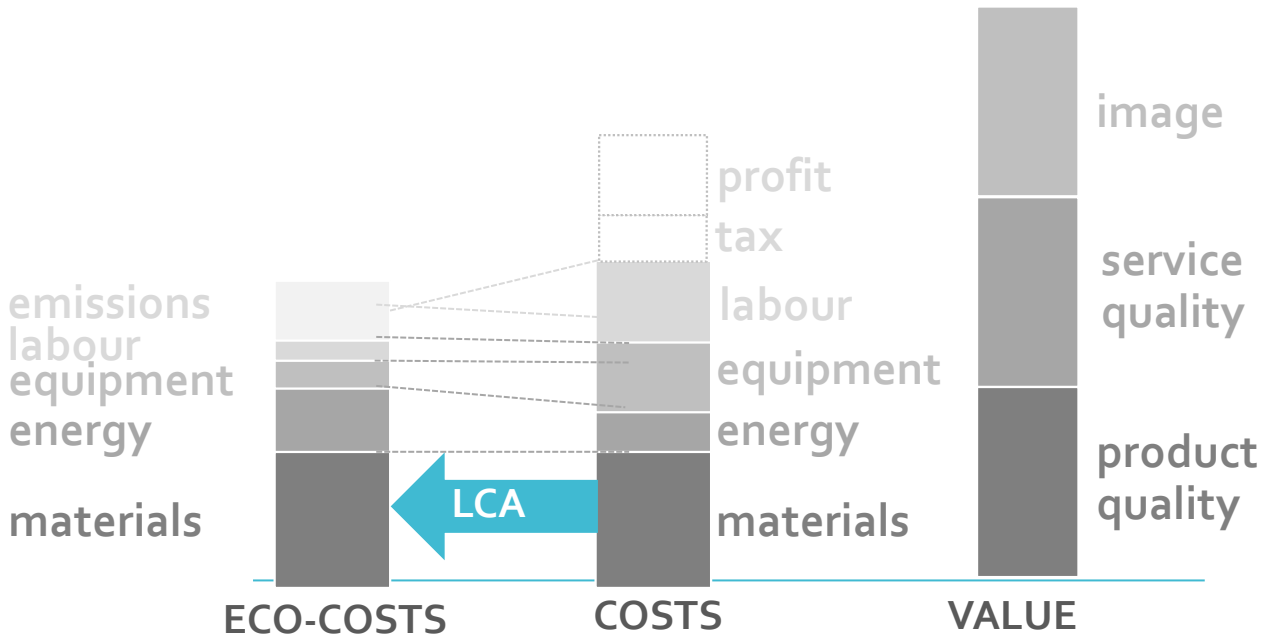


The value is different for every individual buyer, so the market price is a balance between:

- The profit margin of the product (i.e. the difference between sales price and production costs of a product
- The number of people who will buy (i.e. buyers that perceive a higher value than the price)
- In business practice, the optimum price is set to achieve the optimum profit (= margin x number of buyers)

Note that the number of buyers will be lower when the profit margin it higher

Products and services have 3 main dimensions in Eco- Efficient Value Creation (EVC):

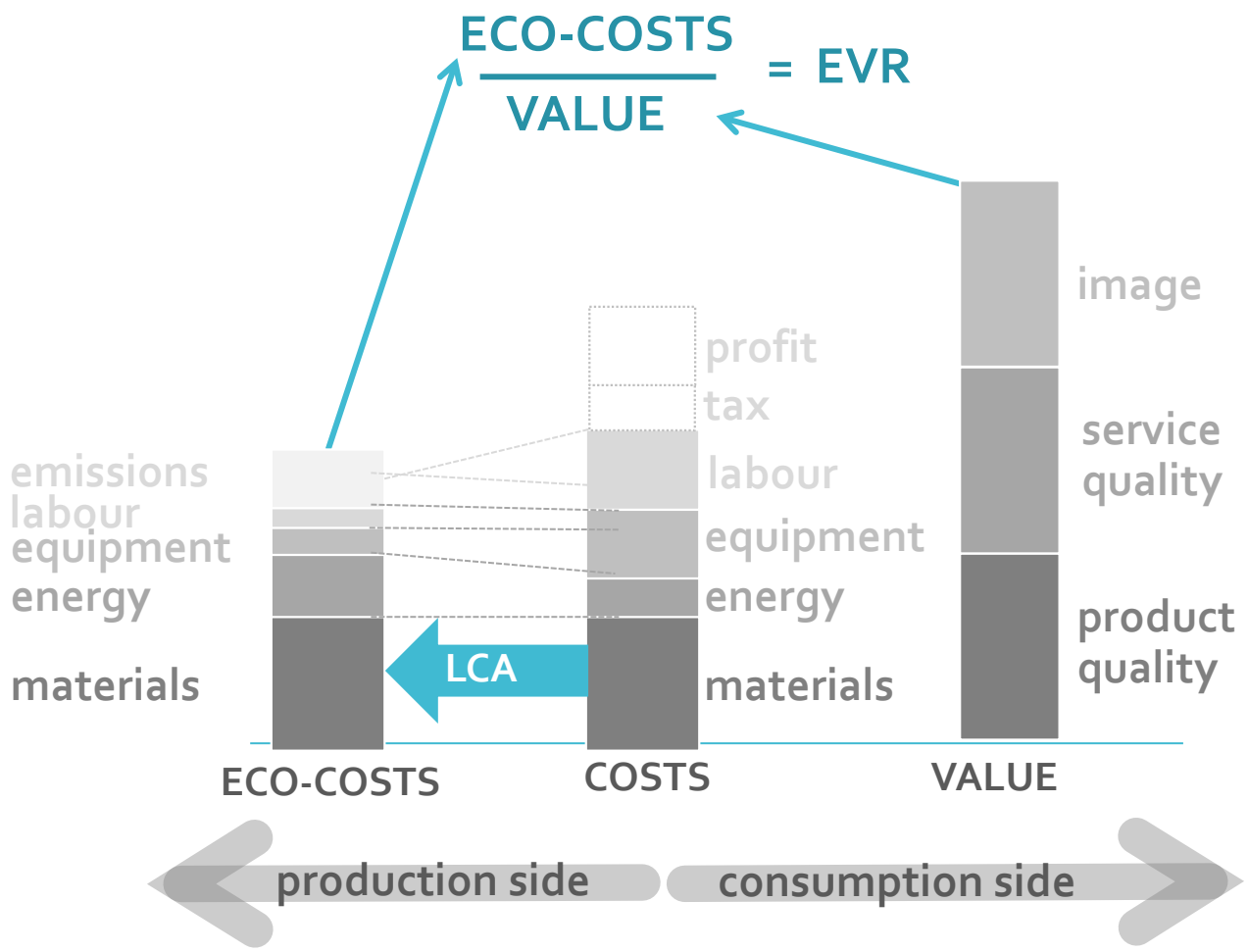


The Value is the "Market Price", which is the "Willingness to Pay" of the marginal buyer:

- for existing products we take the market price
- In design it is determined by potential user panels or customer surveys

- Note: sustainability is part of the image, and plays an important role in brand loyalty
- However, consumers in main-stream markets are NOT prepared to pay more for 'green' products

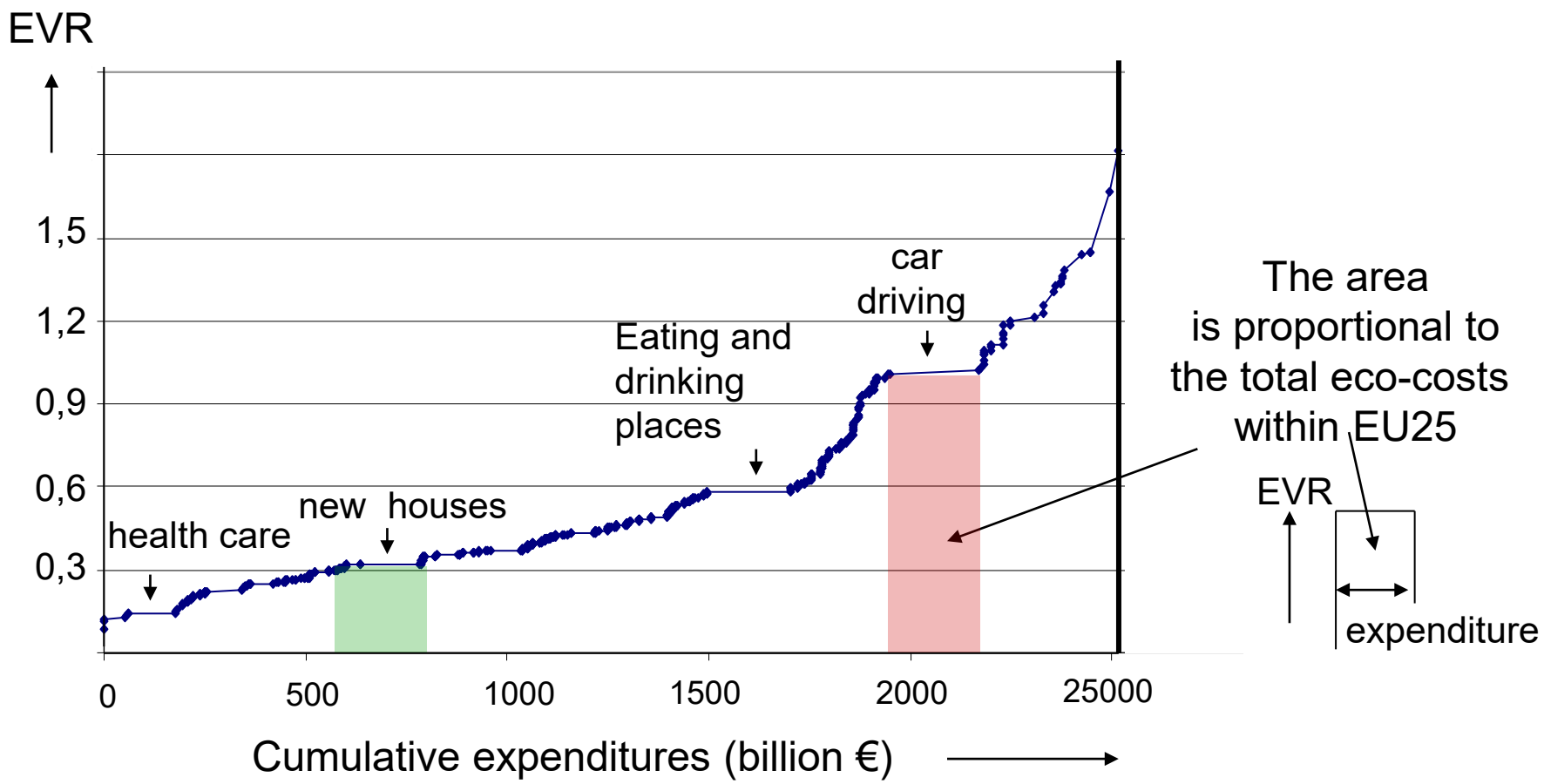
Sustainable buying behaviour is buying products with a low Eco-costs / Value ratio (EVR).



Buying products with an ever lower EVR is the key towards sustainability (the so called 'budgetary approach' in sustainable buying behaviour):

1. Industry has to reduce the eco-burden of their existing products
2. Designers have to develop products with a higher value and at the same time lower eco-costs
3. Consumers have to be seduced to buy high value (quality) products, at a higher price (to be branded by clever green marketing)

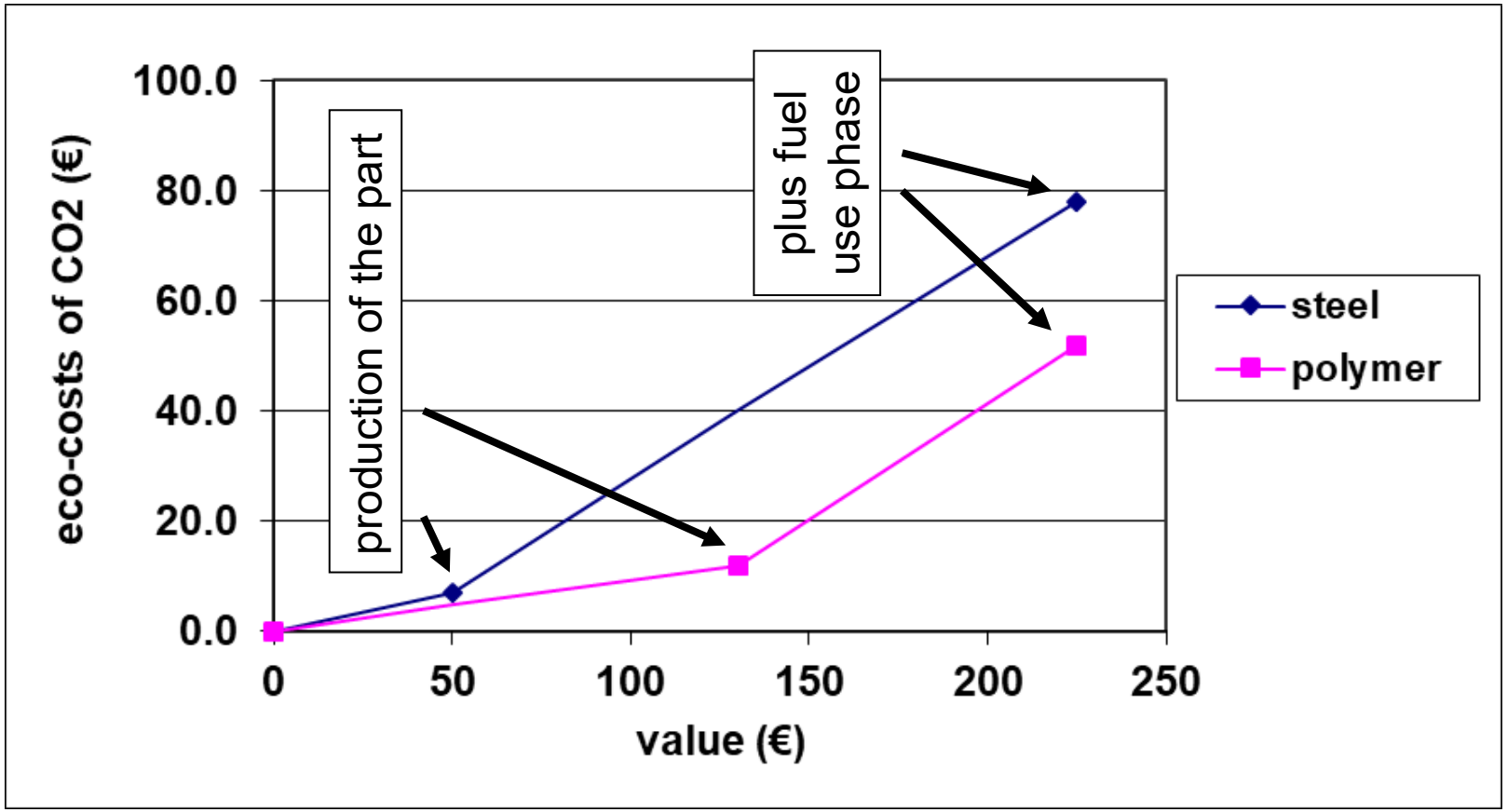
Macro-economic consequences of expenditures of all consumers in the EU25: how to reduce eco-costs?



Two sustainability strategies for the European Union:

- ✓ ask (force) industry to reduce the eco-costs
- ✓ reduce consumer spending at the high end of the curve

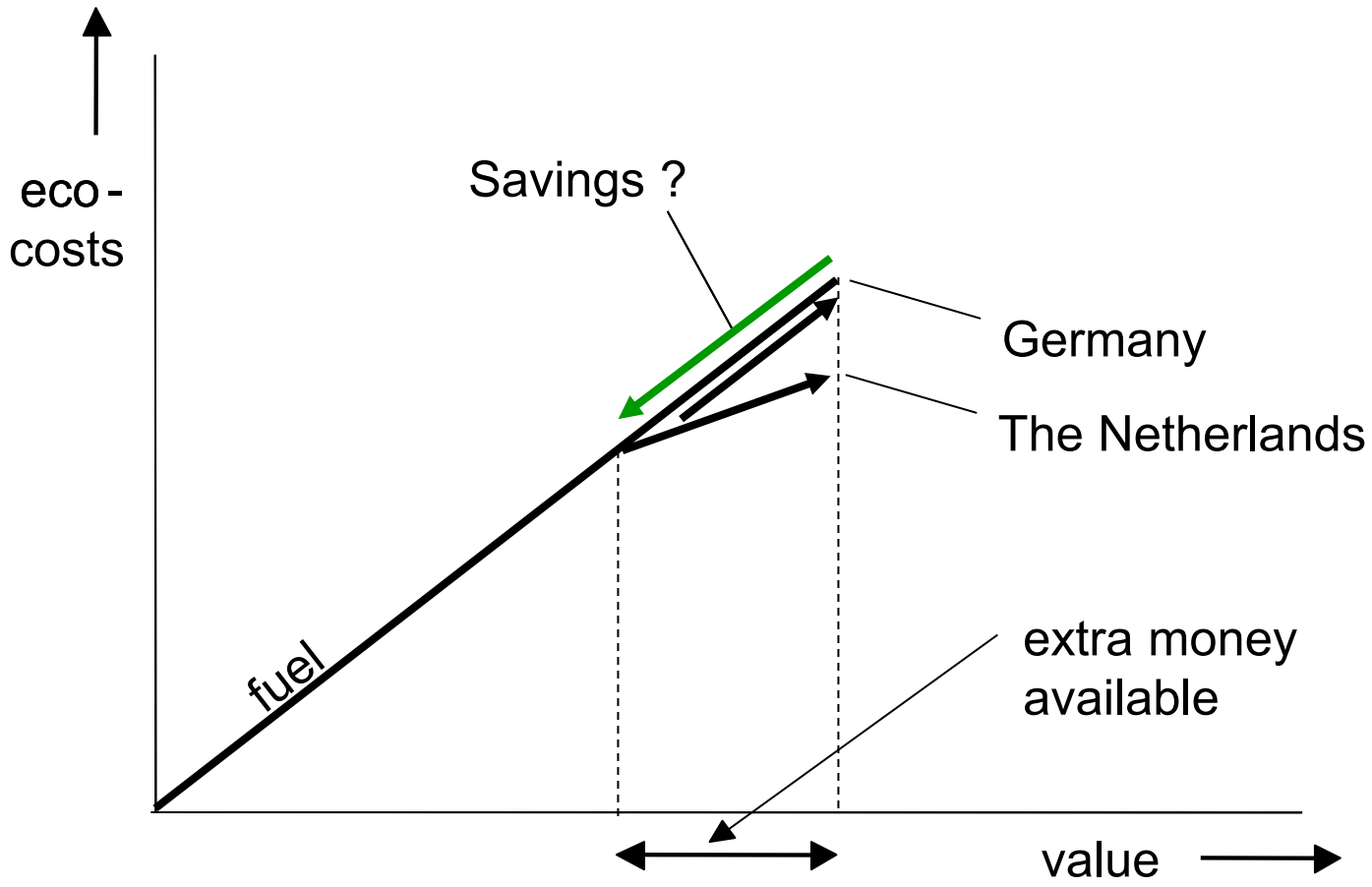
The EVR on product level: example of a more sustainable car by making a part of the body lighter



Replacing steel by a polymer has 3 main consequences

1. Higher eco-costs of the part (engineering plastics have higher eco-costs than steel
2. Savings of fuel in the use phase, since the car is lighter
3. When the whole body is made of plastics, the price would more than double, to be earned back in the use phase.
   A 'total lease' concept is the only way to sell such a car

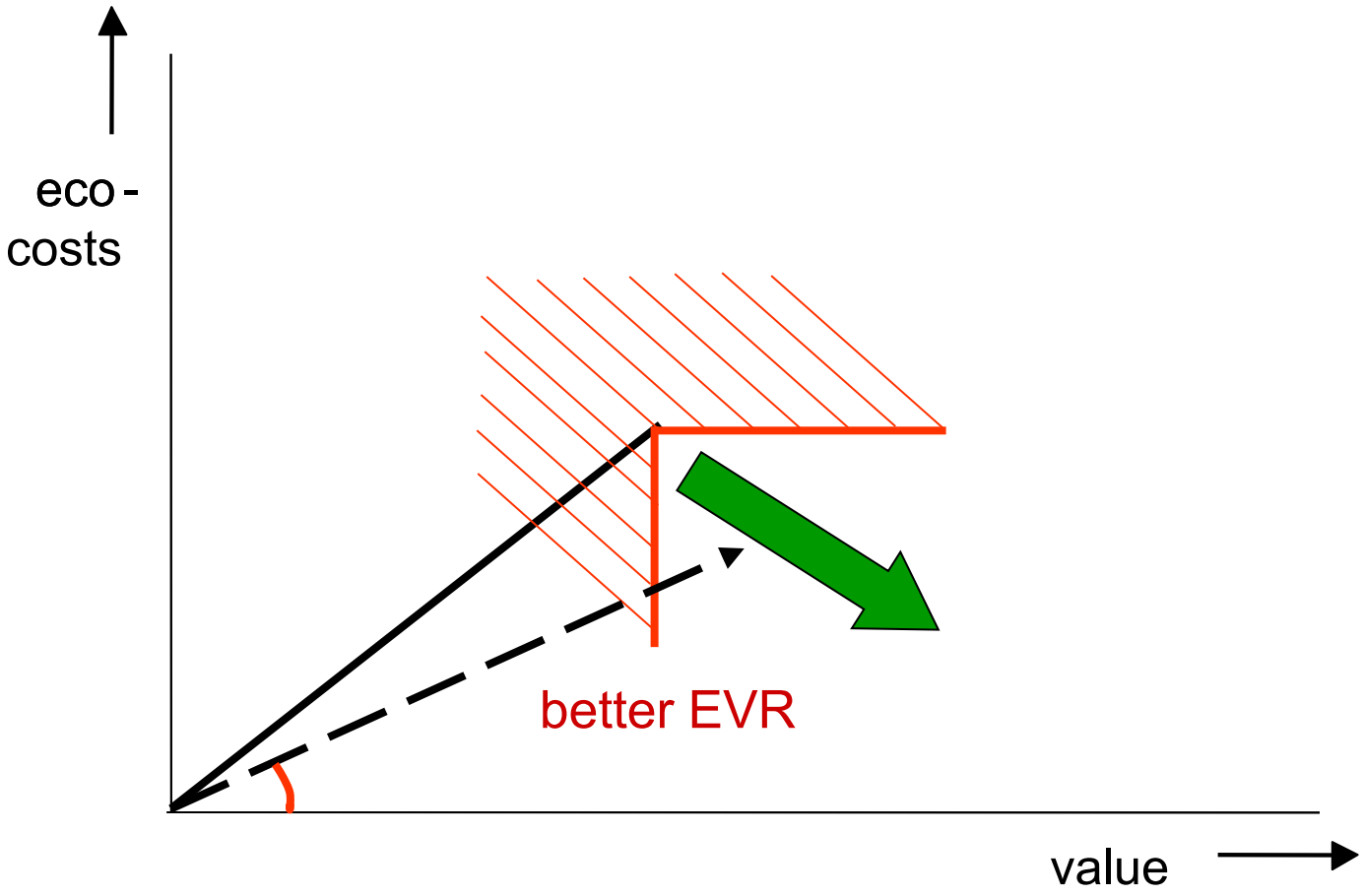
Savings generate the 'rebound effect': example of an aerodynamic car



Energy savings have a 'rebound effect', i.e. when people save money when they save energy, they will spend that money on something that causes eco-costs as well

1. In Germany cars are driving faster since they have better aerodynamics: the advantage of it is converted in 'being able to drive faster'
2. In the Netherlands people are not allow to drive faster, so they drive more, which has a slightly better EVR

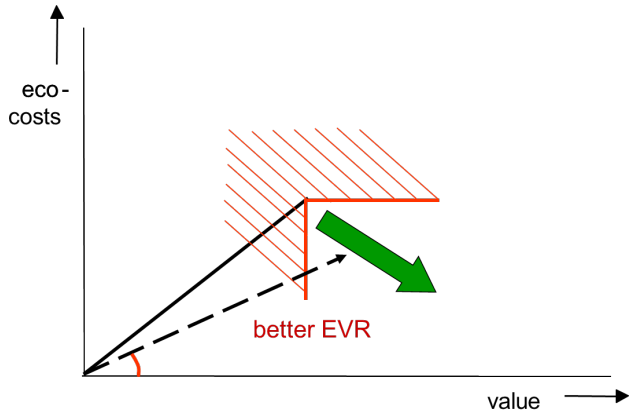
The road towards sustainability: the 'double objective' for innovation and design



The higher value (price) is required since:

1. The new product has to have a higher quality, since modern people tend to buy only higher quality (products with a lower quality are never a success in modern markets).
2. There will be no rebound-effect
3. The extra price is needed to cover the extra costs

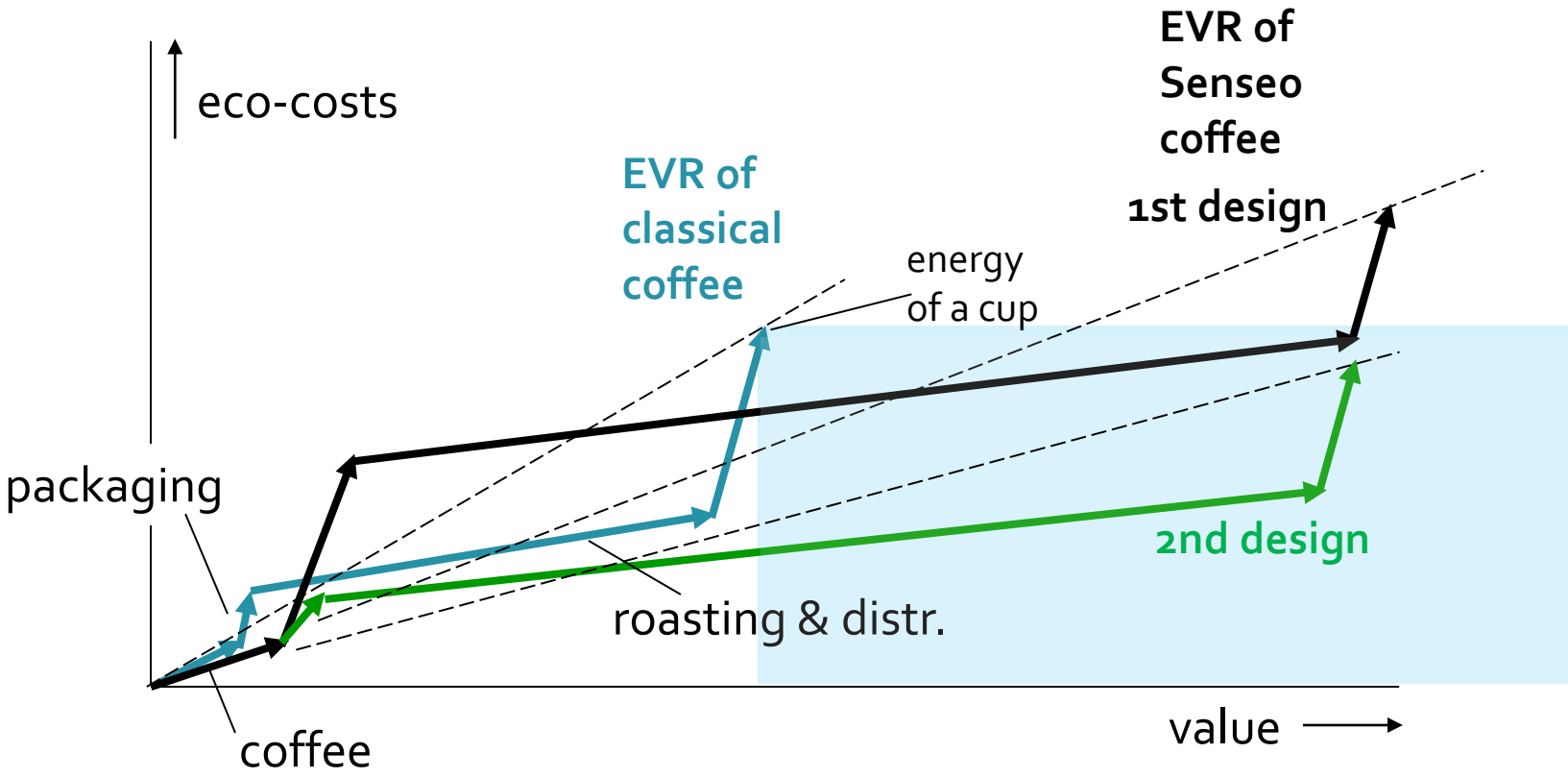
Example of the 'double objective' for innovation and design



The design of a leisure boat by a team of students who apply the double objective of eco-efficient value creation

https://youtu.be/bBJIMUHaWzs

The 'double objective' in product innovation example: the Senseo coffee machine



The Senseo coffee system was designed in 2 steps to fulfil the 'double objective':

- 1st design: more convenience = more market value, and less energy for a cup of coffee
- 2nd design: reduction of eco-costs of packaging system (incl. logistics)
- The result is more sustainable since it has a much lower EVR

Sustainable Product Portfolio management in the circular economy

1. doing nothing
2. EcoDesign
3. add quality and apply PSS

Three long term strategies:

1. Doing nothing is no option: governmental future regulations will erode profits
2. Current products can be made more sustainable by EcoDesign
3. Innovative green products that suffer from low profit margins: add product quality and apply Product Service Systems (e.g. leasing, warranties, repair services, convenience, image)

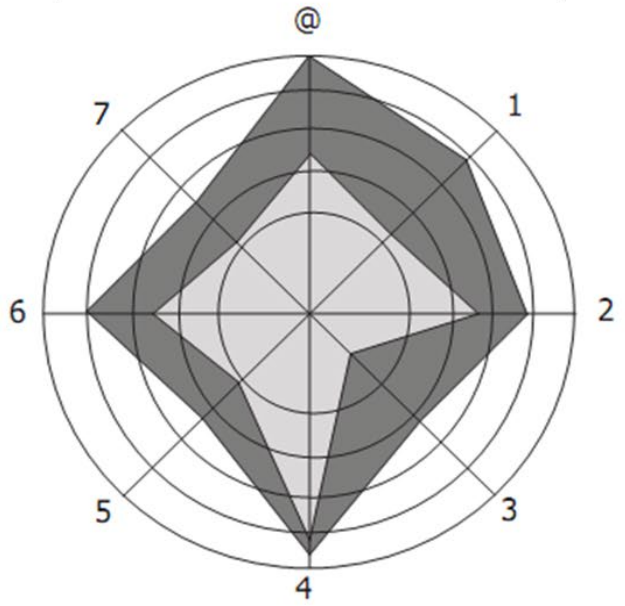
The Life cycle Design Strategy (LiDS) wheel: an LCA based way of EcoDesign

User System Level
- Shared use of the product
- Integration of functions
- Product Service Systems

Product System Level

7. Optimisation of end-of-life system
- Reuse of product
- Remanufacturing/refurbishing
- Recycling of materials
- Safer incineration

6. Optimisation of initial lifetime
- Reliability and durability
- Easier maintenance and repair
- Modular product structure
- Classic design
- Strong product-user relation



Product Component Level

1. Selection of low-impact materials
- Cleaner materials
- Renewable materials
- Lower energy content materials
- Recycled materials
- Recyclable materials

2. Reduction of materials usage
- Reduction in weight
- Reduction in (transport) volume

5. Reduction of impact during use
- Lower energy consumption
- Cleaner energy source
- Fewer consumables needed
- Cleaner consumables
- No waste of energy/consumables

Product Structure level

3. Optimisation of production techniques
- Alternative production techniques
- Fewer production steps
- Lower/cleaner energy consumption
- Less production waste
- Fewer/cleaner production consumables

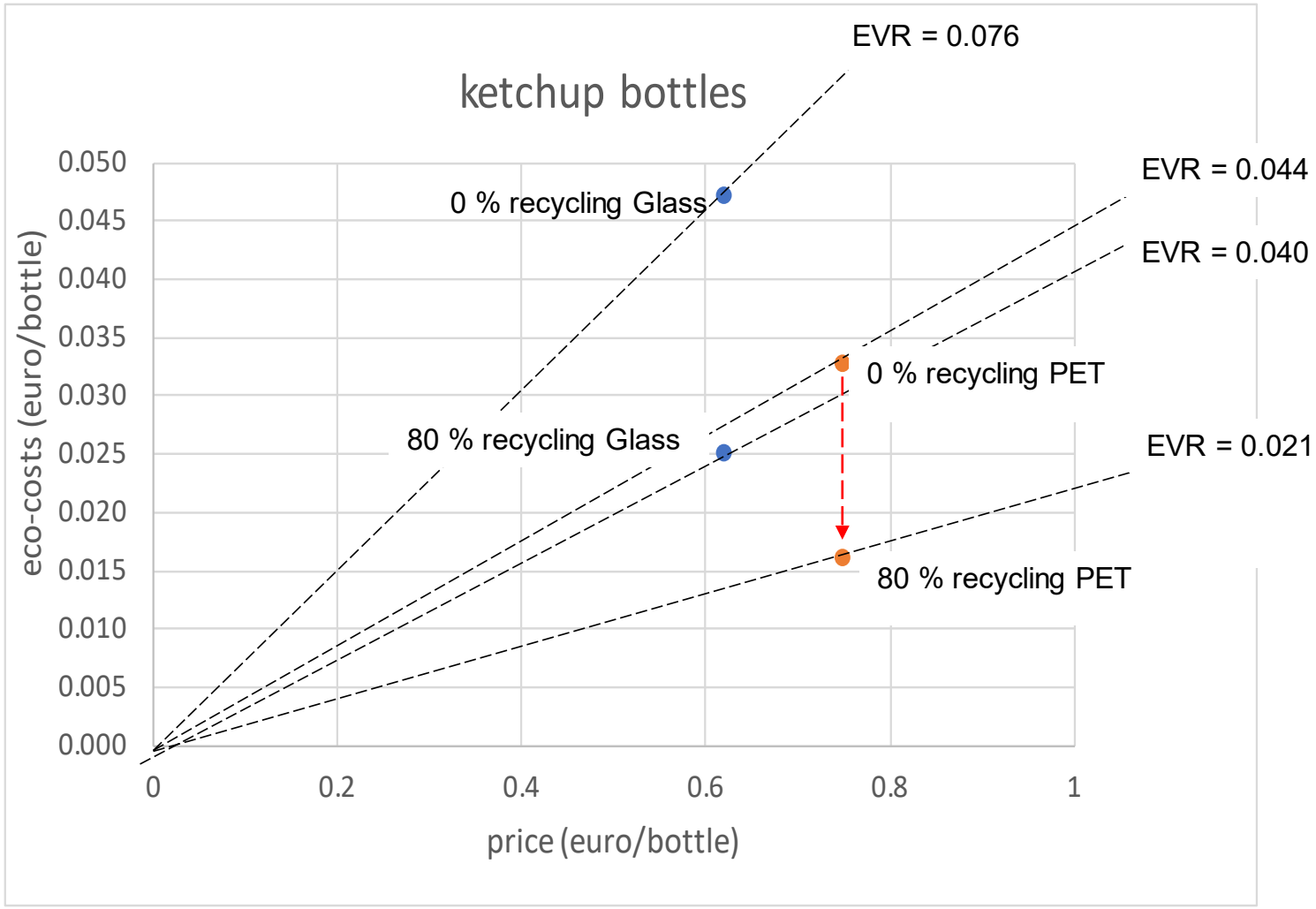
4. Optimisation of distribution system
- Less/ cleaner/ reusable packaging
- Energy-efficient transport mode
- Energy-efficient logistics

old product
new product

The LiDS wheel has multiple functions in eco-design:

- It can serve as a checklist on how to improve a current design, highlighting 'hotspots'
- It can serve as a LCA benchmarking tool, however, point 1 and 2 should be combined then, as well as point 6 and 7
- The top level, point @, is questioning whether or not there are opportunities for a radical innovation

The ketchup bottle, 300 ml, Glass or PET ? A product portfolio



Classic glass bottle

Value ketchup: 0.60 euro
Value bottle: 0.62 euro
Glass weight: 197 gram
Steel cap 3.2 gram

Plastic (PET) squeezable bottle

Value Ketchup: 0.60 euro
Value bottle: 0.75 euro
PET weight: 22.7 gram
PP cap 3.9 gram

Be aware of negative and positive connotation in green product 'branding'

Be aware of the negative connotation of sustainability caused by awareness building (you feel bad when you are confronted with the problems of pollution)

Build on the positive connotation of conservation of a beautiful nature (you feel good when you think about nature)

Connotation is extremely important in marketing, since every buyer wants to be happy with his or her purchase:

- Awareness building is important, but leave that task to the NGOs
- Make buyers happy with the idea that they do something positive with regard to the conservation of mother earth
- Emphasise the quality of your product, also in branding (as explained in previous sheet)

Successful Green Marketing requires a careful strategy, to avoid common failures

Do's and don'ts:

- do not label a product as 'green' in the shop, since it will attract less buyers: *many people in mainstream markets have doubts on the quality of green products*
- do emphasise product quality in the shop, to counteract the negative green image on quality, and to allow for a higher price

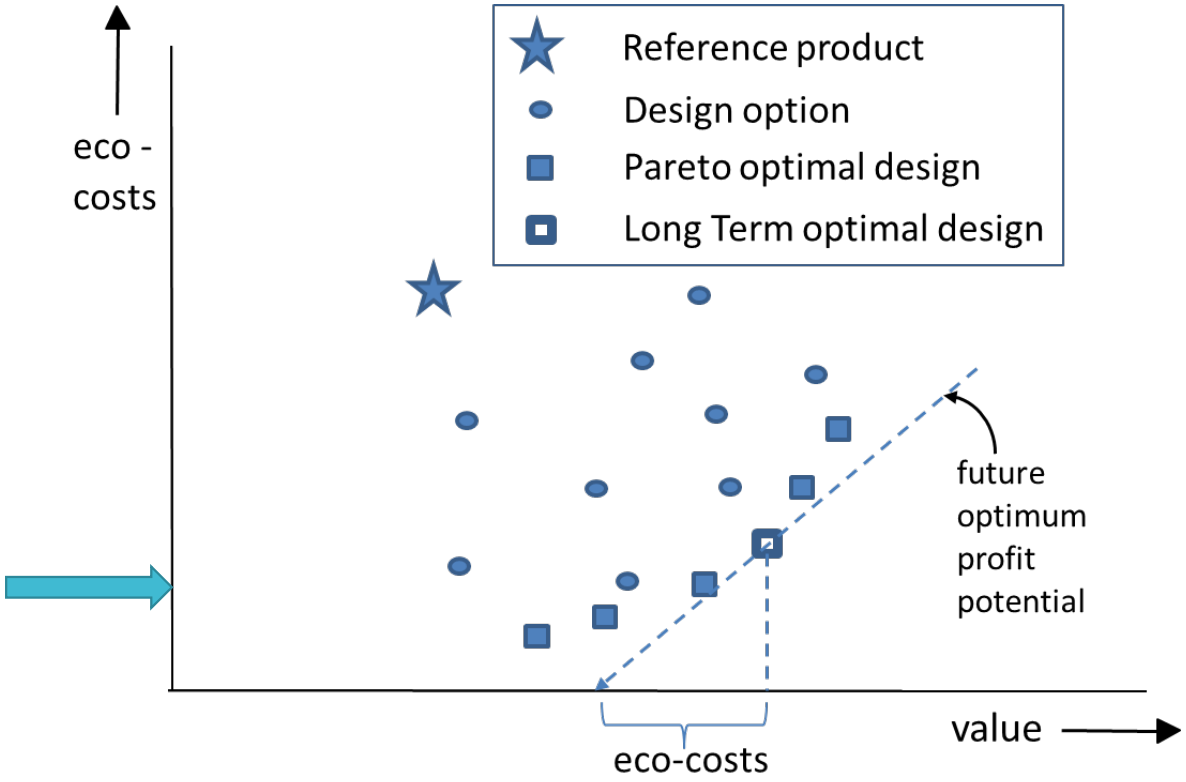
However, *enhance green aspects in product branding*, since that supports the 'feel good' emotion after the purchase, at home (generating 'repeat buyers')

The 'double benefit' model (Jacquelyn Ottman, 1993) distinguishes two types of benefit:

- The 'personal benefit' which is related to the customer perceived quality/price ratio, short term
- The 'environmental benefit' related to the issue of eco-burden, long term
- The 'personal benefit' plays a major role in the shop, the 'environmental benefit' is important at home

Now you can apply the EVC Method to your own product, use a Pareto analysis to select alternatives

1. Calculate the eco-costs of your existing product (the reference)
2. Redesign your product with the EcoDesign method (LiDS wheel), and determine the eco-costs of it (iterative process)
3. Determine the value of that product (= product quality + service quality + image)
4. Optimise your value proposition and check your Business Model
5. Check whether there are other Product Service Systems and Business Models that can meet your clients needs as well
6. Repeat step 2 – 5 until you are satisfied
7. Select the best solution in the EVR matrix (applying a choice in the 'Pareto front' = Pareto optimal design)



Assignment 7:
Load the IdematLightLCA app (in IOS or Android),
Look at the instruction video 2 at
www.idematapp.com

Make the felt-tip LCA (Module 1) at this app

(stop the video, do the assignment, and after that, continue with the next video)

INNOMAT

LEARNING & TRAINING PACKAGES

Module 4: Eco-efficient Value Creation in product innovation

Block 2; exercise and assignments

- Block 1:
  - Introduction
  - What EVC ?
  - EVC examples
  - Green Product Marketing
- Block 2:
  - Exercise and assignments

Authors:
David Sanjuan Delmás
Helmi Ben Rejeb
Janez Turk
Paul Suski
Editor:
Joost Vogtlander
Project Manager:
Jan-Henk Welink

eit RawMaterials ACADEMY

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Example of EVR benchmarking: different types of chairs (1)

Bamboo chair
€ 10.00
4.6 kg
electrical power 2.2 MJ
Sea container 0.05 m3
20.000 km
municipal waste incineration

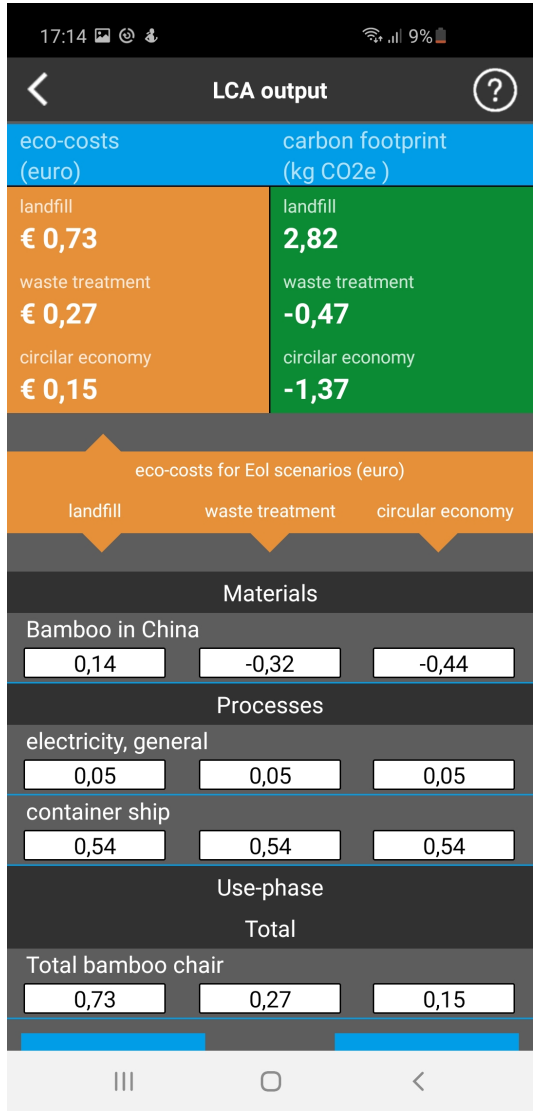
Oak chair
€18.00
4.3 kg
no paint
Truck&trailer 0.05 m3
500 km
municipal waste incineration

Steel chair
€23.00
4.98 kg
Powder coating 1.1 m2
Truck&trailer 0.05 m3
500 km
municipal waste open loop recycling

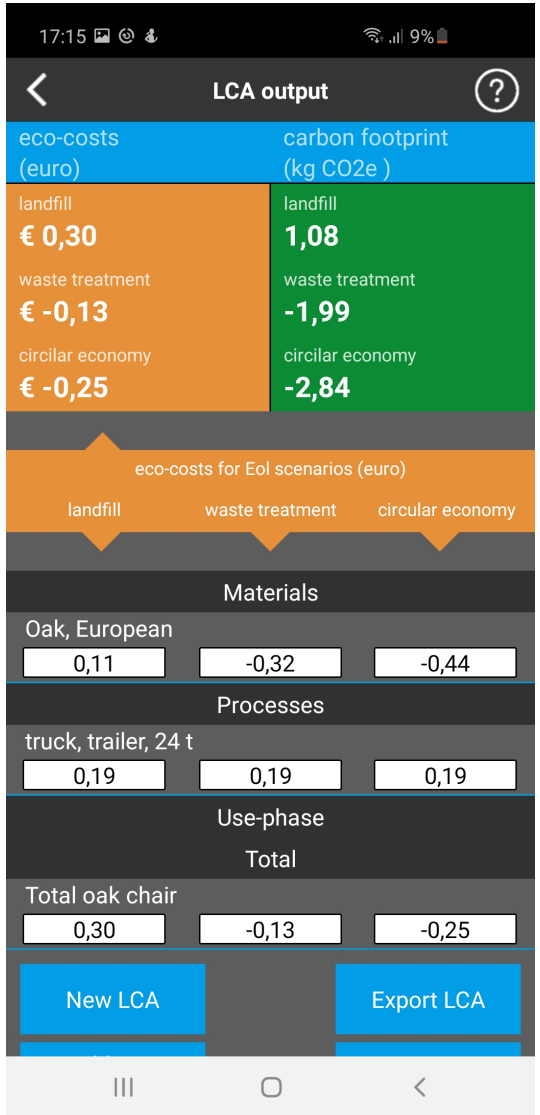
Plastic chair
€11.00
PP - 2.92 kg
Injection moulding
Truck&trailer 0.05 m3
500 km
municipal waste incineration

Example of EVR benchmarking: different types of chairs (2)

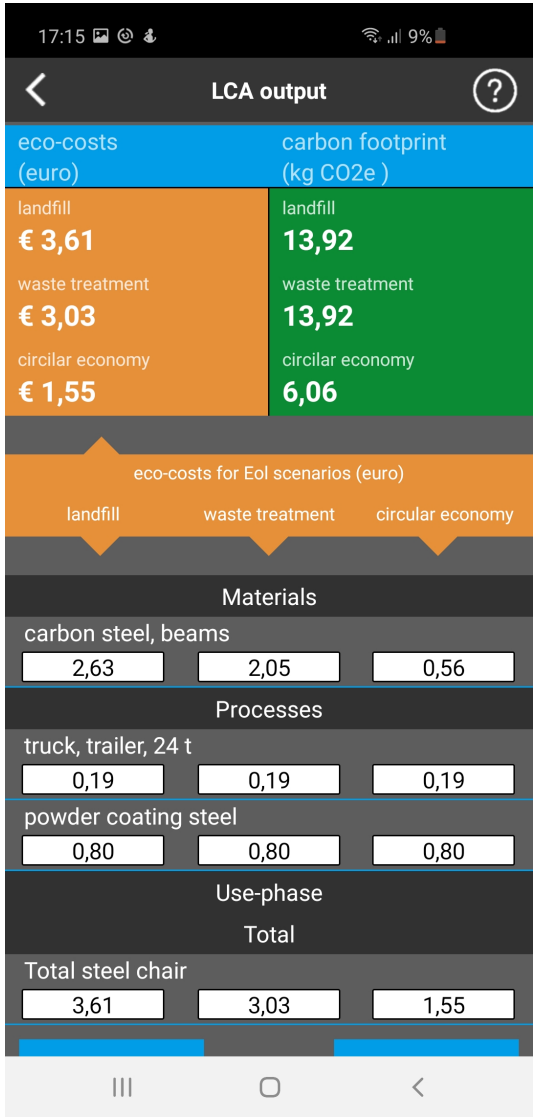
bamboo



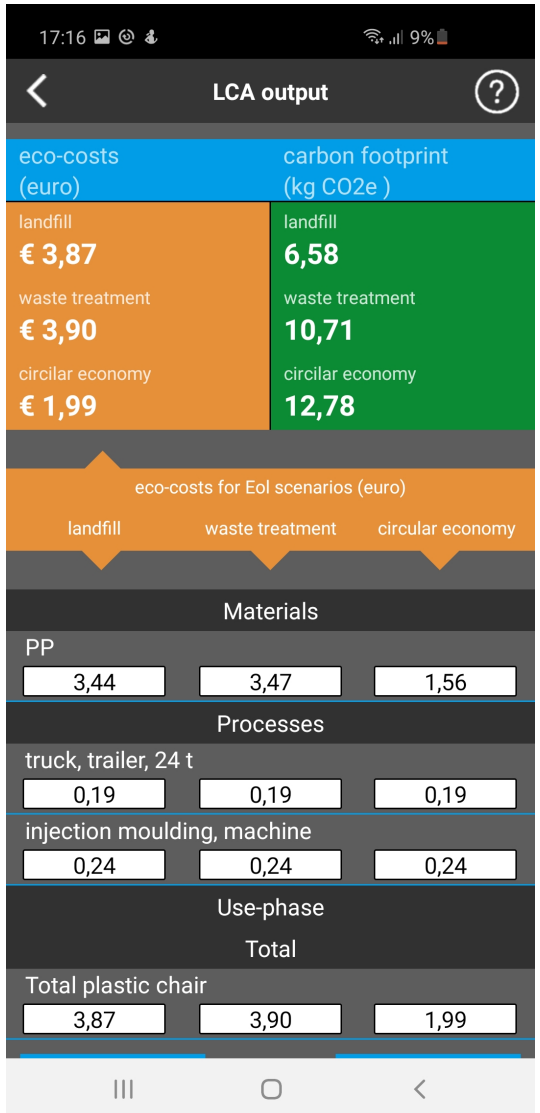
oak



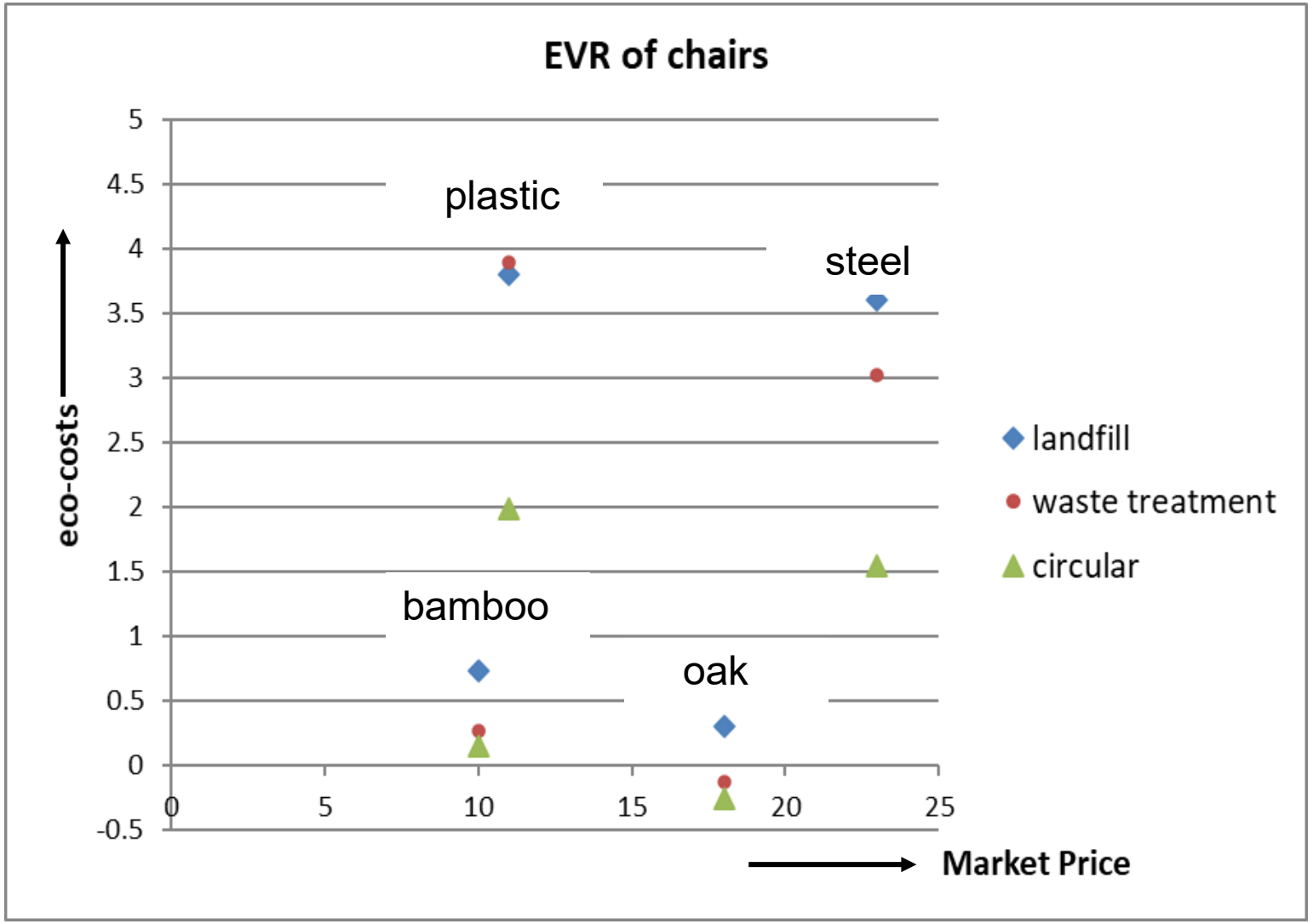
steel



plastic



Example of EVR benchmarking: different types of chairs (3)



Assignment 8:
Make your own calculation on the four chairs

Assignment 9:
Compare four Nespresso coffee cup concepts:
What solution do you have for the coffee cups?
(the required data are in the book with assignments)

(last two assignments)

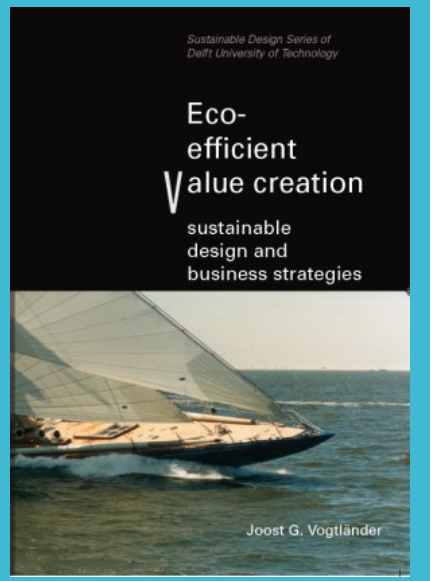
INNOMAT

LEARNING & TRAINING PACKAGES

The End of Module 4

Eco-efficient Value Creation in product innovation

You may read for additional information:



project:
EU EIT Raw Materials
Lifelong Learning KAVA
Education project (project number 17226)

contact:
J.H.Welink@TUdelft.nl

eit RawMaterials ACADEMY

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

INNOMAT

LEARNING & TRAINING PACKAGES

Eco-efficient Value Creation in product innovation

NESPRESSO CASE

project:
EU EIT Raw Materials
Lifelong Learning KAVA
Education project (project number 17226)

contact:
J.H.Welink@TUdelft.nl

eit RawMaterials ACADEMY

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Exercise of EVR benchmarking: 4 different types Nespresso coffee cups (1)

- Environmental pressure groups accuse Nestle of applying Aluminium coffee cups as being disastrous for the environment, e.g. Die Deutsche Umwelthilfe (DUH)
- The issue is that Nestle claims that AL is a good solution, when it is 100% recycled
- The pressure groups say that this is not a good solution, since even in Switzerland the recycling rate is not higher than 50%, already for many years (in the Netherlands approx. 23%, in Germany not know, but not higher than 50%)
- Nestle says that the consumer should change his or her behaviour, but the pressure groups say that Nestle should apply another material
- Nestle has announced that they will use virgin Al from Rio Tinto that uses electricity from hydro-electric power plants as of 2020 (which reduces the eco-costs of CO2 from 1.17 to 0.46 euro per kg)
- Nestle claims that Al is required to maintain the coffee quality standard, but is that true? EVOH blocks all gasses as well. Or take biodegradable plastic cups in a metal container (instead of cardboard)

The advertisement of Nespresso https://www.youtube.com/watch?v=aM20MRUPSTk

The response to it of an NGO

https://player.vimeo.com/video/116606409

Exercise of EVR benchmarking: 4 different types Nespresso coffee cups (2)

- Step 1. Make a group inventory on the Willingness to Pay for different kind of coffee cups: (1) Al, (2) PP with EVOH layer, (3) biodegradable plastics or fibres in steel container, or other ideas. Use post-its.
- Step 2. Create groups of 3 – 4 participants
- Step 3. estimate the eco-costs of the Al solutions ("virgin" and "RioTinto virgin" for 50% recycling. Benchmark materials only, including end-of-life, for 1 kg Al (= 1000 cups)
- Step 4. estimate the eco-costs of the EVOH on a bio-PE concept (10% EVOH, 90% bio-PE). Benchmark materials plus end-of-life only. Calculate also bio-PE without EVOH.
- Step 5. Plot each solution in the 2 dimensional EVR matrix, assume that the Al coffee cup price is 0.35 euro and the plastic cup price is 0.30 euro
- Step 6. Decide on your best options
- Step 7. Report your findings to the group

- Note: The fastest data source is the app, however, the app has no data for the virgin Rio Tinto Al (from hydropower). Make a correction by hand: - 0.7 euro per kg). 100% recycled Al would score better, but is not allowed for food? Note that the -0.7 correction must **not** be applied to the recycled Rio Tinto AL.

Exercise of EVR benchmarking: 4 different types Nespresso coffee cups (3)