

Analysing the unlinking potential of product system innovation with the E2 vector

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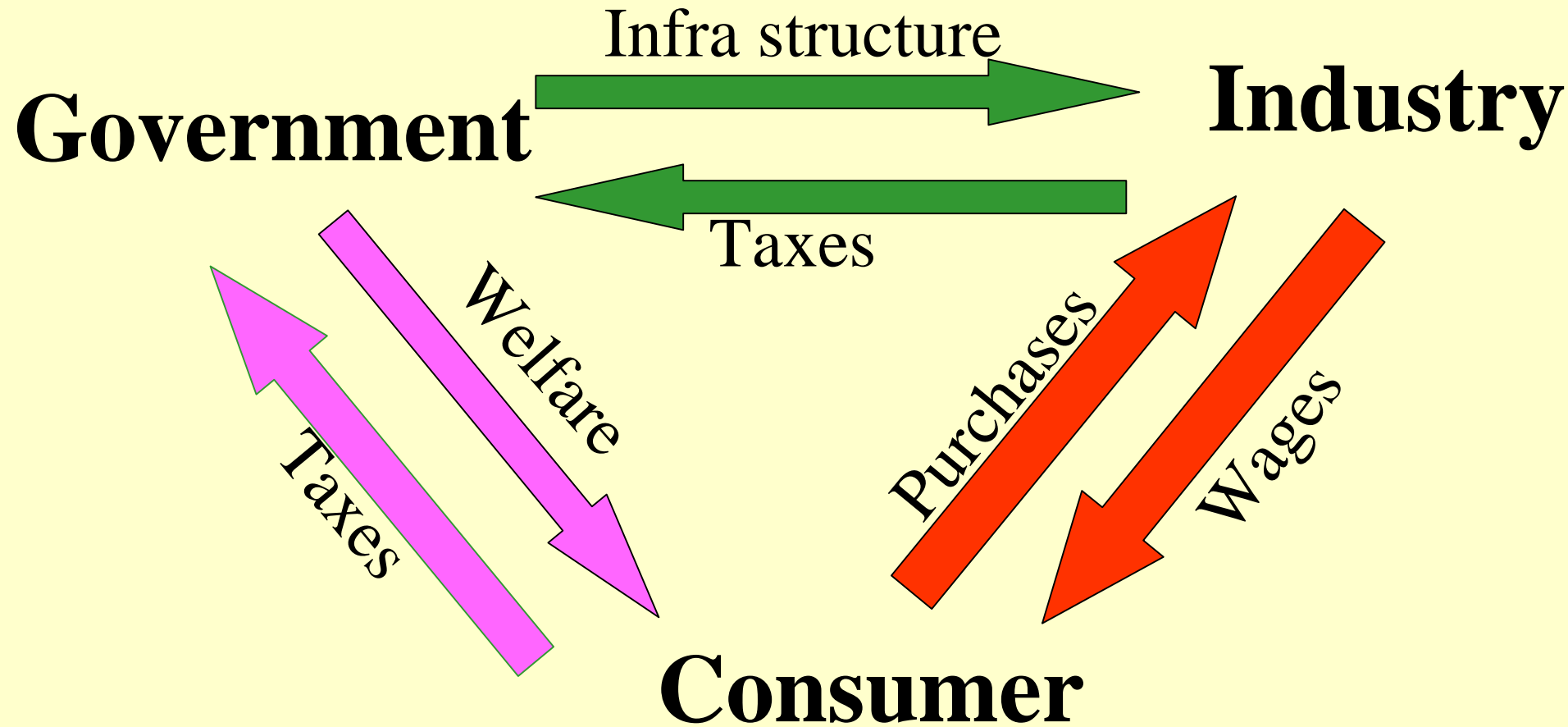
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Cees van Halen, PricewaterhouseCoopers

Overview

- Defining the bottom line: create more value at lower environmental load, or **unlink** economic growth and environmental load.
- The problem: LCA does not address the macro effect. Analysis on the macro effect does not see the chain effect.
- E2 vector addresses lifecycle AND macro effects
- 3 case studies show unlinking potential

The Rat-race

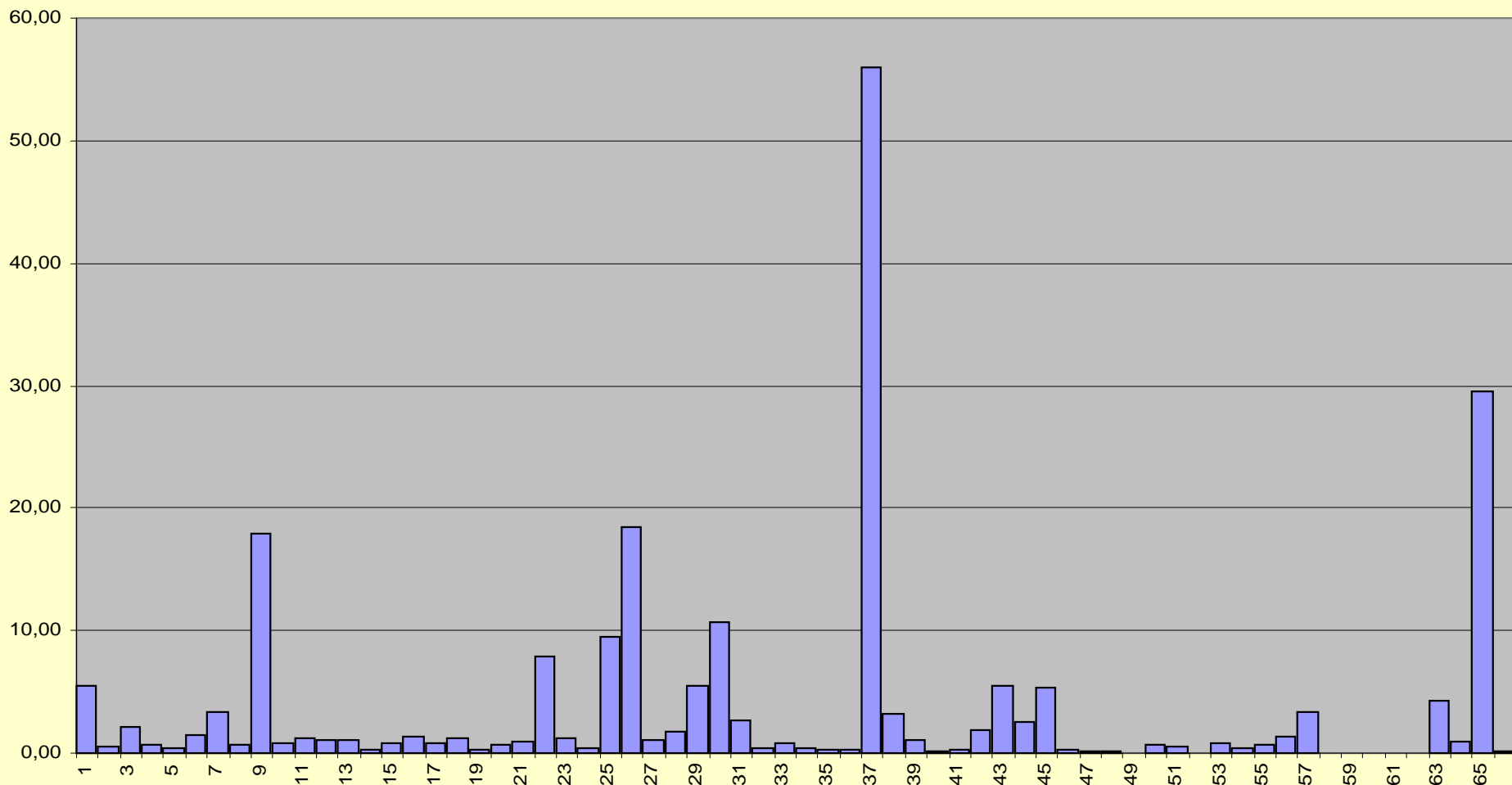


Unlinking

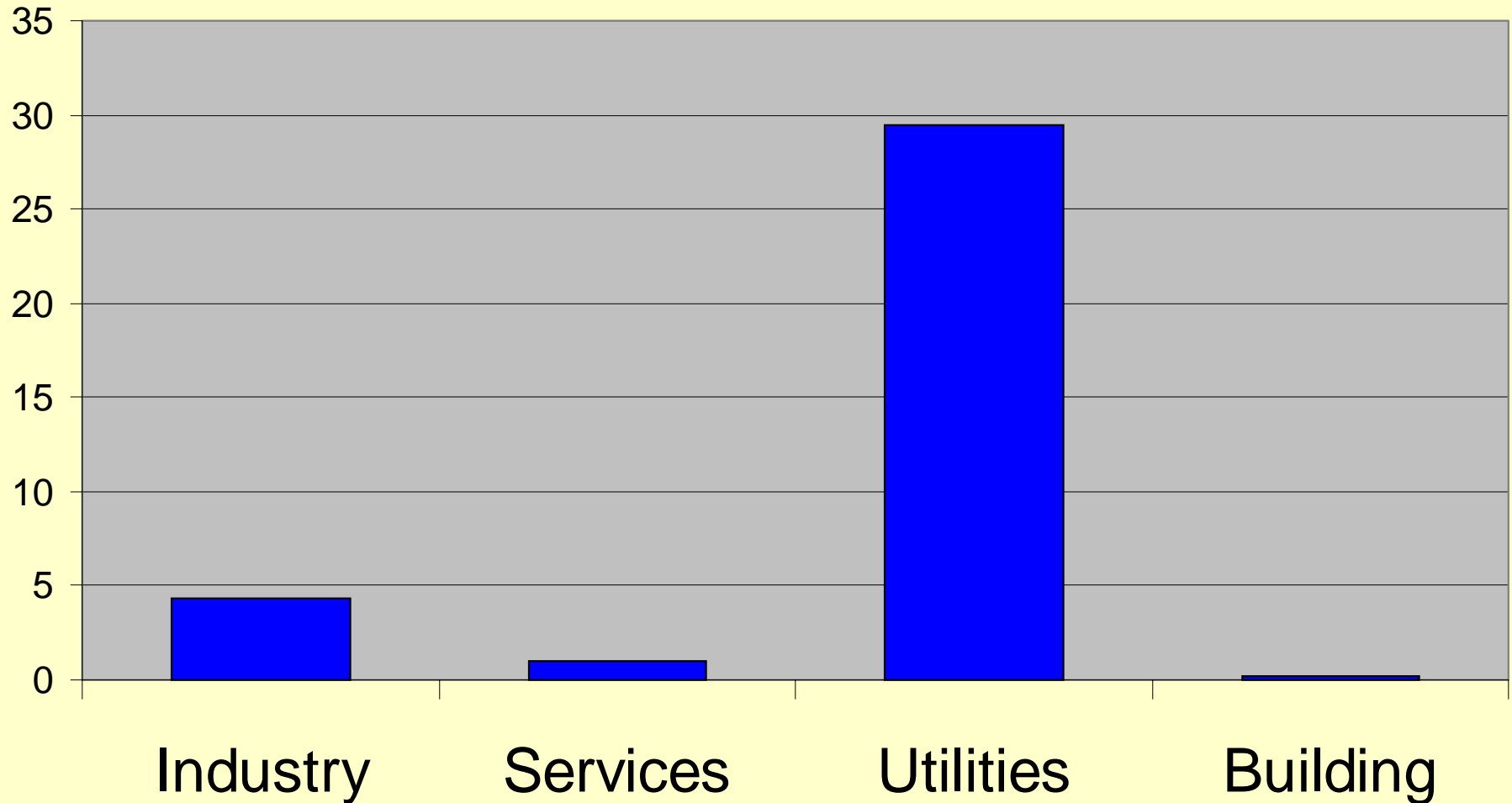
- Economic growth and environmental load go hand in hand.
- Money is in constant circulation.
- Economic growth means more money circulating.
- More money means more products and energy are in circulation.

Unlinking is needed

Energy use per unit value per sector

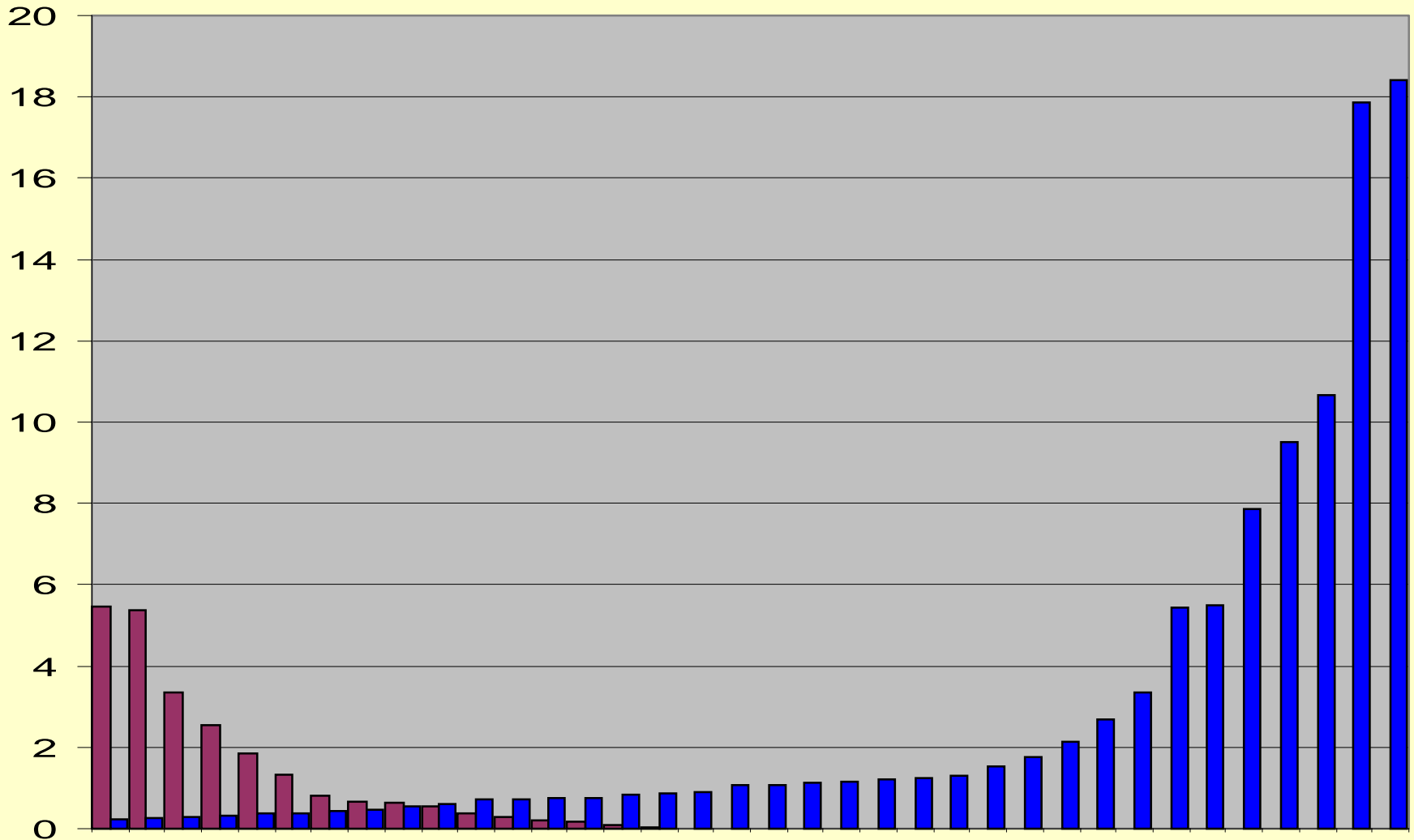


Average energy consumption per value



Worst case, best case

■ service sectors ■ industrial sectors



Limitations of the *macro* perspective

- In a macro perspective we cannot see the lifecycle perspective.
- Examples:
 - Sector: Repair of consumer goods is one of the worst performing service sectors, yet it will have very positive effect on other sectors
 - Sector: manufacturing of clothes is one of the best industrial sectors, yet it needs massive amounts of materials like cotton

The limited scope of LCA

Strength:

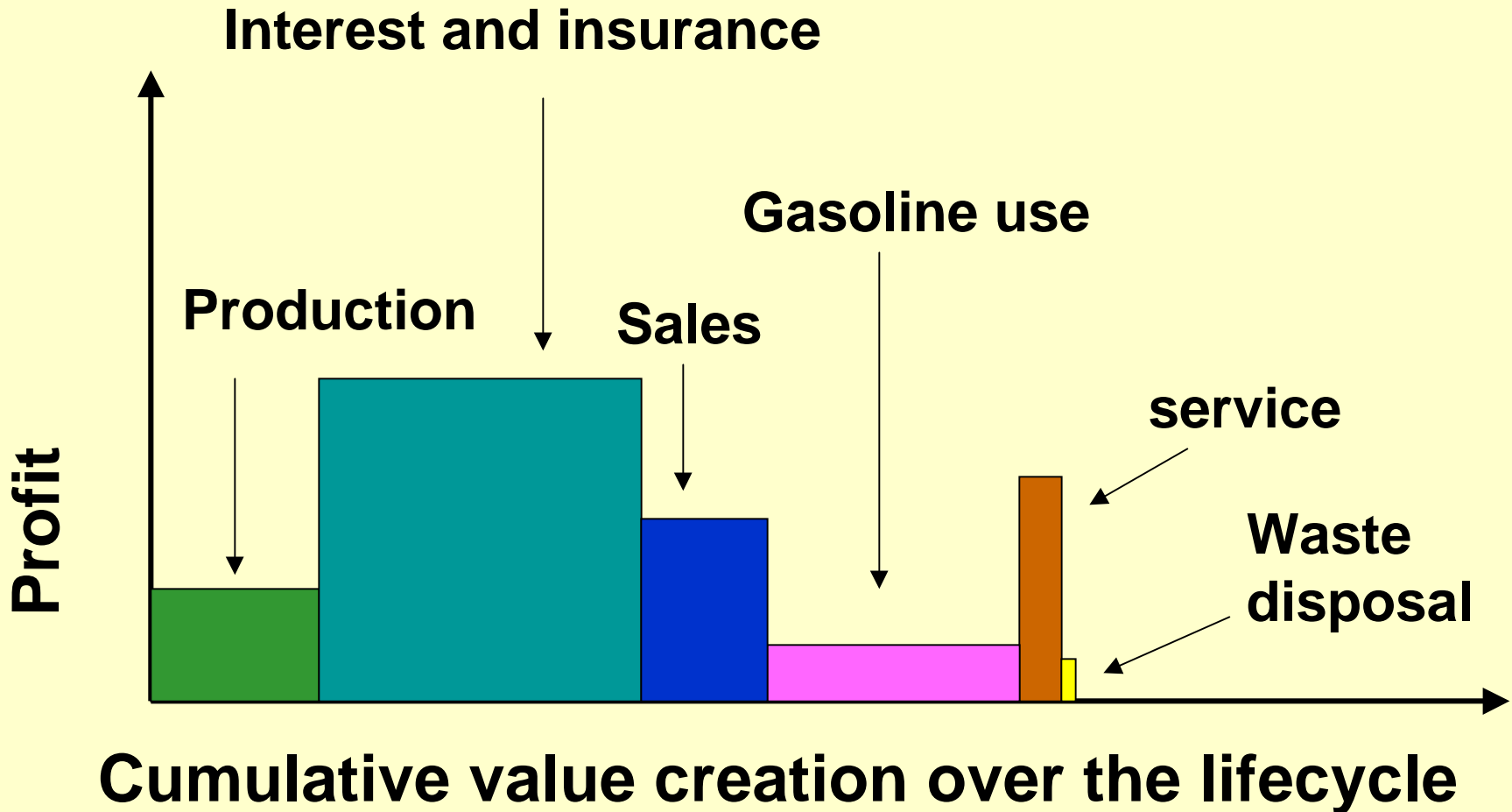
- LCA is based on a functional unit
- The environmental load per unit of function fulfilment is studied in a systematic way.
- Products can be improved

Limitation:

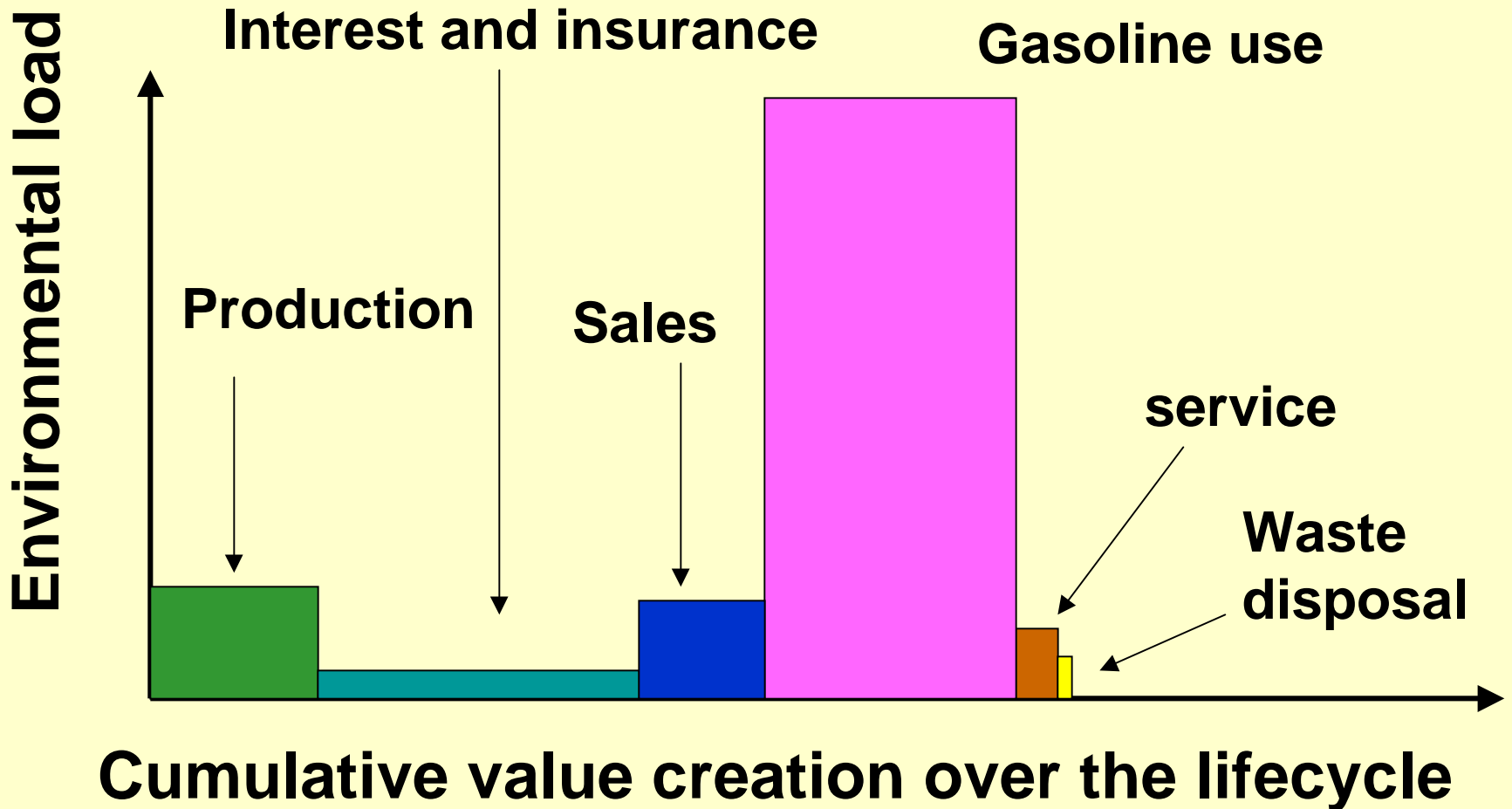
- In real life the number of functional units is not constant.
- Behavioural Changes can easily spoil all gains.
- The total effect on society cannot be assessed.

Profit pool*) for car (estimated)

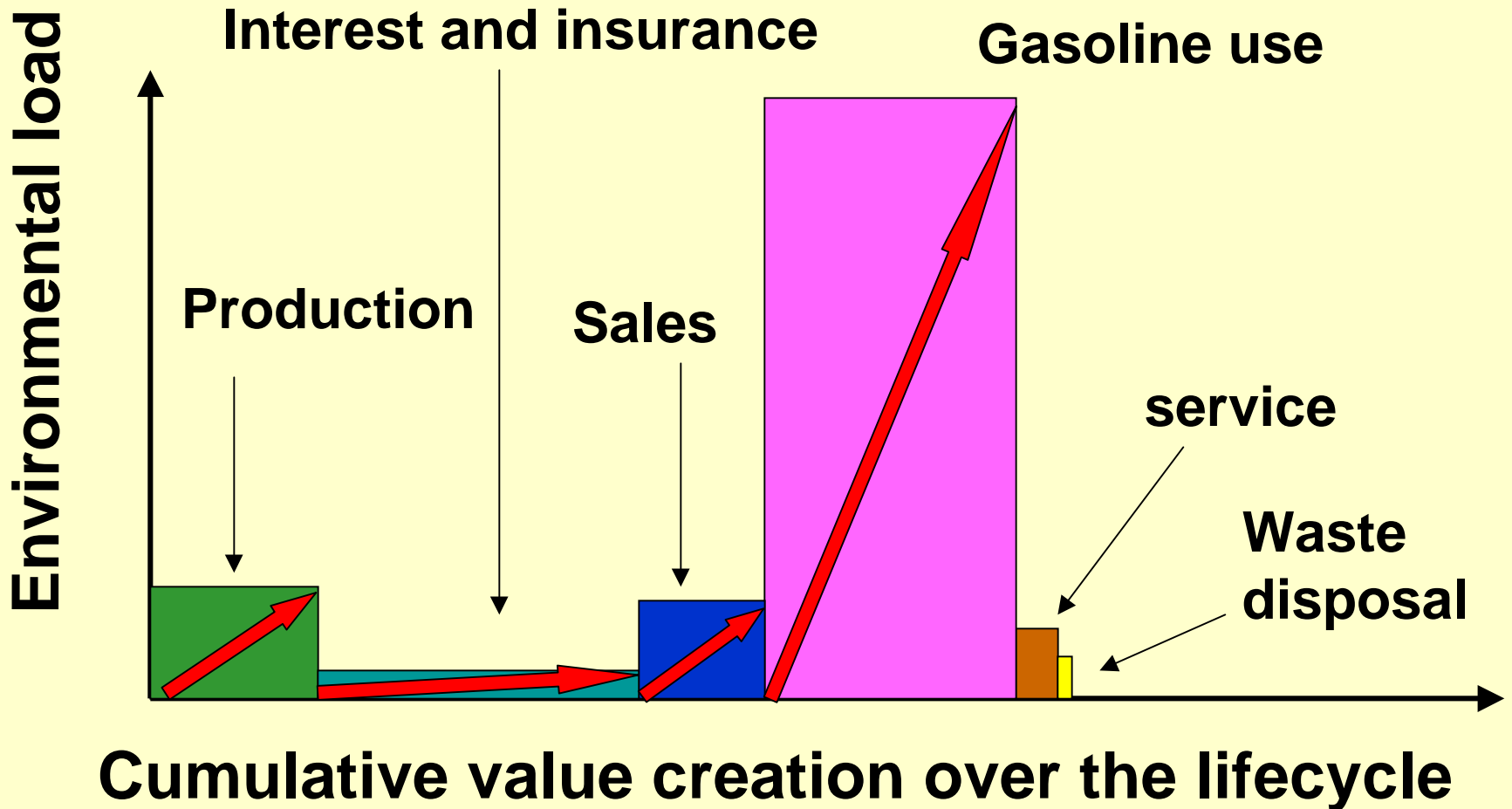
*) O.Gadiesh, J.L.Gilbert; *Profit Pools: A Fresh Look at Strategy*; Harvard Bus. Rev.; June 98



Eco-pool for a car (estimated)

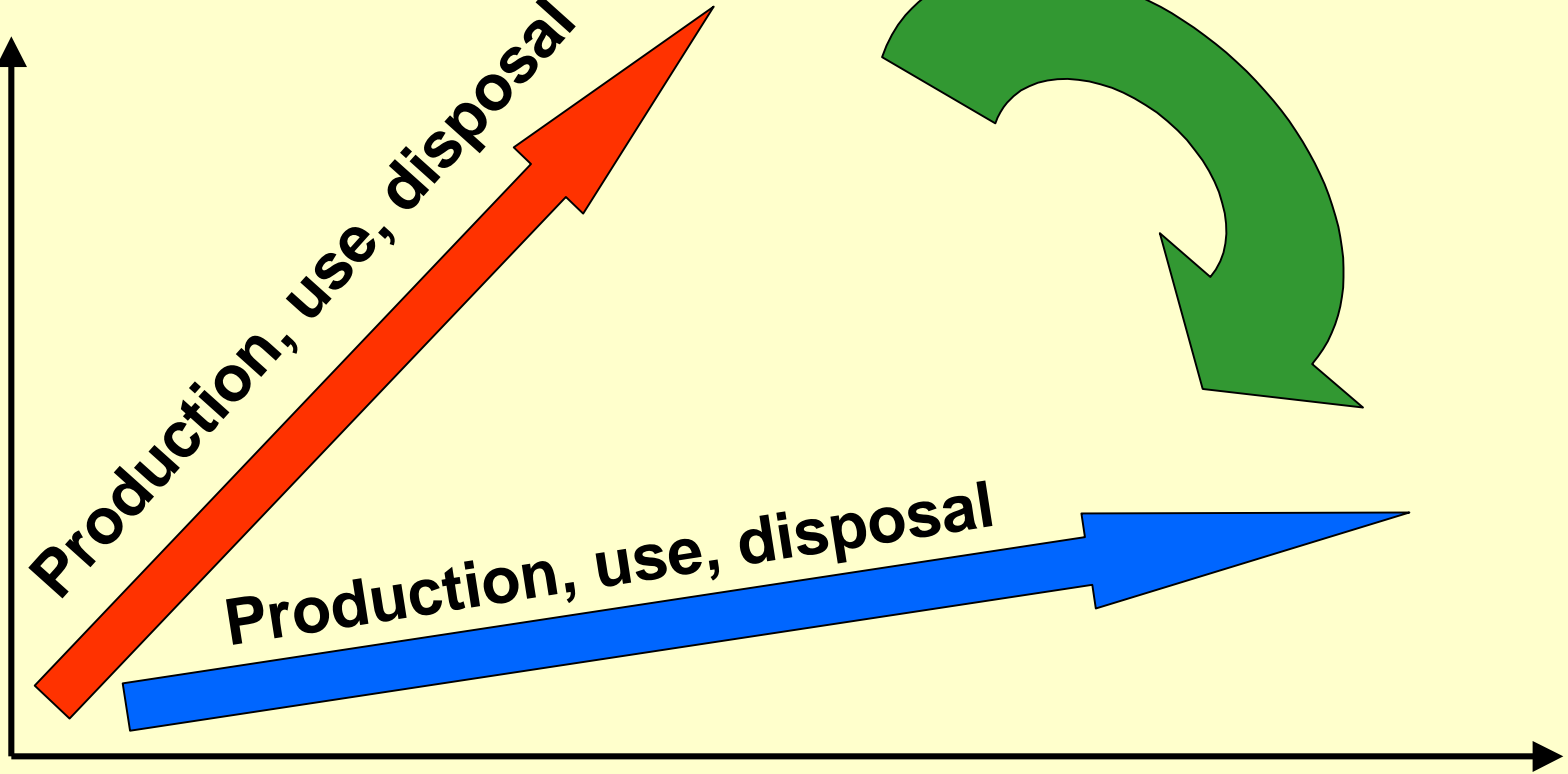


Steepness of the vectors show economic value / environmental load



E_2 vector

Environmental load



Unlinking

Value creation

Environmental aspects of PS-Systems

- Services are immaterial products, they generate value without the production and disposal of physical products.
- PS Systems could be a solution for unlinking economic growth and environmental load
- *We need low environmental load per unit of value creation*

Case 1: Car sharing

- “Greenwheels” is setting up a system in which a car can be found within 500 meters of each home in the major cities.
- The user needs to pay a monthly contribution and gets a key card. He pays per hour and per km.
- Advantage: lower cost, less parking problems and lower use of the car.

Problems in the analysis

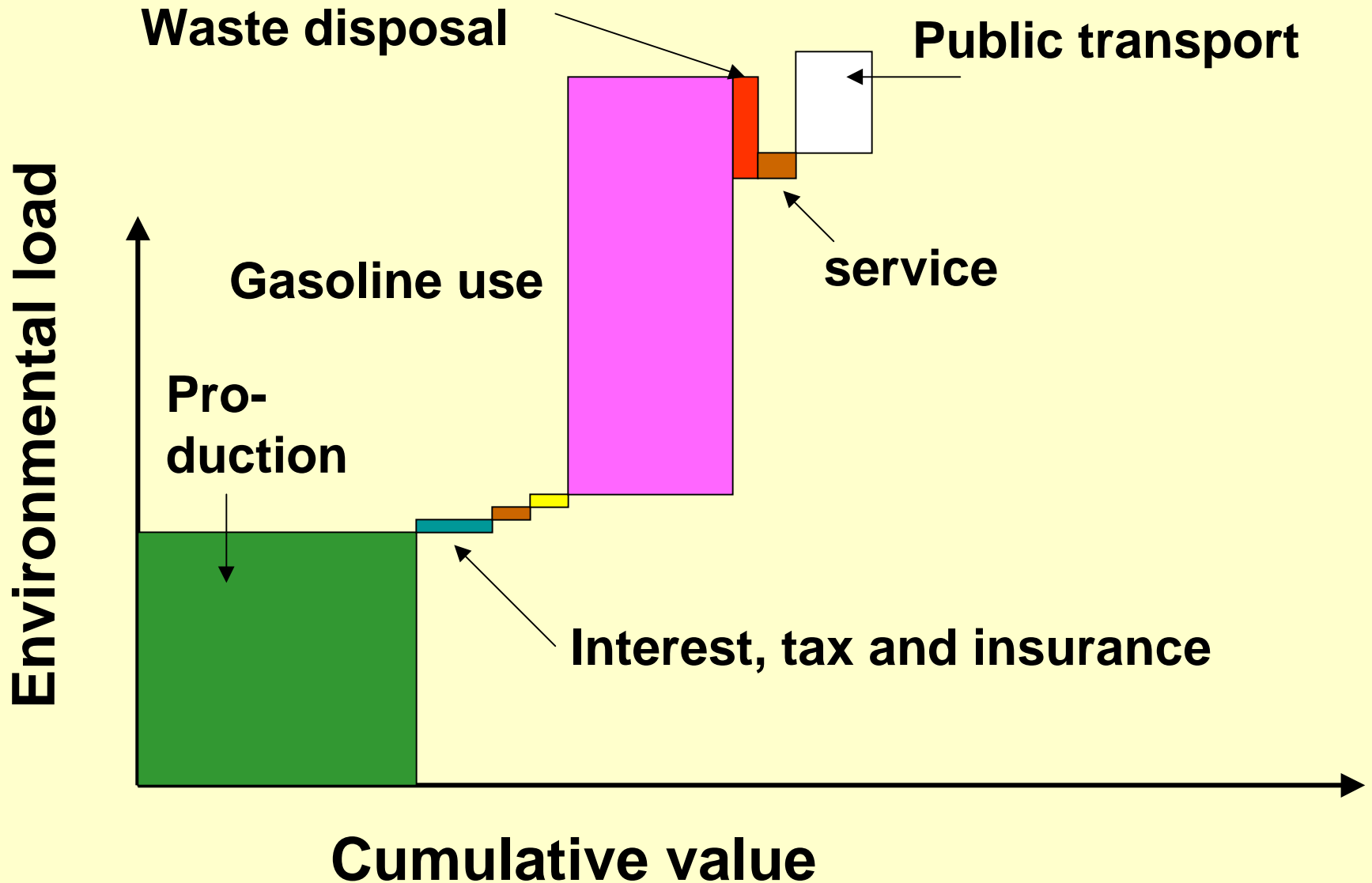
- How to determine a functional unit? Is a car sharing system comparable with private ownership?
- We used a study that monitors the actual behaviour of users before and after they joined the system:
 - Some users gave up their car: they drove less
 - Some users did not have a car, they drove more
- As functional unit we used the average driving behaviour in a month.

The scope of the Functional Unit

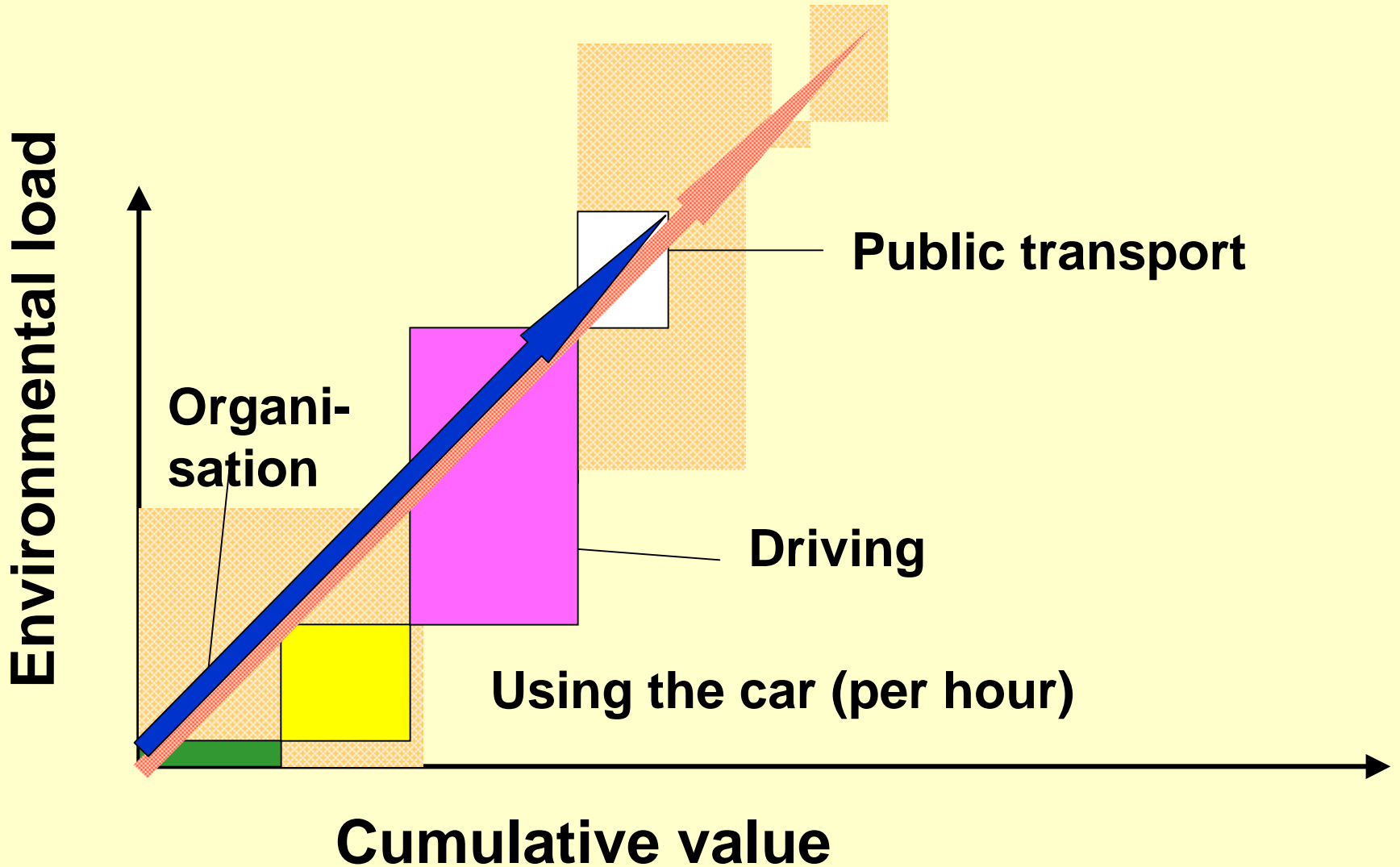
- A narrow definition is easy to handle (comparison on the basis of a distance of 100 km)
- A wide definition introduces many uncertainties (the total monthly transport of an average person)

However, the wide definition can incorporate behavioural changes

Before car-sharing introduction



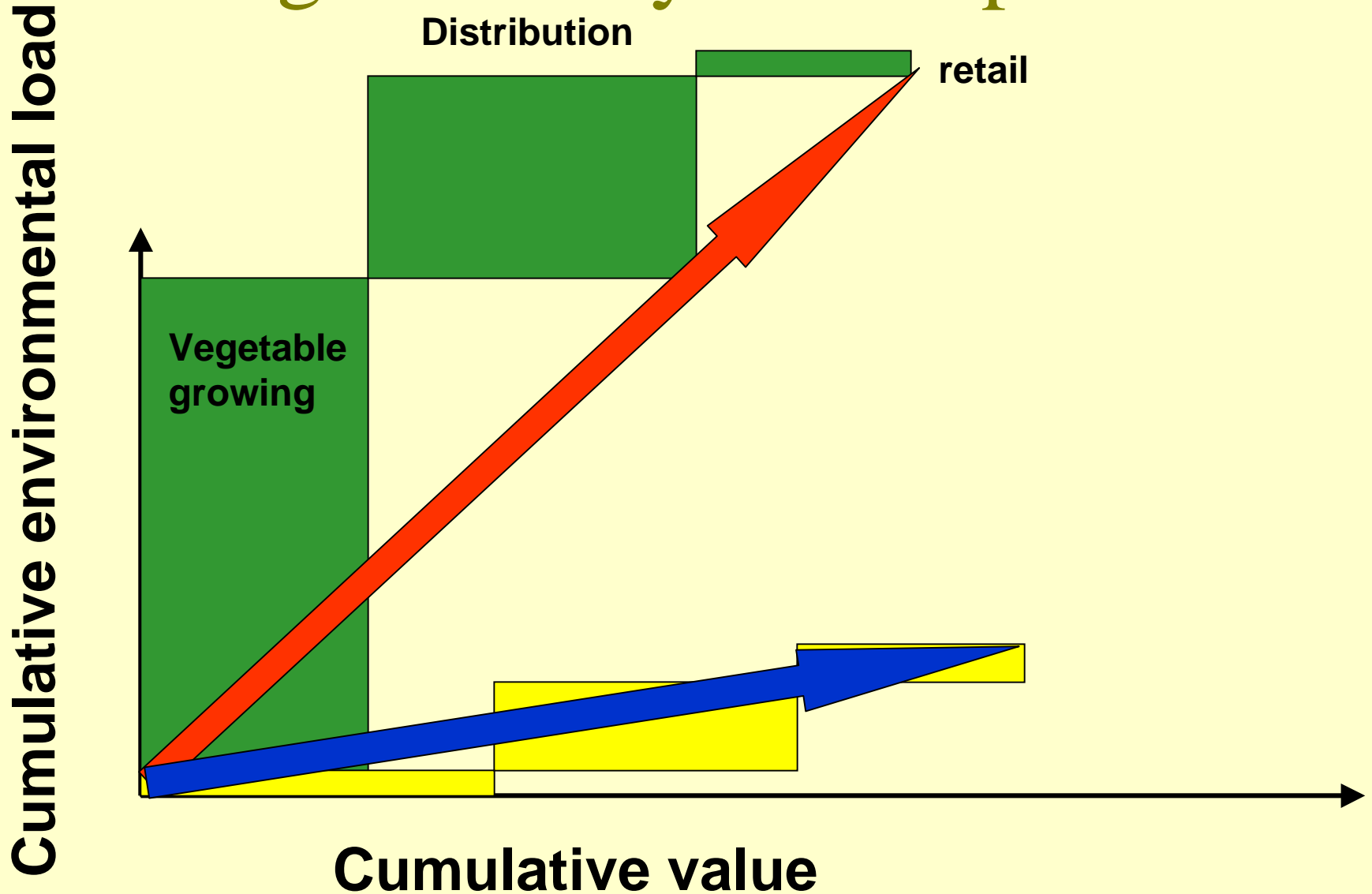
Car sharing



Case 2: Vegetables by subscription

- Ecologically grown vegetables are delivered by subscription: each week a bag is delivered for a fixed price.
- The consumer has no influence on the contents: Recipes for the vegetables delivered are included.
- Functional unit: the vegetable consumption in one week.

Vegetables by subscription

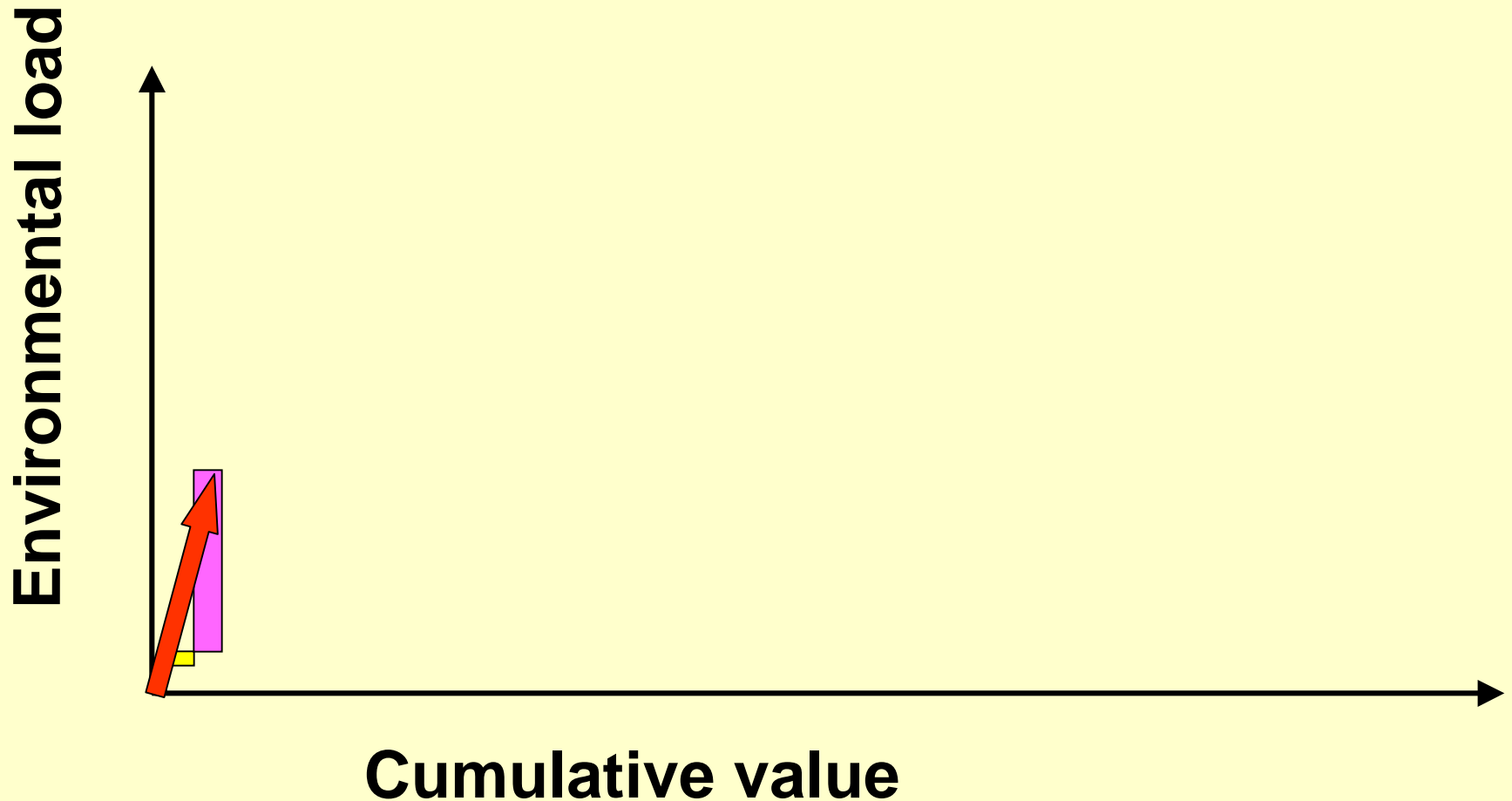


Case 3: Laundrette

- An old system: why own a washing machine if you can have clothes washed and the laundrette?
- Problem how do people wash at home. We assumed two extremes:
 - The machine is loaded with 4,5 kg, no drier
 - The machine is loaded with 3 kg, 50% have a drier, people wash 50% more at home

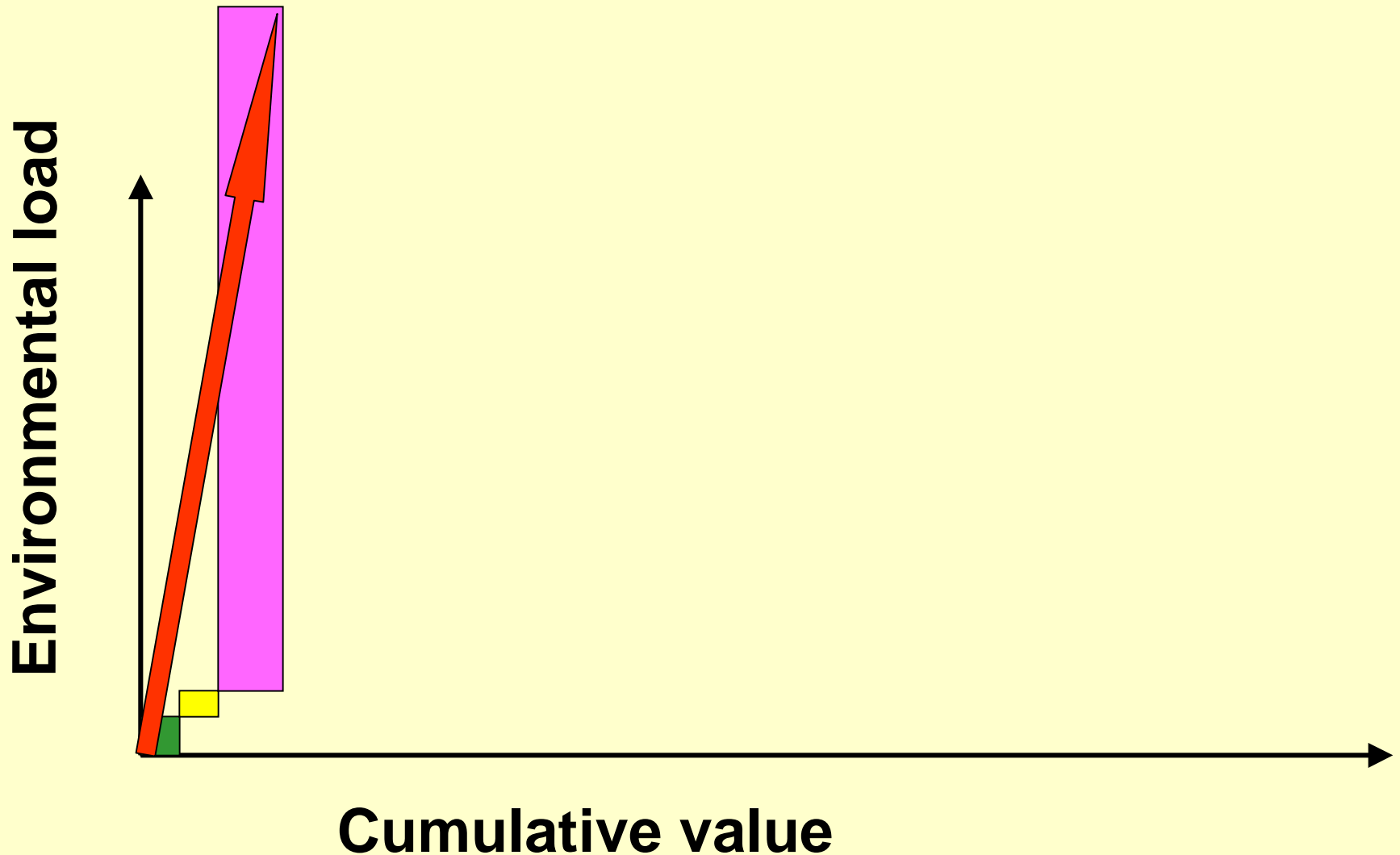
Private washing,

4,5kg/charge, no drier, equal amounts

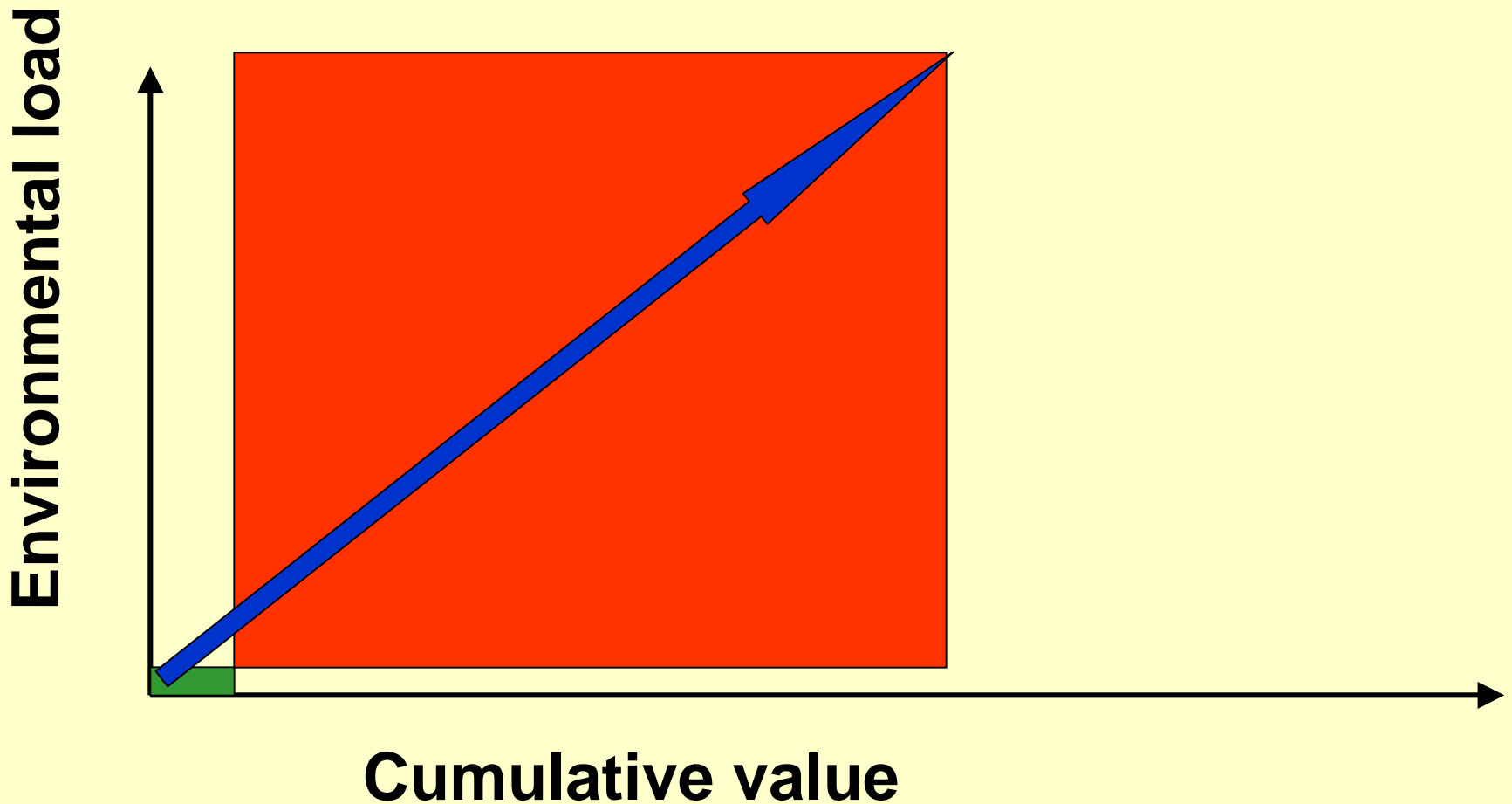


Private washing,

3kg/charge, 50% drier, 1,5 times more



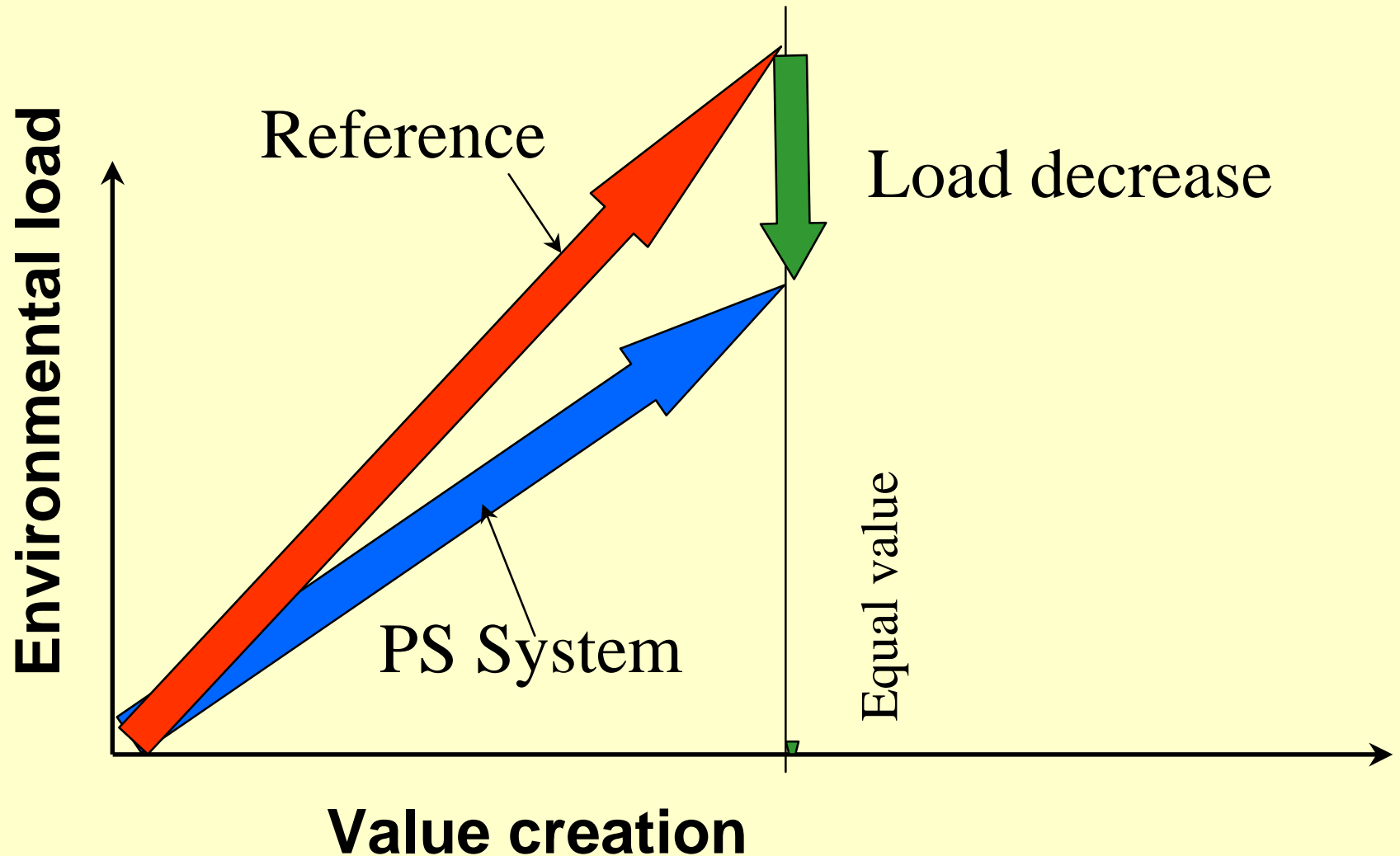
Laundry service



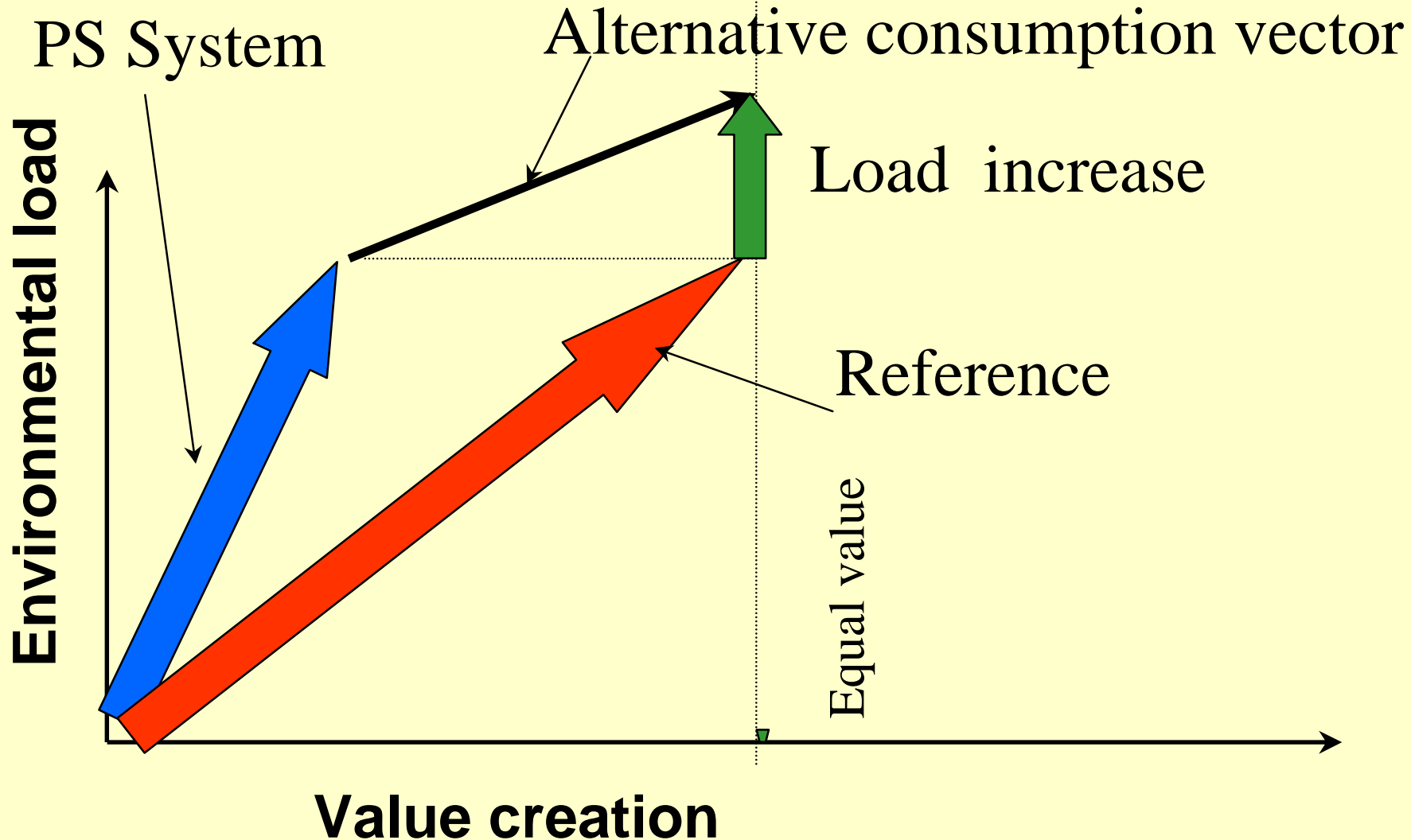
E2 vector Cases

- For car sharing the vector gets shorter: the unlinking effect depends on what people do with the money saved (alternative consumption)
- For vegetable system, the value is about equal, while load is lower: clear unlinking
- For laundrette, load is about equal, but value higher: clear unlinking

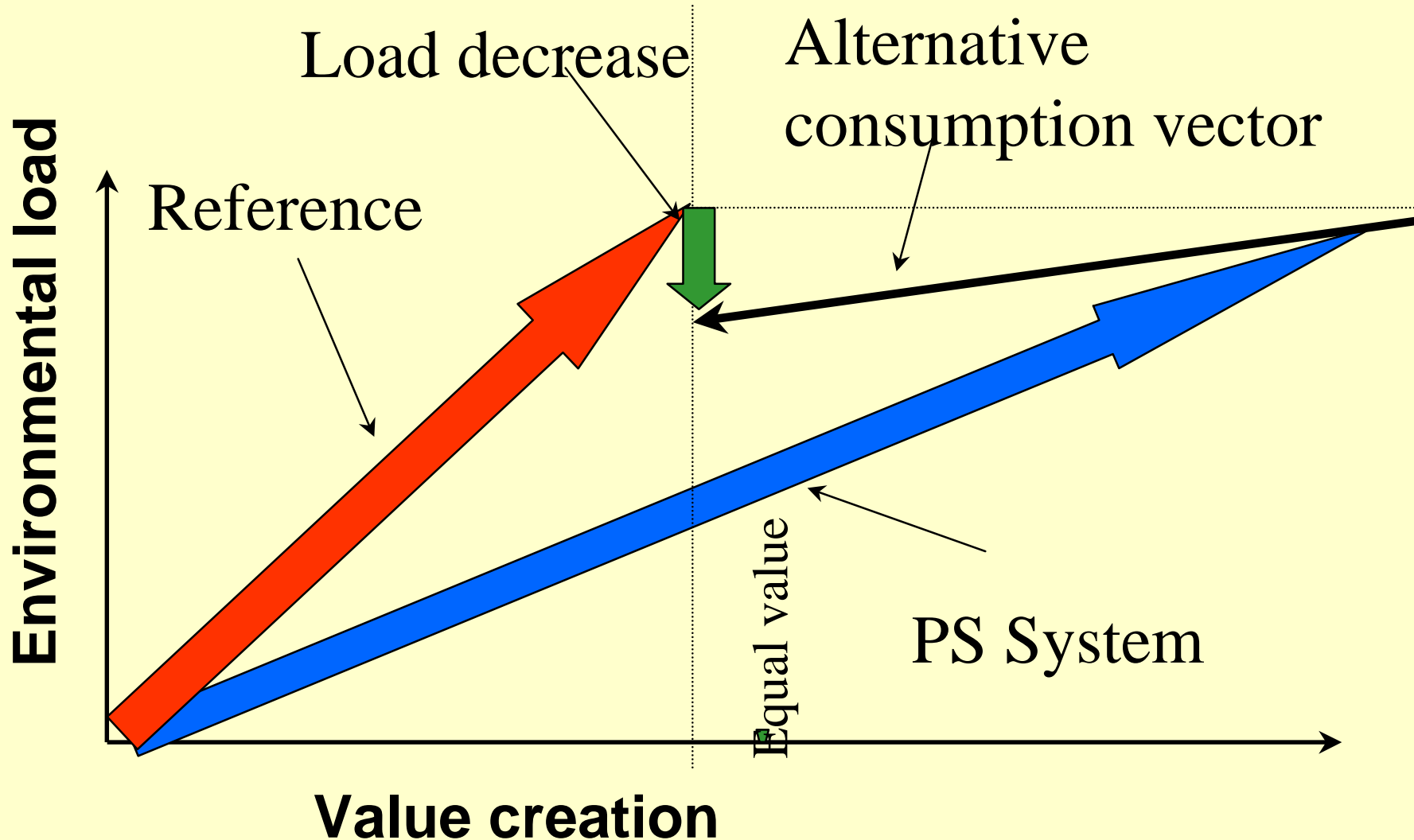
Equal value, lower load



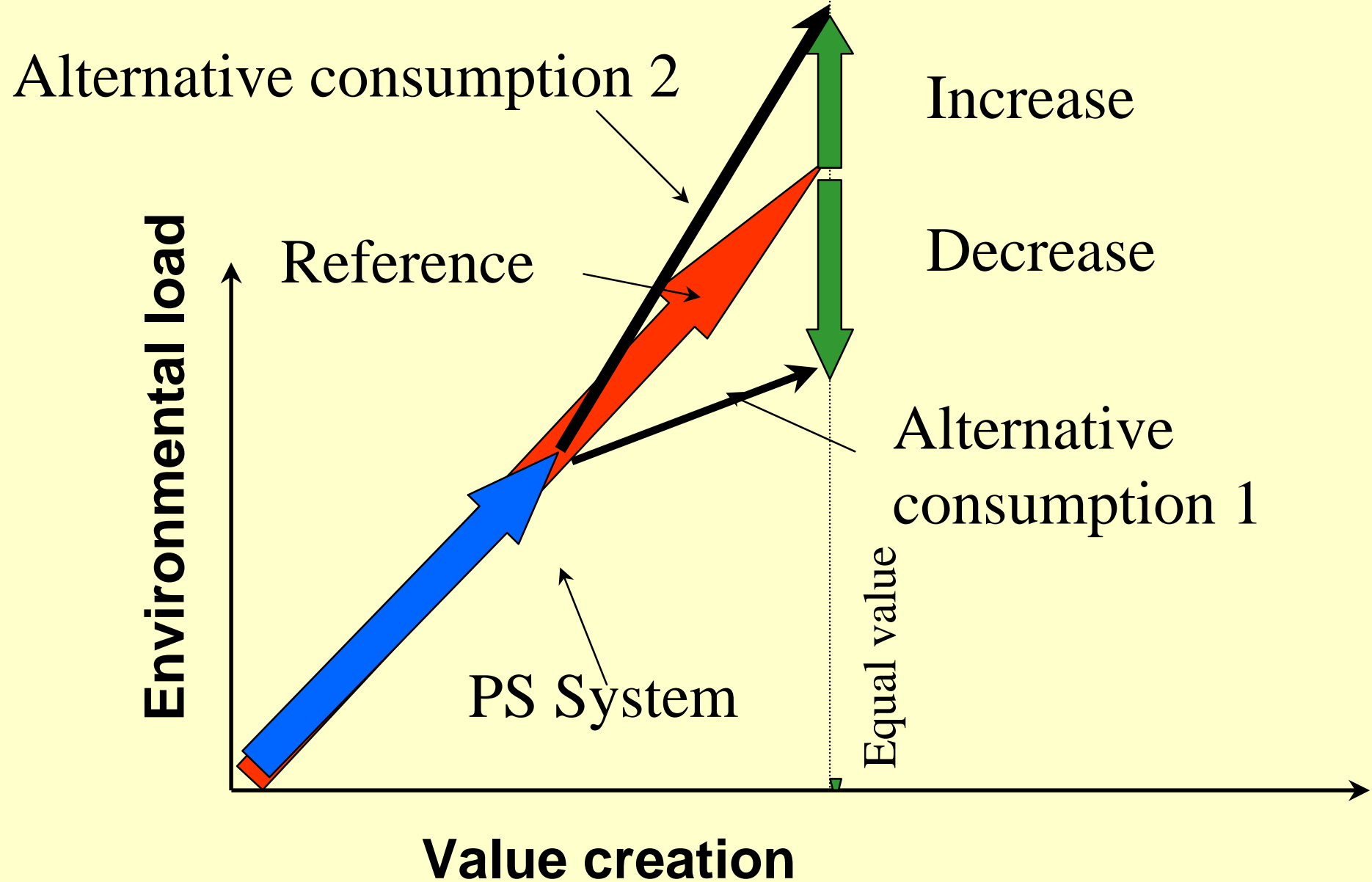
Equal load, lower value



Equal load, higher value



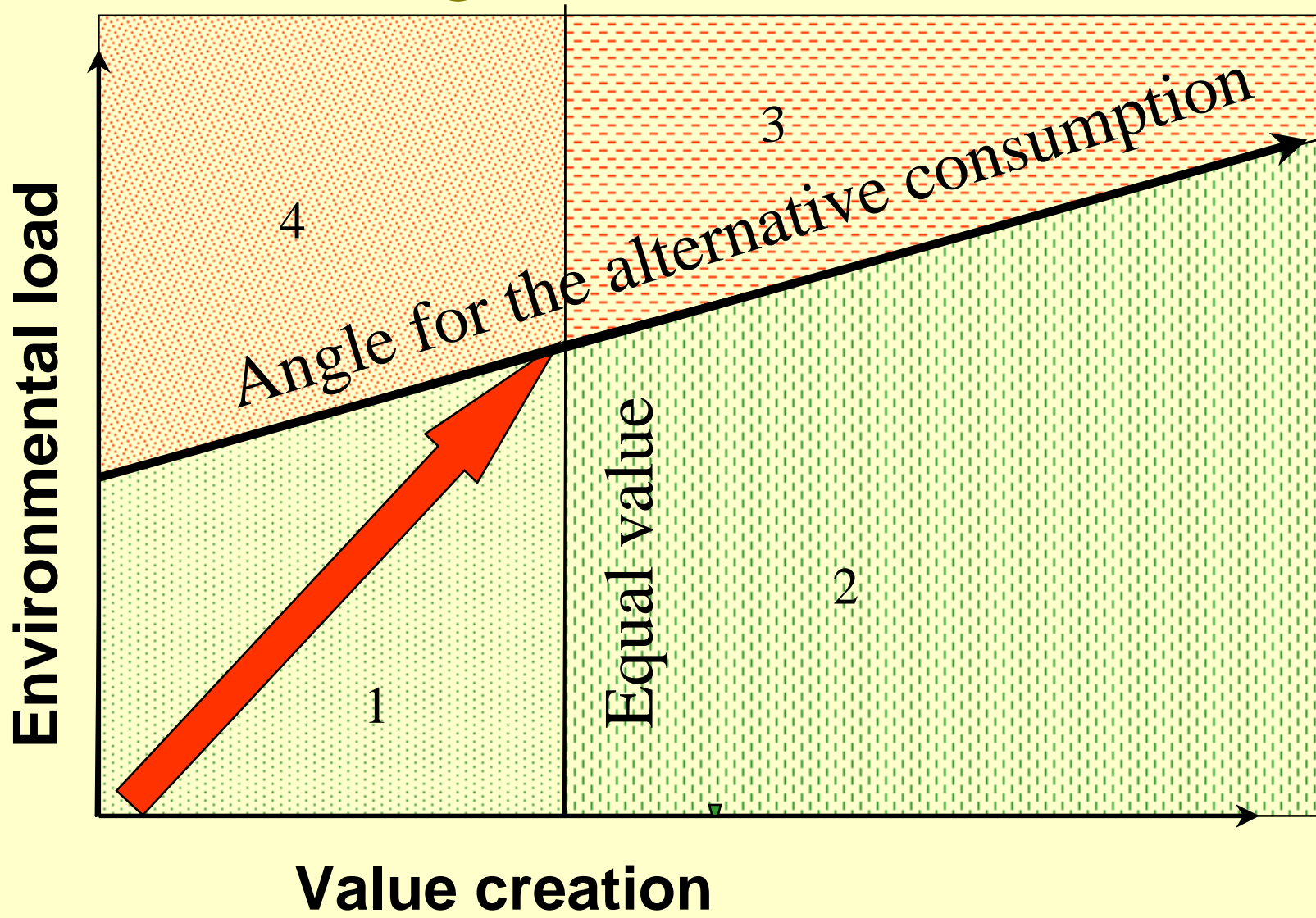
Equal ratio of load and value



Alternative consumption vector

- In many cases the unlinking potential depends on the assumed alternative consumption.
- Marginal alternative consumption is needed; probably there are differences in long term and short term effects.
- Currently a database for over 60 E2 vectors for economic sectors is established.

Unlinking below alt. cons. line



Conclusions

- For sustainable economic growth we need lower environmental load per value
- Analysis of unlinking potential need wide scope and functional unit.
- New tools are needed that combine the macro and the lifecycle perspective.
- The Profit pool, Ecopool and the E_2 vector provide new perspectives for businesses and regulators.