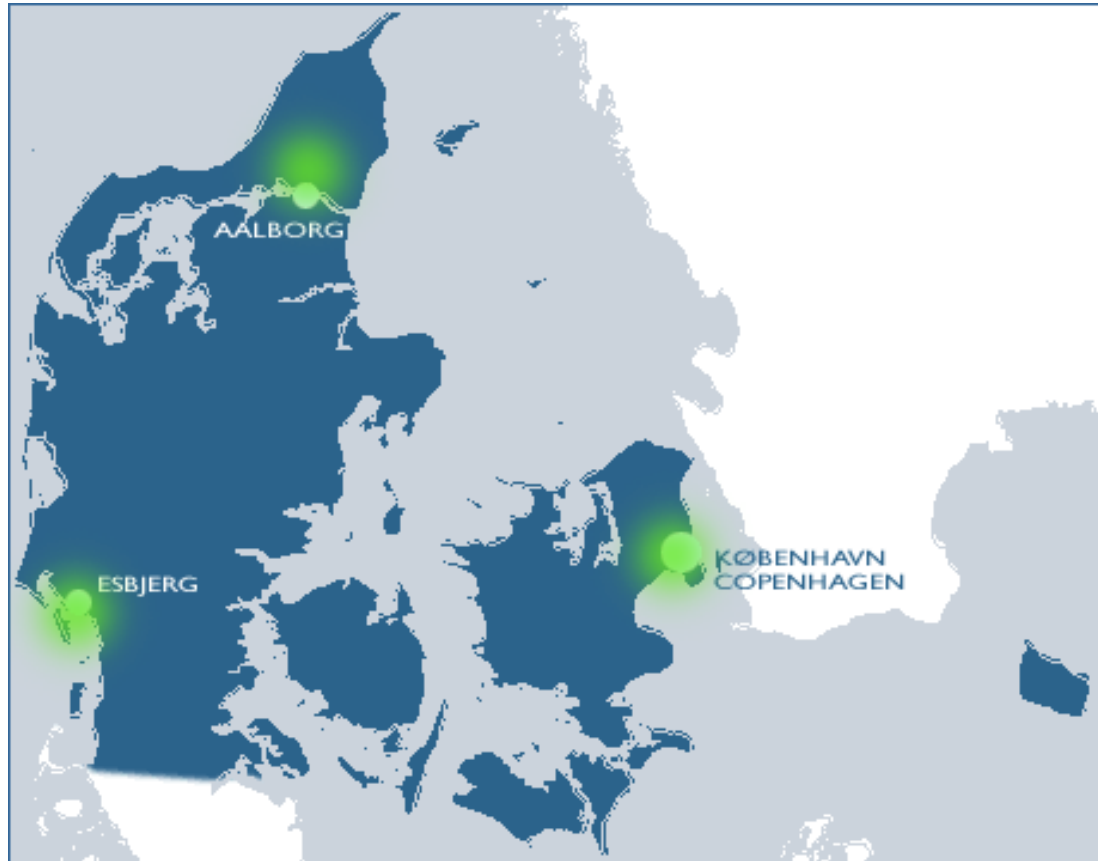


# Environmental Management Department of Development & Planning

Head of Department  
Eskild Holm Nielsen  
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## Faculty of Engineering, Science and Medicine Geographical locations



## Main Campus







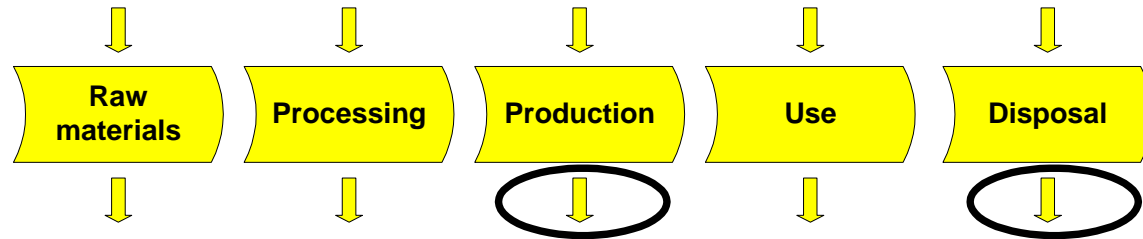


Aalborg city

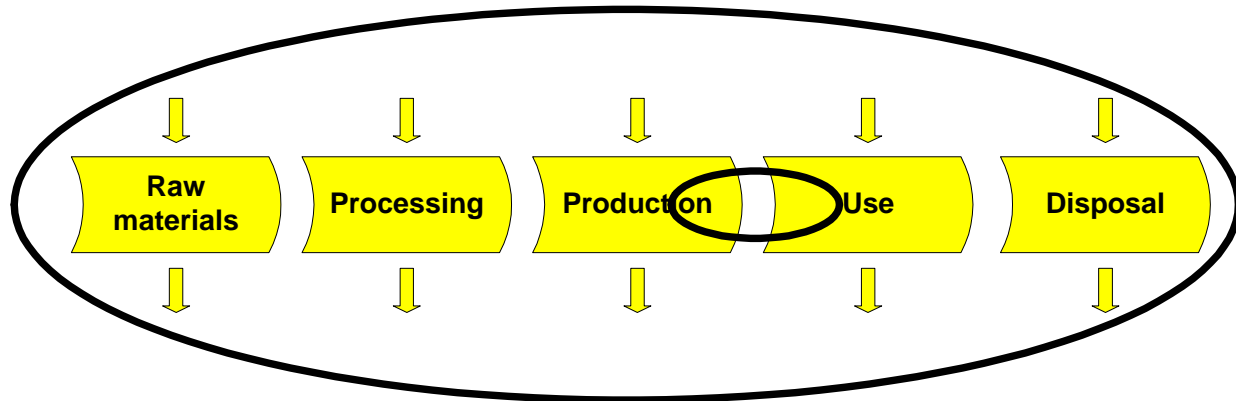


### Environmental Focus

The old focus



The new focus





# Life cycle – from cradle to grave.....

Extraction of raw materials

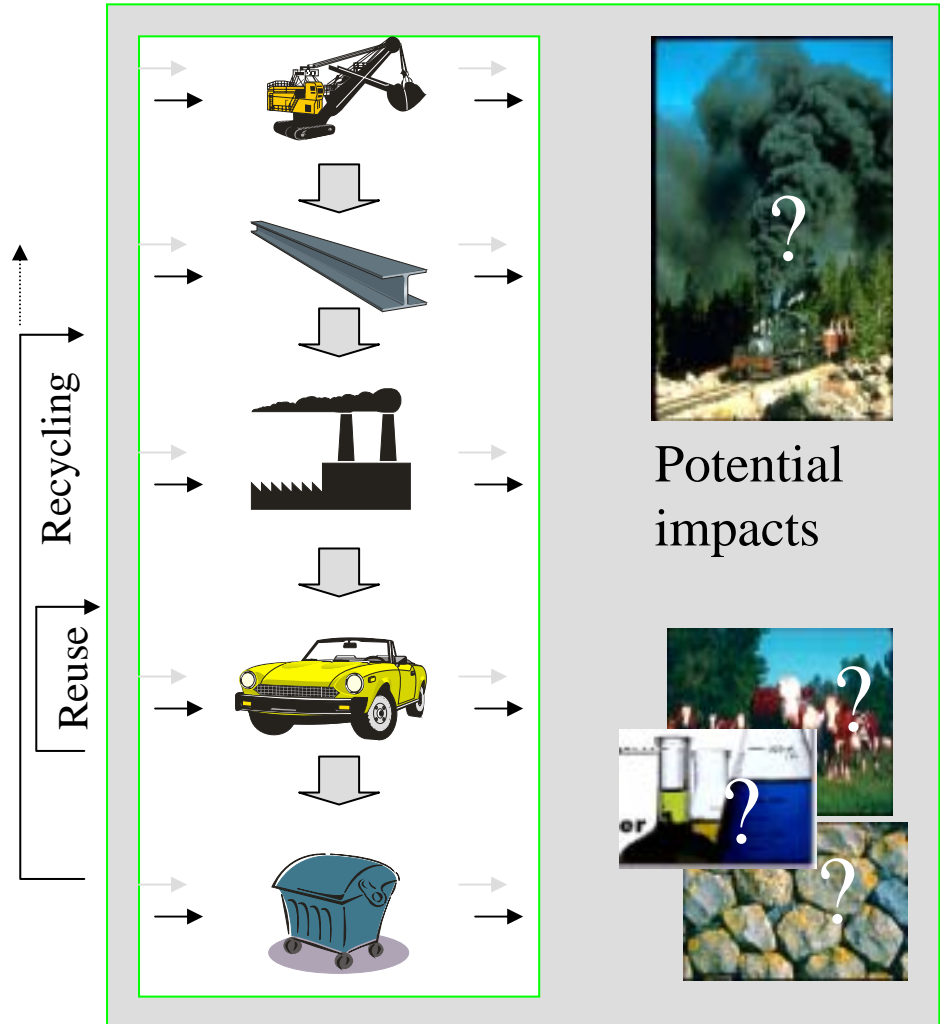
Processing of materials

Production

Use and maintenance

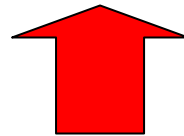
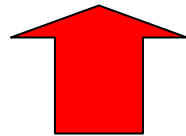
Disposal

life cycle perspective



## The fundamental problem (IPAT equation)

$$\mathbf{Impact} = \mathbf{People} \times \mathbf{Affluence} \times \mathbf{Technology}$$





## Ecological Transformation is needed for meeting Environmental challenges

Type of practice	State	Industry	Civil society
Discursive	Sustainable development	<b>Ecological modernisation</b>	Ecological lifestyle
Institutional	Responsive regulation	<b>Environmental Management</b>	Public participation
Technological	Ecological procurement	<b>Cleaner production</b>	Green consumption

Andrew Jamison (2001)

# **Greening of Industry (Process)**

## **- Technological and Institutional innovations**

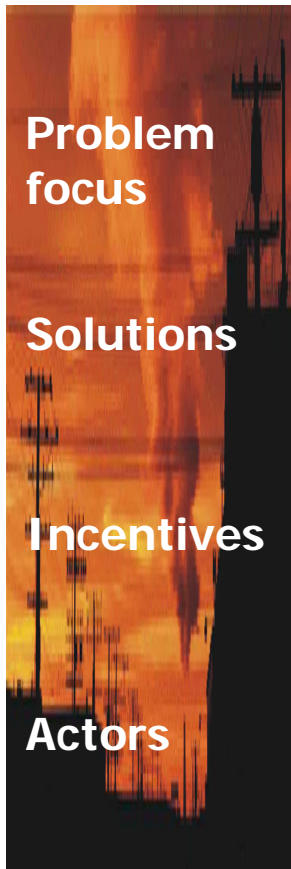
### **1) Greening of Industry / pollution prevention**

- environmental protection
- cleaner production
- environmental management
- cleaner products

### **2) Institutional changes for Pollution Prevention**

- command-and-control regulation
- self-regulation
- differentiated and dynamic regulation
- new synergies and patterns of interaction

## *“Out of sight out of mind”*



- Environmental damage to local recipients

- **Dilution**

- Ad hoc problems

-





## The 1970ies *"Output focus - Symptom treatment"*



**Problem focus**

- Emissions

**Solutions**

- **End of pipe measures**

**Incentives**

- Compliance with the Law (emission limits)

**Actors**

- Environmental authorities

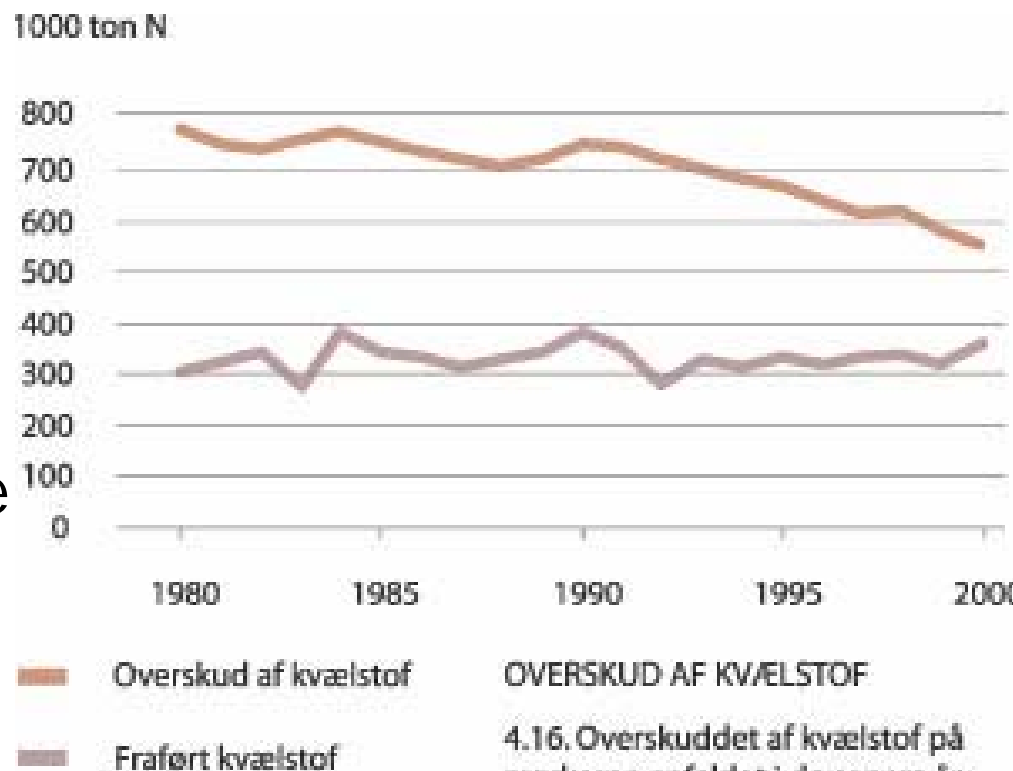
## Action plan for the Aquatic Environment

First Action Plan in 1987


Later we have had 3 more

Intense regulation of farms  
(animals, fertilising, slurry-  
handling)

The nitrate leaching is on the  
decline



## The 1980ies *"Technology focus - Prevention"*



### Problem focus

- Emissions
- Resource consumption

### Solutions

- Opening of black box (**Cleaner Production**)
- Focus on technique and single projects

### Incentives

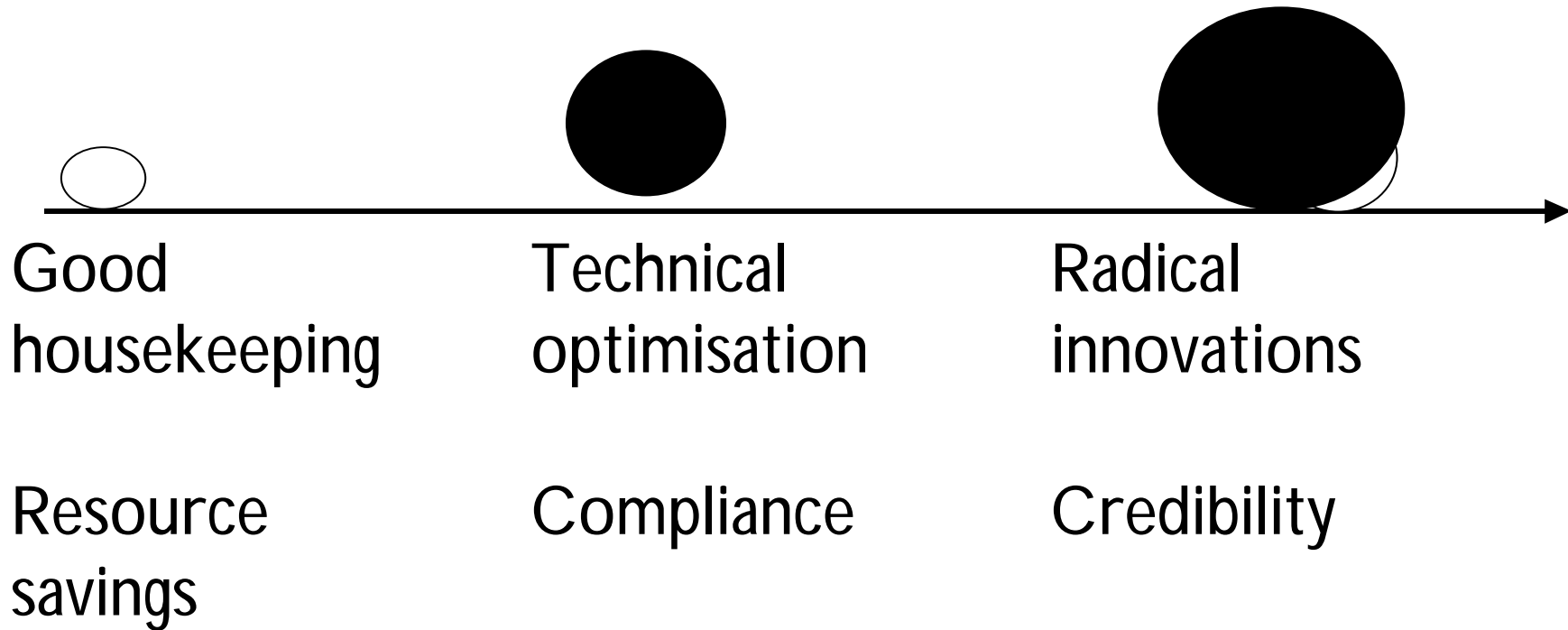
- Resource savings (3P)
- Compliance with the law

### Actors

- Engineers
- Consultants
- Env. Authorities (service + counterpart)



# A dynamic approach to cleaner production



## The 1990ies *"Management focus - Dynamic"*



### Problem focus

- Emissions and resource consumption
- Organisational preconditions

### Solutions

- Environmental management systems (**EMS**)
- Focus on management and continuous improvements

### Incentives

- Internal dynamic and company image

### Actors

- Management and employees
- Trade organisations and consultants
- Env. authorities (sparring partner)

## 2000... *"Product focus - triple bottom line"*



### Problem focus

- Environmental impacts from products
- New chemicals and materials

### Solutions

- **Cleaner products, (POEMS and LCM) ?**

### Incentives

- Competitive advantages and image (first mover advantages)

### Actors

- Designers and product developers
- Consumers, customers and public purchasers



# The stairway to sustainability



**Step 1**  
**Cleaner**  
**production**  
( - resources,  
and emissions



**Step 2**  
**Environmental**  
**management**  
- on-going  
improvements

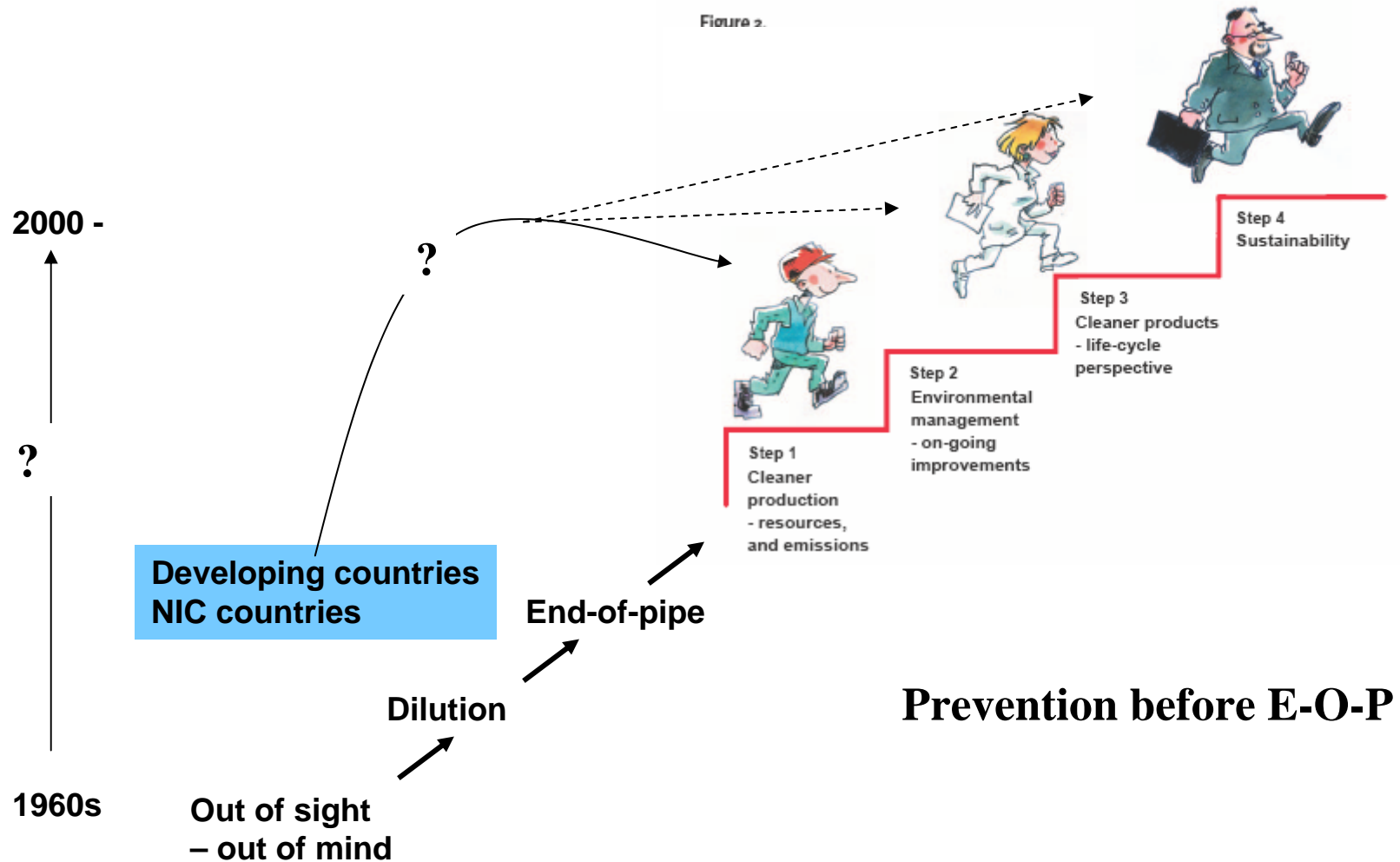


**Step 4**  
**Sustainability**

**Step 3**  
**Cleaner products**  
- life-cycle  
perspective

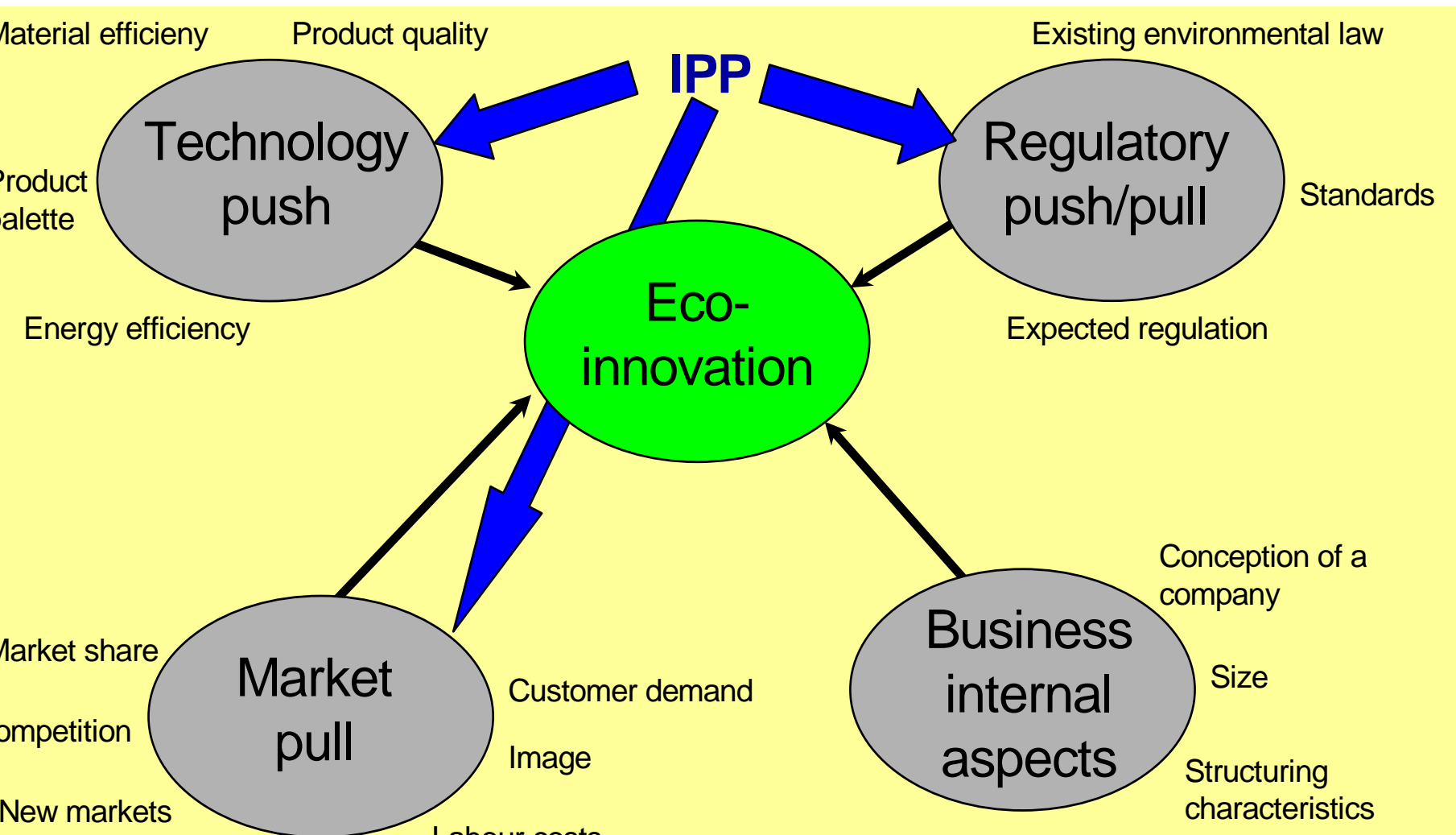
# Avoid our mistake – The China Strategy – Is a short cut possible?

Figure 2.



Source: Cleff/Rennings 1999 & Rubrik, 2002

# Integrated Product Policy

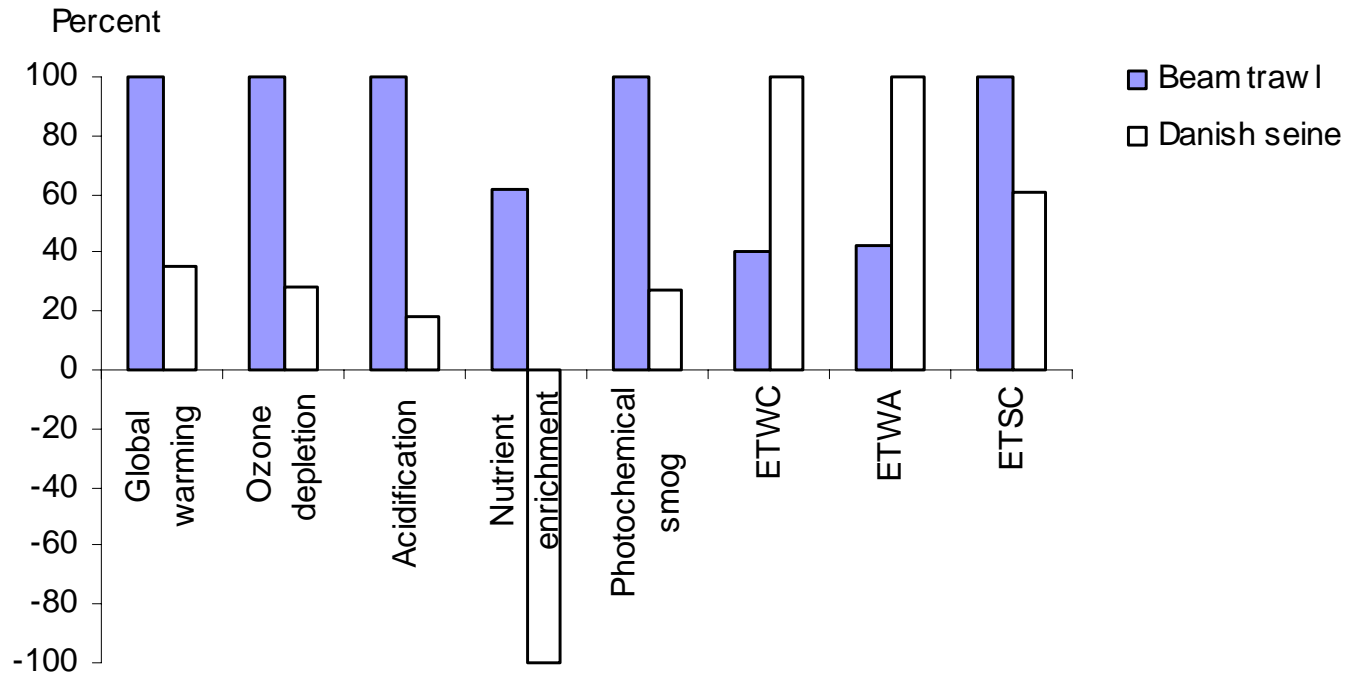


# LCA – improvement analysis

**Beam-trawl**

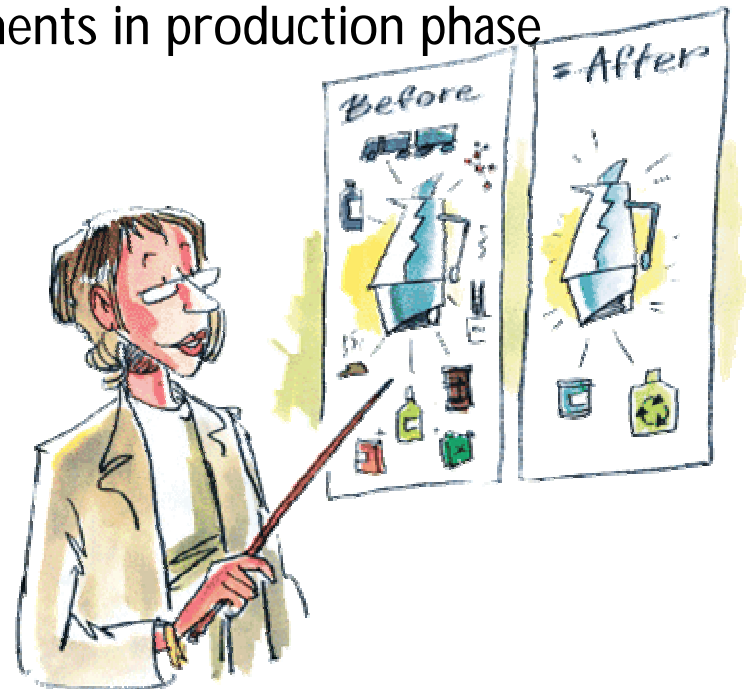


**Danish seine**



# Why EcoDesign and Life Cycle Thinking?

- Global problems
- Global Environmental Problems
- Global production and Consumption
- Lack of significant potentials for improvements in production phase
- Market, costumers consumers etc.






# Rules of thumb "6xR"

**Re-think:** Re think the product and its **functions**

**Re-duce:** Reduce the **energy** consumption and **resource** consumption in the whole life cycle

**Re-place:** Replace hazardous **substances** with more environmentally sound alternatives

**Re-cycle:** Use those **materials** which can be reused or recycled

**Re-use:** Design in such a way that the **product** or parts of it can be reused

**Re-pair:** Design a product that is easy to **repair**

Improve		

## Brain storm and env. principles

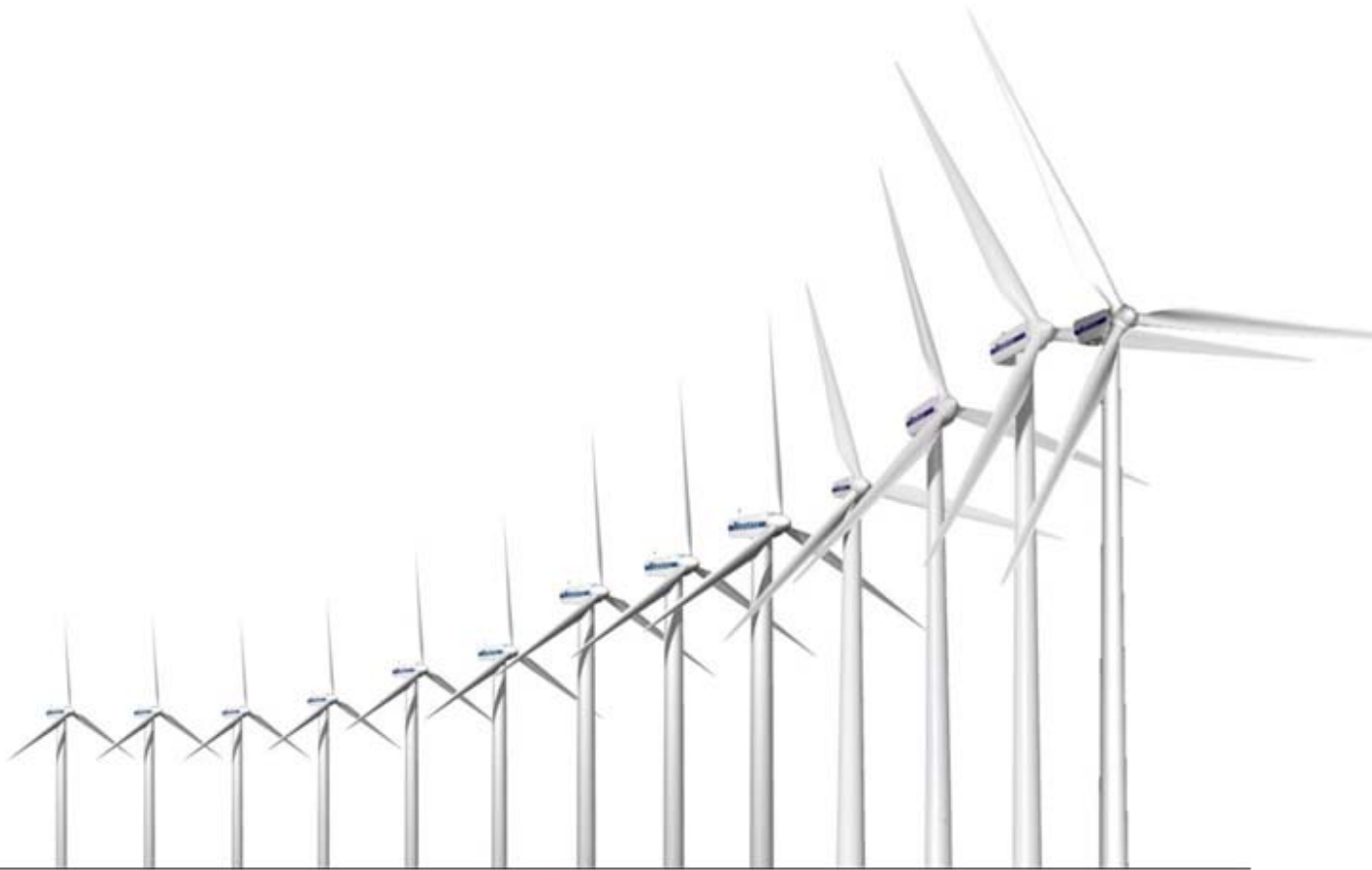
- P 1) Achieving environmental **efficiency** / optimal function
- P 2) Saving **resources**
- P 3) Use of **renewable** and sufficiently available resources
- P 4) Increasing product **durability**
- P 5) Design for product **reuse**
- P 6) Design for material **recycling**
- P 7) Design for **disassembly**
- P 8) Minimising **harmful substances**
- P 9) Environmental friendly **production**
- P 10) Minimising environmental impact of product **in use**
- P 11) Using environmentally friendly **packaging**
- P 12) Environmentally friendly **disposal** of non recyclable materials
- P 13) Implementing environmentally friendly **logistics**

# Environmental innovation

Windmill - Vestas 3MW



# Development of Vestas turbines



Product/Rotor diameter (m)	V15	V17	V19	V20	V25	V27	V39	V44	V47	V52	V66	V80	V90
Year of installation	1981	1984	1986	1987	1988	1989	1991	1995	1997	2000	1999	2000	2002
Capacity (kW)	55	75	90	100	200	225	500	600	660	850	1750	2000	3000
Wh/year	217	265	301	346	481	647	1304	1581	1947	2530	4705	6768	-

# One of the method is EcoDesign

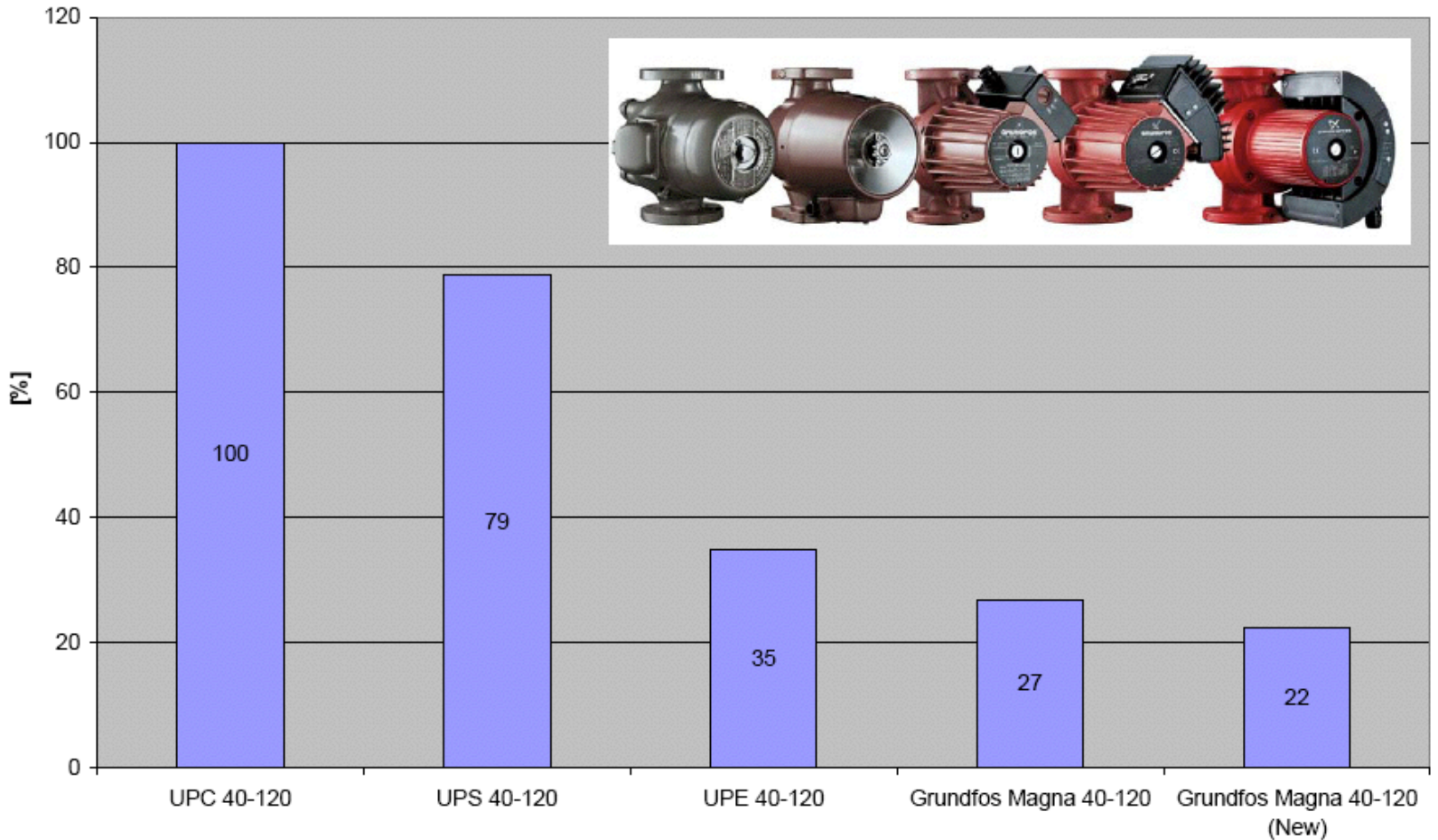
Årlig CO<sub>2</sub>-besparelse i  
Europa - ved skift til  
A-mærkede pumper:

*17,6 mio  
tons CO<sub>2</sub>*

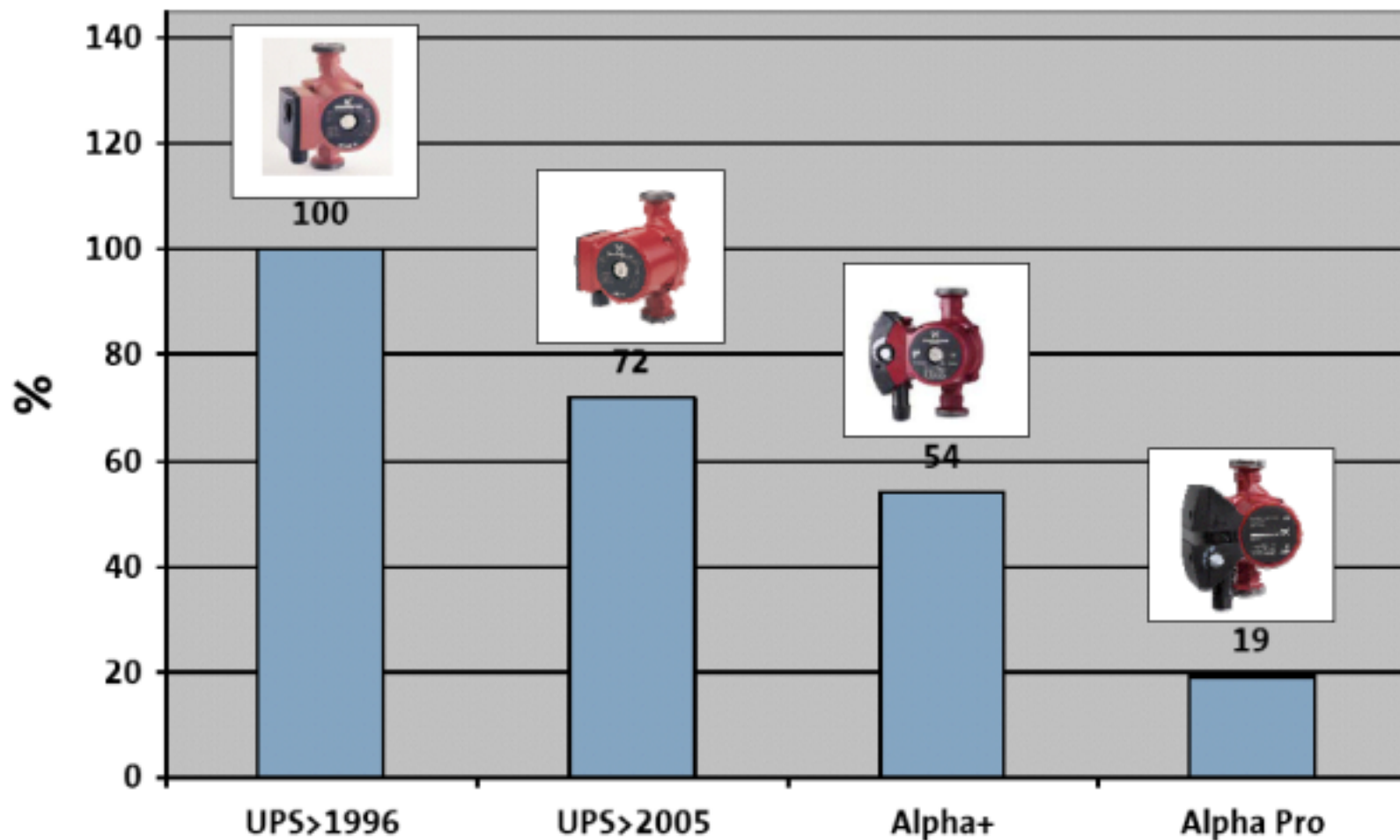




# Udvikling i cirkulationspumpers elforbrug



## Udvikling i cirkulationspumpers årlige elforbrug



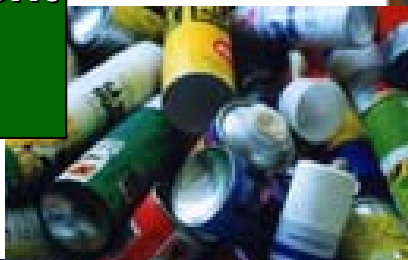
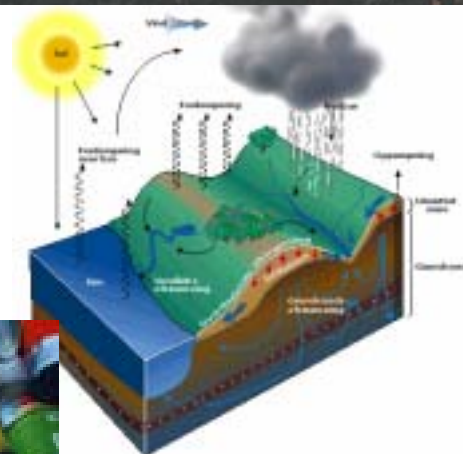
# Environmental Management

4. Thesis

3. Project

2. Environmental management  
society, discourses  
and regulation

1. Environmental management  
Industries and cleaner  
production and products



# Sustainable Energy Planning and Management

4. Thesis

3. Traineeship/project

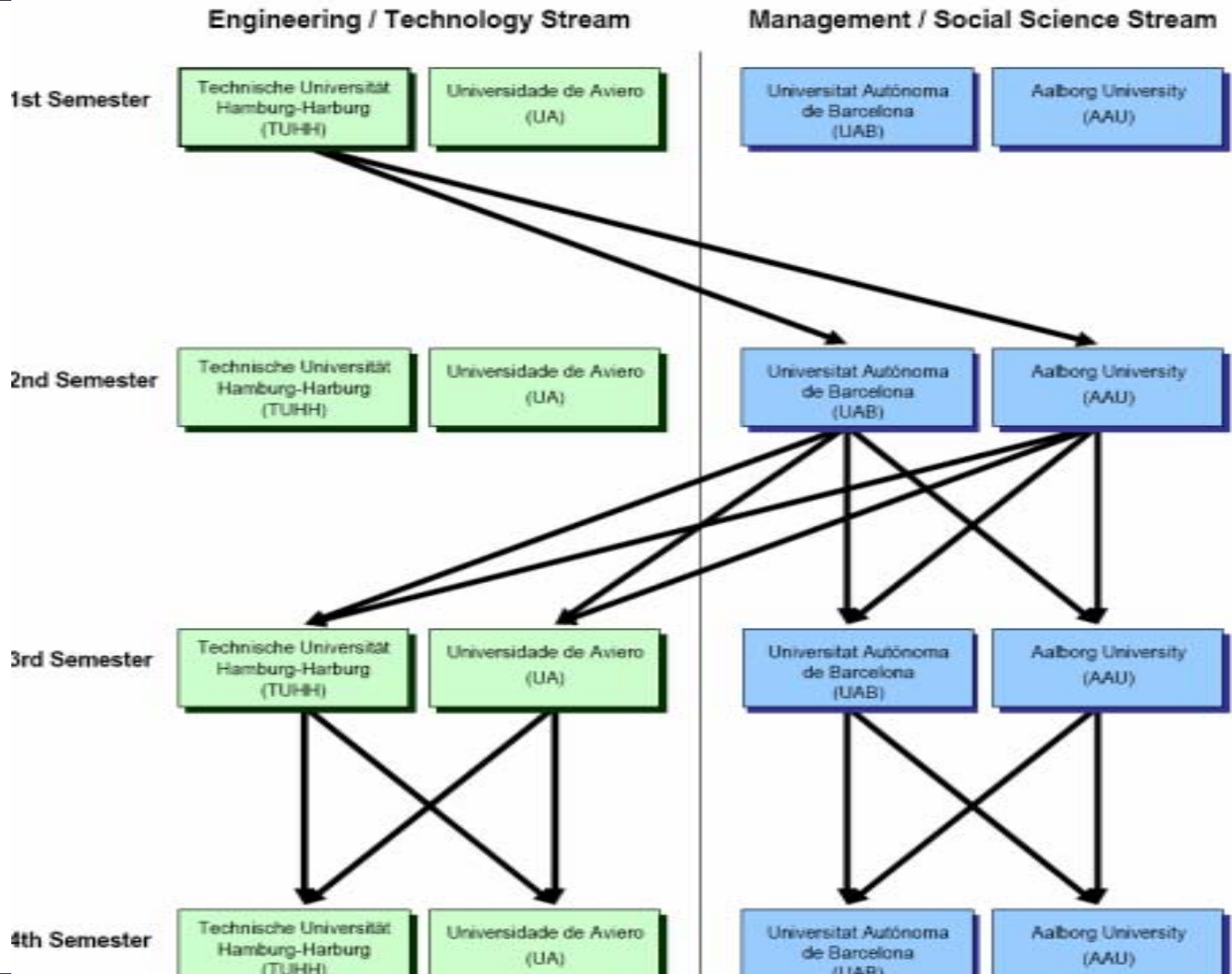
2. Energy management  
society and regulation

1. Energy systems  
Companies - renewable energy



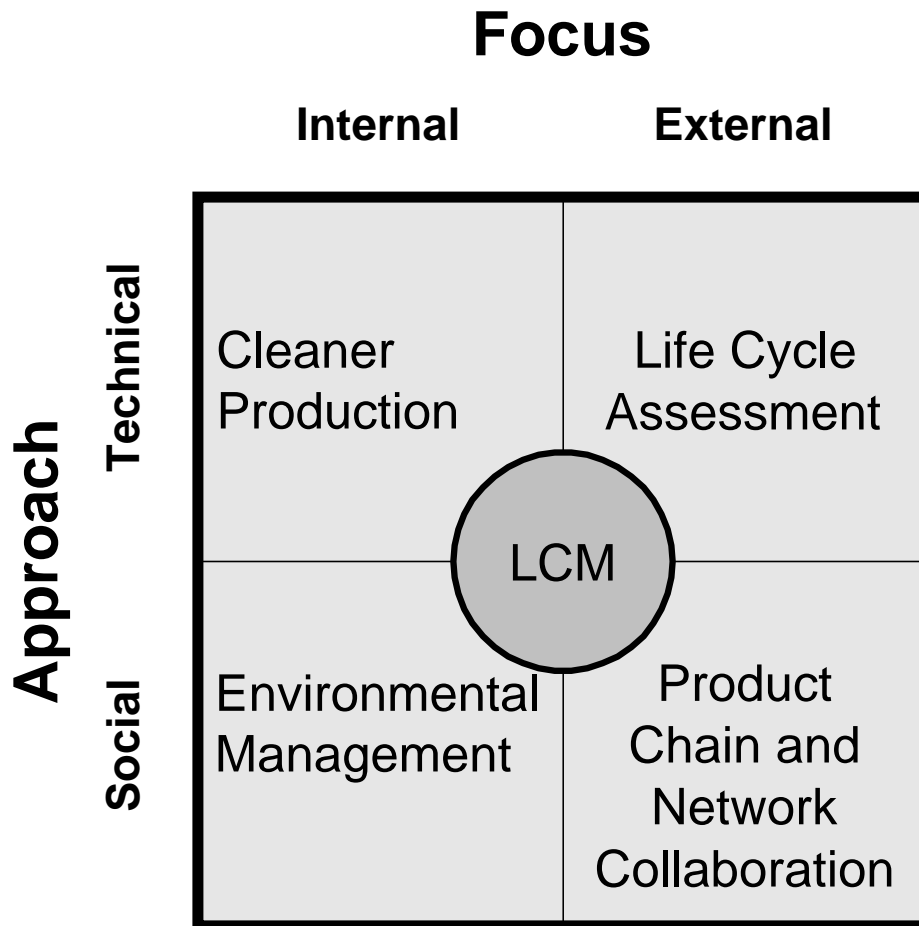
# Student Mobility Overview

Simple Version



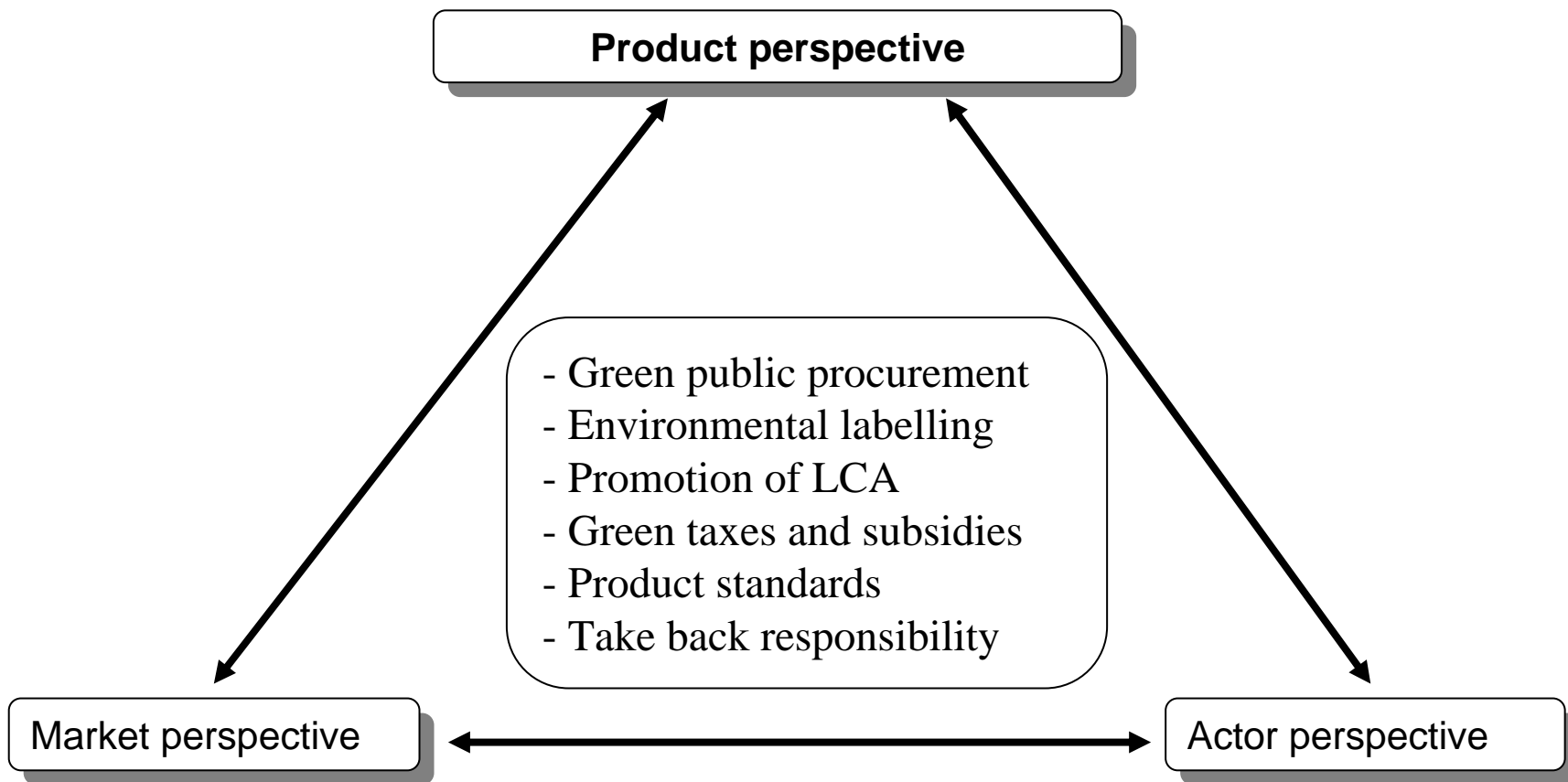


# Life Cycle Management - LCM



LCM: Life Cycle Management

## Danish IPP



# Research Groups

- Urban Planning & Mobility Studies
- **Sustainable Energy Planning**
- **Sustainability, Innovation and Policy**
- **Environmental Assessment & Governance**
- **PBL & Engineering Education**
- Participation & Technology
- Innovative Fisheries Management
- Geography

## 1. Semester

# Environmental management and planning in a company perspective

- Analyse environmental problems of a company and propose solutions
- Learn about environmental regulation
- Learn about how companies functions, stakeholders etc.
- Learn about environmental management systems

## 1. semester

### **General courses**

- Feasibility Studies (Economics) 2 ECTS
- Research Methodology 2 ECTS

### **Project courses**

- Corporate Environmental Management 2 ECTS
- Energy planning 2 ECTS
- LCA 1 ECTS
- Life cycle thinking 1 ECTS
- Organizational Theory 1 ECTS
- Others like GIS, Eco-tourism etc. is offered if students shows interest and/or resources are available

## 8. Semester

### **Environmental management and planning at a societal level**

- **Take as departure an environmental problem and focus on the policies, strategies and planning measures able to solve it**
- **Learn about environmental discourses and different paradigms**
- **Institutional and political perspectives**
- **Regulatory regimes and how regulatory strategies works in different countries, EU and so on**



## 3. semester

- Ordinary project (not supported by courses)
- Special semester focused on assessment methodologies (2-4 courses will be given). LCA, EIA, SEA

## 4. Semester

- Thesis
- Research-based. Within the topics you have worked with in previous semesters