



# **Environmental Cost Management**

**- reducing costs by reducing non-product output -**

For further information, please contact:

GTZ-P3U

Dr. Edith Kürzinger, Wachsbleiche 1, D-53111 Bonn, Germany, tel.: +49-228-604710 ou -113,

fax: +49-228-9857018, e-mail: [GTZP3U@aol.com](mailto:GTZP3U@aol.com), <http://www.gtz.de/p3u>



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fax: +49-228-9857018, e-mail: GTZP3U@aol.com, <http://www.gtz.de/p3u>

or

Kienbaum Unternehmensberatung GmbH

Dr. Hartmut Fischer, Grolmanstr. 36, D-10623 Berlin, Germany,  
tel.: +49-30-880198-20, fax: +49-30-880198-15, e-mail: [hartmut.fischer@kienbaum.de](mailto:hartmut.fischer@kienbaum.de)



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**The full cost of non-product output**



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**The P3U portfolio of tools and services**



# Introduction

- Environmental Cost Management and other environmental management instruments -



Setting parameters for companies		Companies' action within these parameters	
<b>Command and Control</b>		<b>Management Systems</b>	
	Setting environmental rules and regulations		EMAS, ISO 14000ff
	Implementation of rules and regulations		Environmental Cost Management, Integrated Management System
<b>„Hard“ market-based tools</b>		<b>Management tools</b>	
	Cost-covering prices for utilities and waste services		Auditing, check lists
	Ownership rights to environmental „goods“		Environmental Cost Accounting
	Liability for environmental damages		Eco-balances, benchmarks, Good-Housekeeping
<b>„Soft“ market-based tools</b>		<b>Operative technical-organizational processes</b>	
	Purchasing policies of public institutions		
	Influencing customer preferences by information (e.g. labeling schemes) and public opinion		best available technologies (BAT)
	Influencing the image of environmental „leaders“ and „laggards“		logistics of waste collection and treatment



# Introduction

## - The development of Environmental Cost Management -



### **Metals processing**

90 employees, East German manufacturer of bearings. Adaptation to tighter emissions standards and cost reduction. Initial development of Environmental Cost Management

### **Chemical industry**

800 employees, East German subsidiary of a multinational, manufacturer of silicones. Cost analysis of waste water streams, development of base strategies for cost reductions. Confirmation of the basic approach of Environmental Cost Management

### **Metals processing**

150 employees, manufacturer of vibration dampening equipment. Cost reductions, adaptation of management system towards the EMAS requirements. Development of moderating techniques for Environmental Cost Management.

### **Textiles**

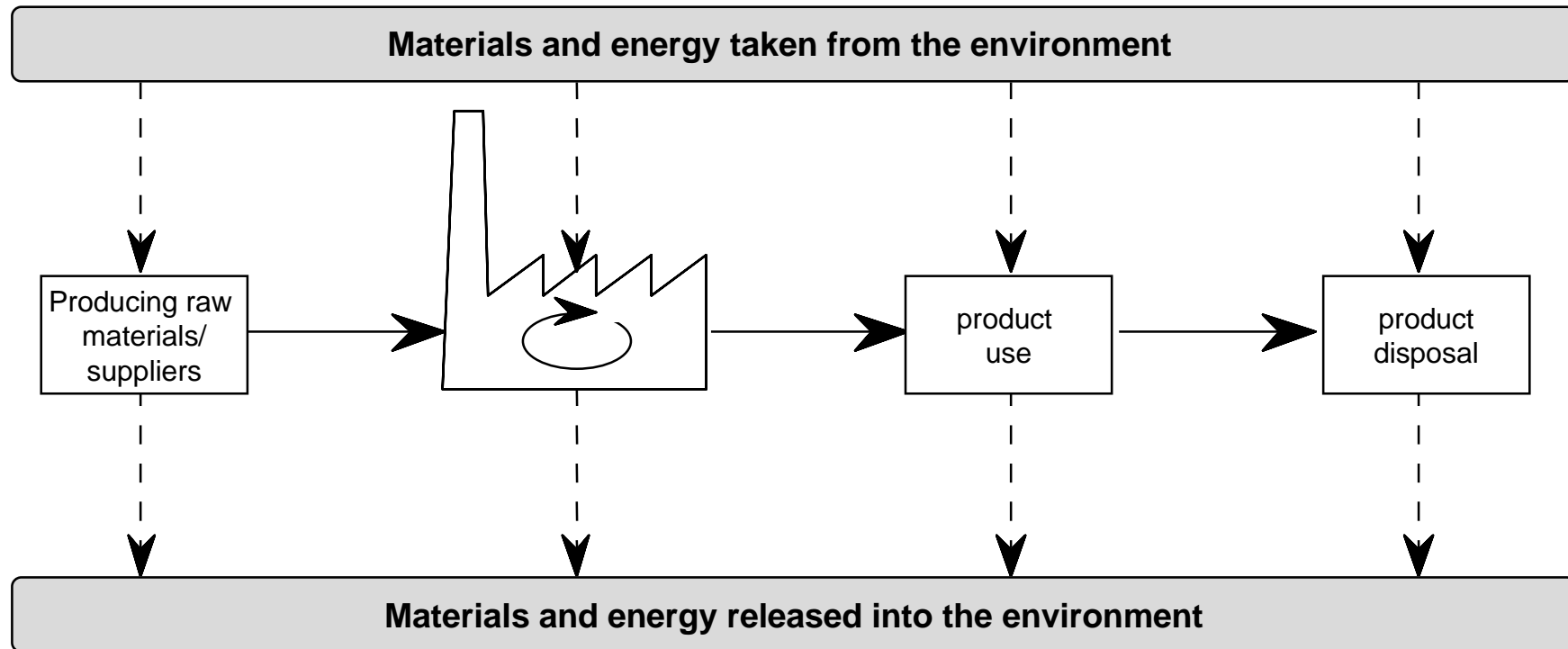
400-employee-site of a 5,000-employee manufacturer of mens and womens stockings and associated footwear. Cost reductions, adaptation of management systems, adaptation of information systems. Environmental Cost Management in a project structure „came of age“. Further integration into organizational structures. Beginning integration into information systems.



# Introduction



- What is environmental management in industry ? -



**In industry, environmental management mainly is management of materials and energy flows**



**Important objectives in doing this are observance of environmental regulations and achievement of sustainable patterns in the use of natural resources**

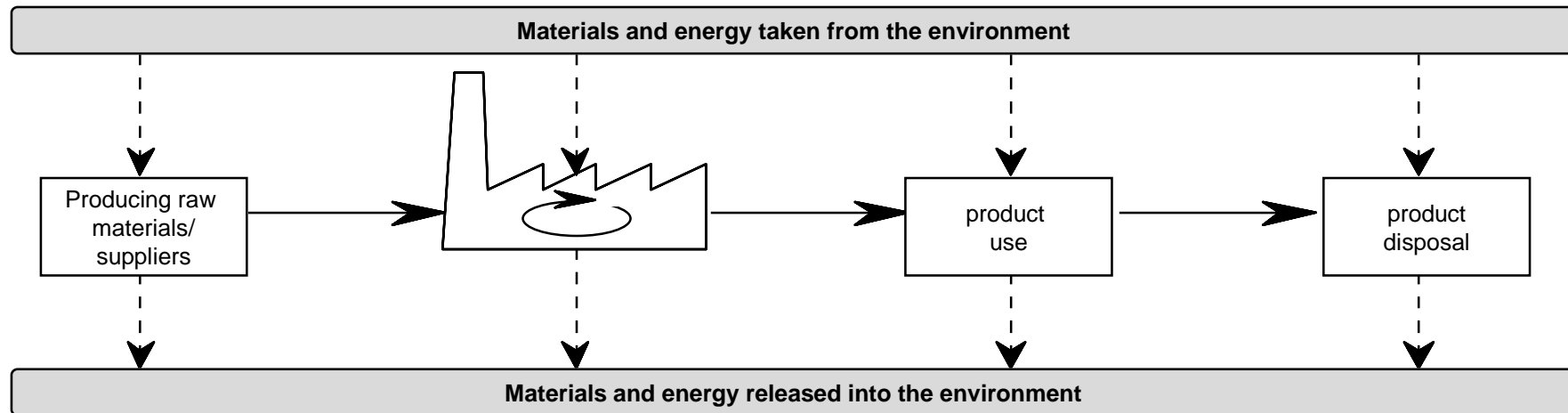


# Introduction



- Do business and environmental interests have to be at odds with another ? -

- Harming the environment is not an intrinsic goal of companies. Therefore, conflicts don't arise at the level of goal-setting but at the level of the means that are chosen
- A scrutiny of the means chosen shows that there are not only win-lose situations (i.e. cost increases) but also a considerable number of win-win-situations (i.e. cost reductions)



**Environmental and business interests aren't *always* in conflict**

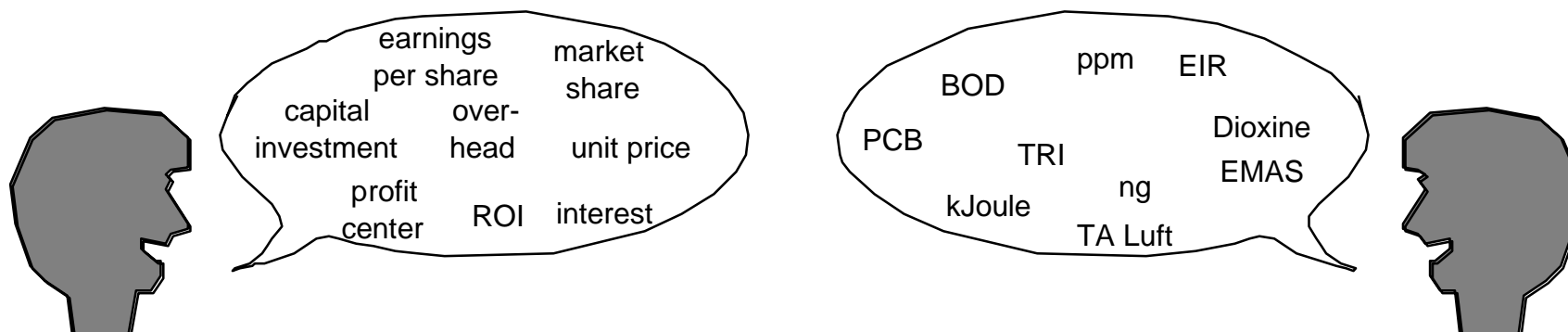


# Introduction



- Environmental management in and around production requires a „translation“ between the perspectives of the business and the environmental manager -

**Costs are an important aid in translating environmental needs into business needs. In addition, they already serve as an "official language" in the company**



**With the cost translation, the business and environmental manager can communicate and cooperate more effectively**



# **The full cost of non-product output**



# The full cost of non-product output



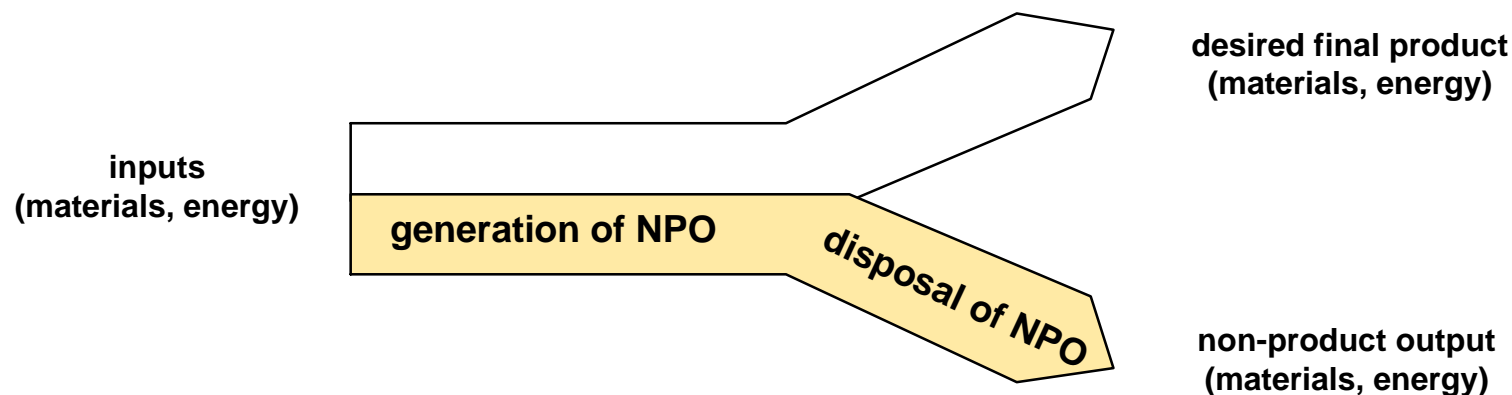
- non-product output - the undesired output of manufacturing -

## What is non-product output?

- A large part of the materials and energy used ends up in the desired final product. The other part turns into solid waste, waste water and air emissions. These outputs are summarized as “non-product output” (NPO)

## What percentage of total output is non-product output ?

- Typically, NPO adds up to 30-50% of total output (by weight)



## What is the cost of non-product output ?

- Non-product output causes non value-adding activities (generation and disposal of NPO)
- The full cost of NPO typically adds up to **5-15% of a company's total costs**



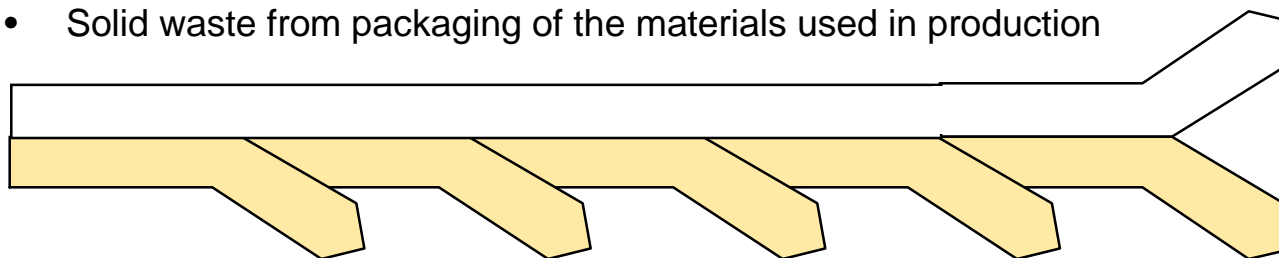
## The full cost of non-product output



- Every process within a firm generates at least some non-product output -

### Examples for non-product output are:

- Solid waste, waste water and emissions from production processes. These outputs contain all auxiliary materials and part of the raw materials that are inputs to production
- Rejects due to insufficient quality
- Air emissions from combustion processes
- Solid waste and waste water from office buildings
- Disposal of raw materials or finished goods, that are no longer of use or cannot be sold anymore
- Solid waste from packaging of the materials used in production



**NPO is generated in every major process in all branches of industry**



## The full cost of non-product output



- Existing cost accounting systems only show the tip of the iceberg -

	cost of materials	costs caused in production processes	cost of disposal	full cost
<b>initial situation</b>	1,00 DM/kg	0,50 DM/kg	0,30 DM/kg	1,80 DM/kg
<b>recycling</b>	1,00 DM/kg	0,50 DM/kg	-0,10 DM/kg	1,40 DM/kg

### Consequences of incomplete information

- Management is not aware of the full cost of NPO
- Opportunities for reducing the cost of NPO are overlooked



**With respect to NPO, effective cost reduction and cost control are not assured**

# Cost definitions



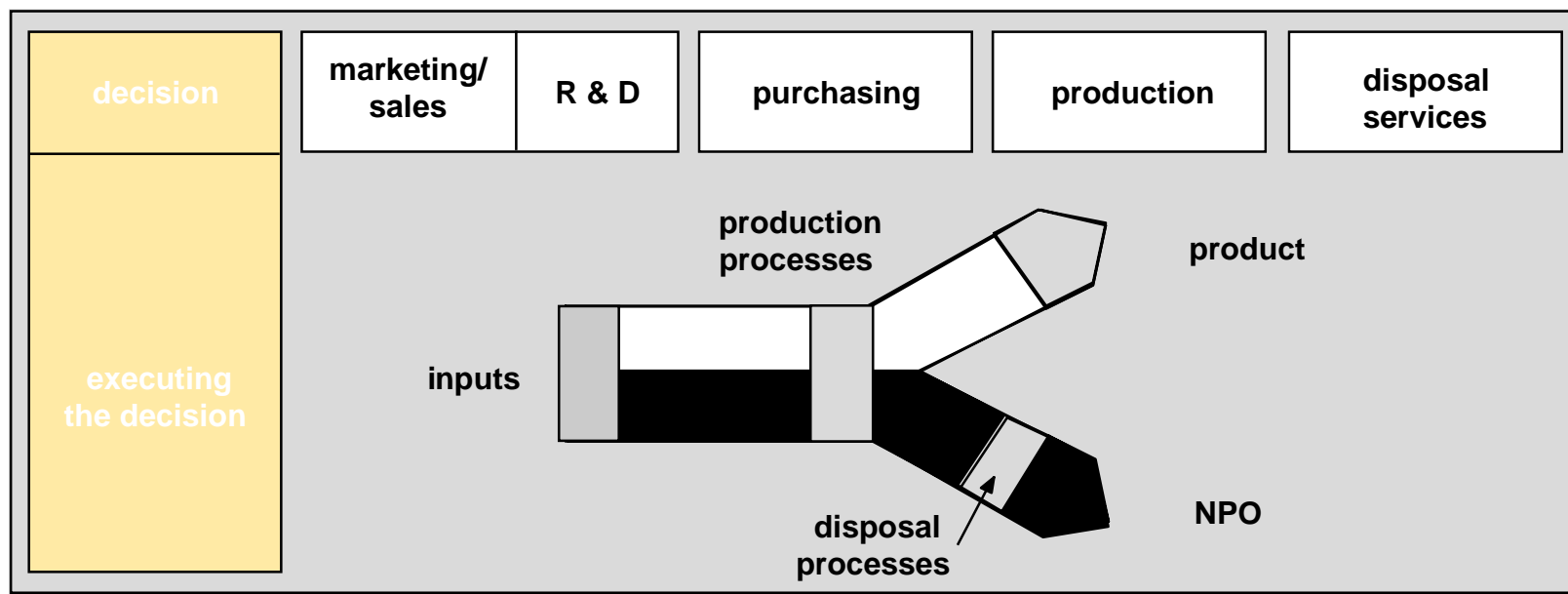
# Cost definitions



- Important decisions of environmental management -

## Types of decisions

- Pollution prevention - prevention of NPO/waste
- End-of-pipe measures - improvement of NPO disposal



## Important parameters for these decisions are

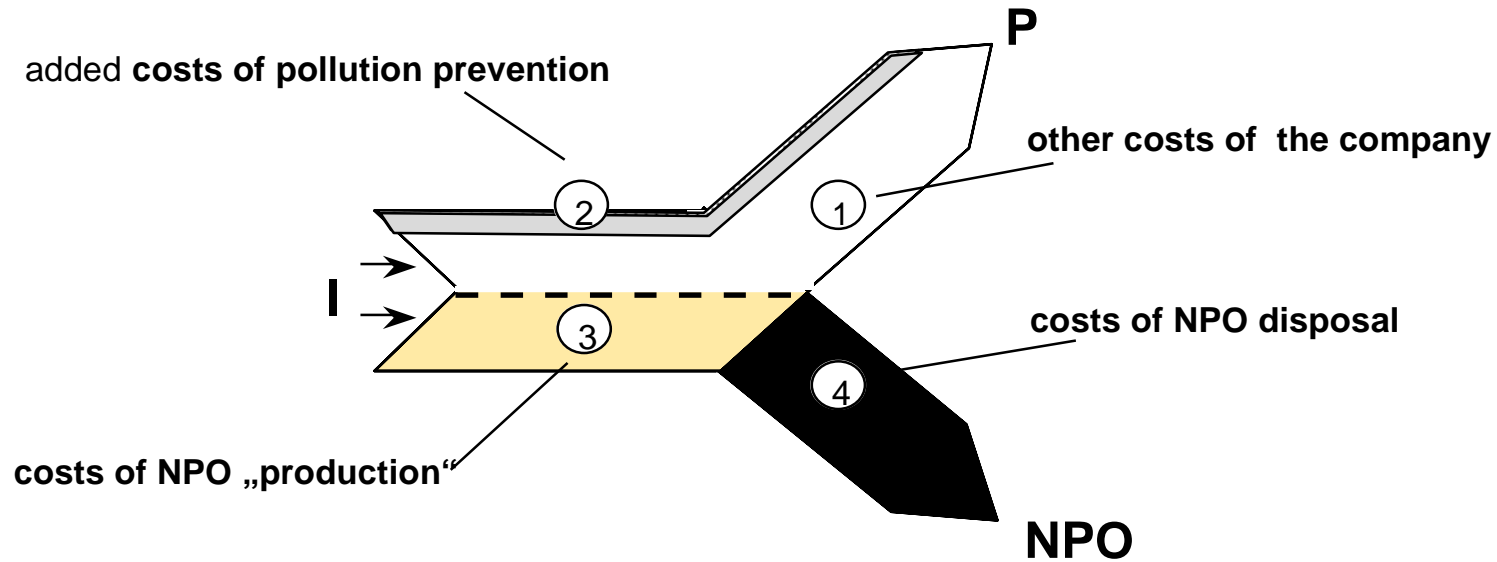
- product design
- choice of input materials
- production processes (technology, organization)
- disposal processes (collection, treatment, „where to“)



# Cost definitions



- The relation between cost terminology and cost element -



cost element	typical (t) or proposed (p) terminology
① + ② + ③ + ④	total costs of the company (t)
② + ④	environmental costs (t)
④	„end-of-pipe-costs“ (p)
③ + ④	„NPO costs“ (p)

# Achieving cost reduction





# Achieving cost reduction

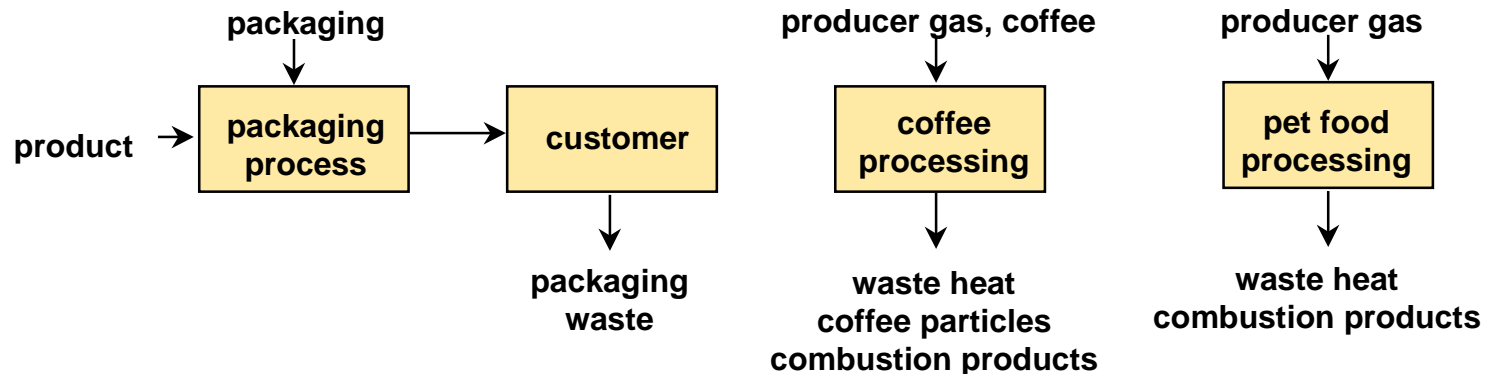
- Case study food-processing (Zimbabwe) -



**company and products**

Major national producer of potato chips, coffee, peanut butter, pet food and other dry foods

**processes**



**cost of NPO**

33 % of total cost

**measures**

Reduction of heat demand (downsizing equipment), reduction of heat losses, waste heat recovery. Recycling of direct material in NPO. Changes in packaging design.



**cost effects**

- **measures for reducing costs of select NPO by 15% developed in 4 days**
- **pay back period 14 months**
- **extrapolation to company as a whole: net reduction of total cost by 5 %**

**environmental effects**

- **reduction of the energy consumption and emissions to air by over 60%**
- **reduction of solid waste by 14%**



# Achieving cost reduction

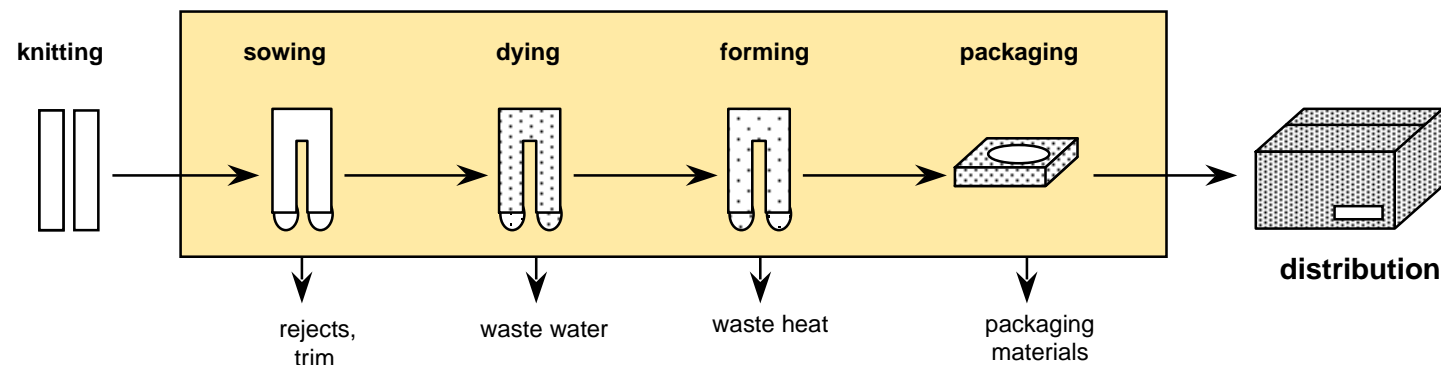
- Case study textiles industry (Germany) -



## company and products

One of the leading European manufacturers of socks and stockings for men and women with production sites in Germany, Eastern Europe and the Mediterranean

## processes



## cost of NPO

7% of total cost, if the site in question had been an independent company

## measures

Changes in the product development process, improved sensors in production, changes in the capacity of waste water treatment and in the application of water treatment chemicals



### cost effects

- reduction of total cost by 1,7 %
- pay back period 6 months

### environmental effects

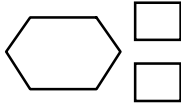
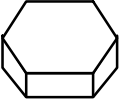
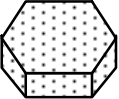

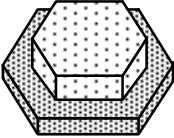
- reduction of solid waste by 34%
- reduction of chemicals in waste water by 20%



# Achieving cost reduction



- Case study metal-processing industry (Germany) -

<b>company and products</b>	Manufacturer of shock absorbers for heavy machinery, buildings and rail systems. Leading domestics manufacturer and worldwide distribution				
<b>processes</b>	<b>metal cutting</b>	<b>soldering</b>	<b>coating</b>	<b>viscous mass</b>	<b>assembly, packaging</b>
					
	↓ sheet metals cutting		↓ emissions (solvents) paint sludge	↓ empty containers, solvents	↓ packaging materials
<b>cost of NPO</b>	5% of total cost				
<b>measures</b>	Changing product design, coating technology with reduced overspray, better financial terms for external recycling				



## cost effects

- reduction of total cost by 1,0 %
- pay back period 3 months

## environmental effects

- recycling or prevention of 95% of toxic waste
- reduction of scrap metal by 20%



# Achieving cost reduction

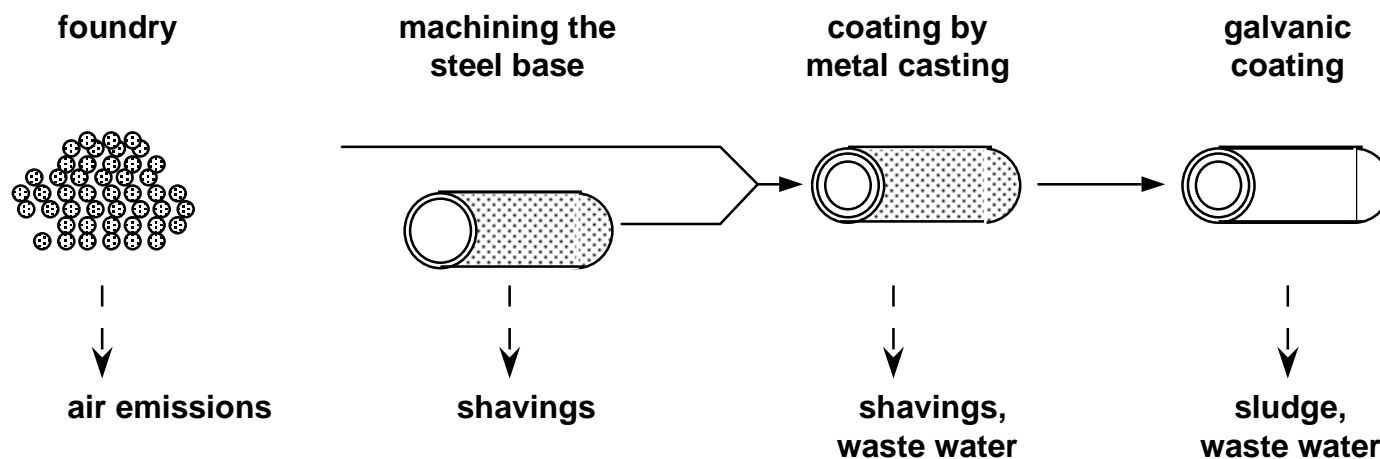
- Case study metal-processing (Germany) -



**company and products**

Manufacturer of bearings coated with non-ferrous metals for turbines and heavy machinery

**processes**



**cost of NPO**

28 % of total cost

**measures**

Improved fit of foundry and air pollution control technology, closed water loops and waste heat recovery in the metal casting process, changes in the galvanic coating systems



**cost effects**

- reduction of total cost by 7,0 %, pay back period 3,5 years
- compliance with new, stringent environmental regulations

**environmental effects**

- reduction of water use by 75%
- reduction of pollutants in emissions to air by 90%



## Achieving cost reduction - Assuring acceptance of measures -



### Participants

- Development of measures in teams with company's employees. If appropriate, crossfunctional team composition
- Involvement of managers responsible for implementation and the costs that are to be lowered, including at least one member of top management

### Evaluation

- Always quantitative cost evaluation of measures (savings, costs)
- Evaluation by the experts of the company (technical, accounting and environmental staff)
- Conservative evaluation of benefits

### Planning implementation

- Planning implementation should be integrated into the development of measures (results are taken more seriously, obstacles to implementation are recognized earlier on)



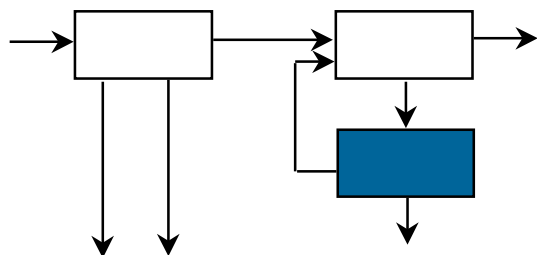
**Measures need to be understood, accepted and implemented by technical staff, business administration staff and management**



# Achieving cost reduction

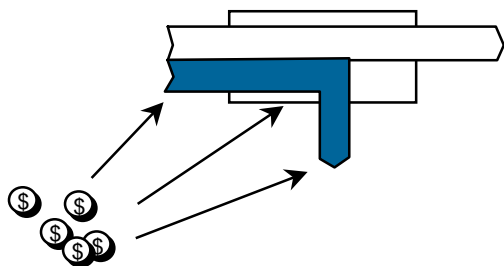


- cost reduction is achieved in three steps -



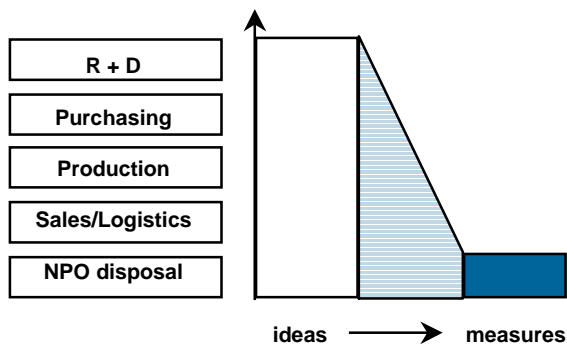
## Identification of NPO

- Which processes generate which NPOs in which amounts ?
- In some areas, this will be well documented. In other areas, it will require some “research” (interpretation, estimation)



## Identifying the cost of NPO

- Which costs are caused by which NPOs ?
- Allocation of material costs, labor costs, disposal costs etc. to NPOs



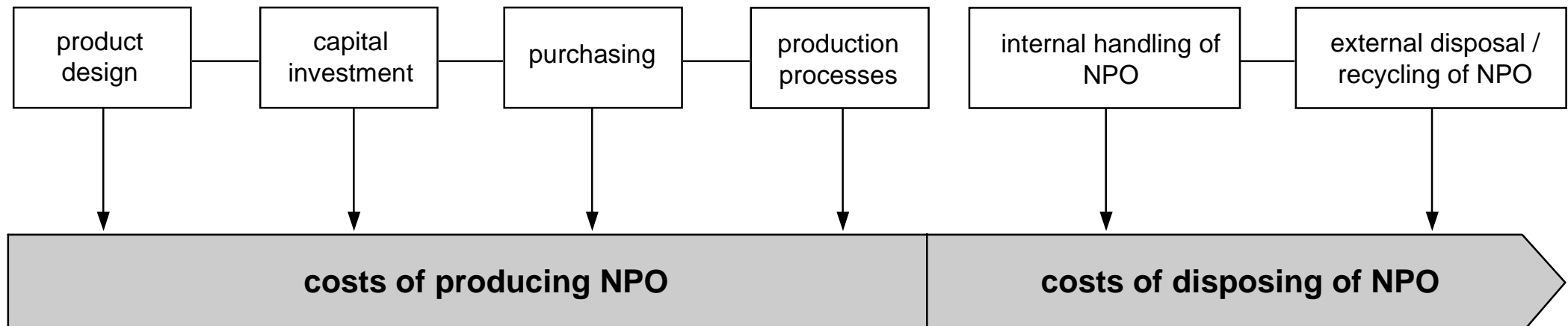
## Development of measures

- Development and implementation of measures for cost reduction
- The cost data is used to focus the development of measures and for evaluating their costs and benefits



# Achieving cost reduction

- Techniques for developing measures -



- Many function within the company contribute to the amounts and costs of NPO by their decisions
- Reducing NPO costs can require giving up well entrenched perspectives and habits

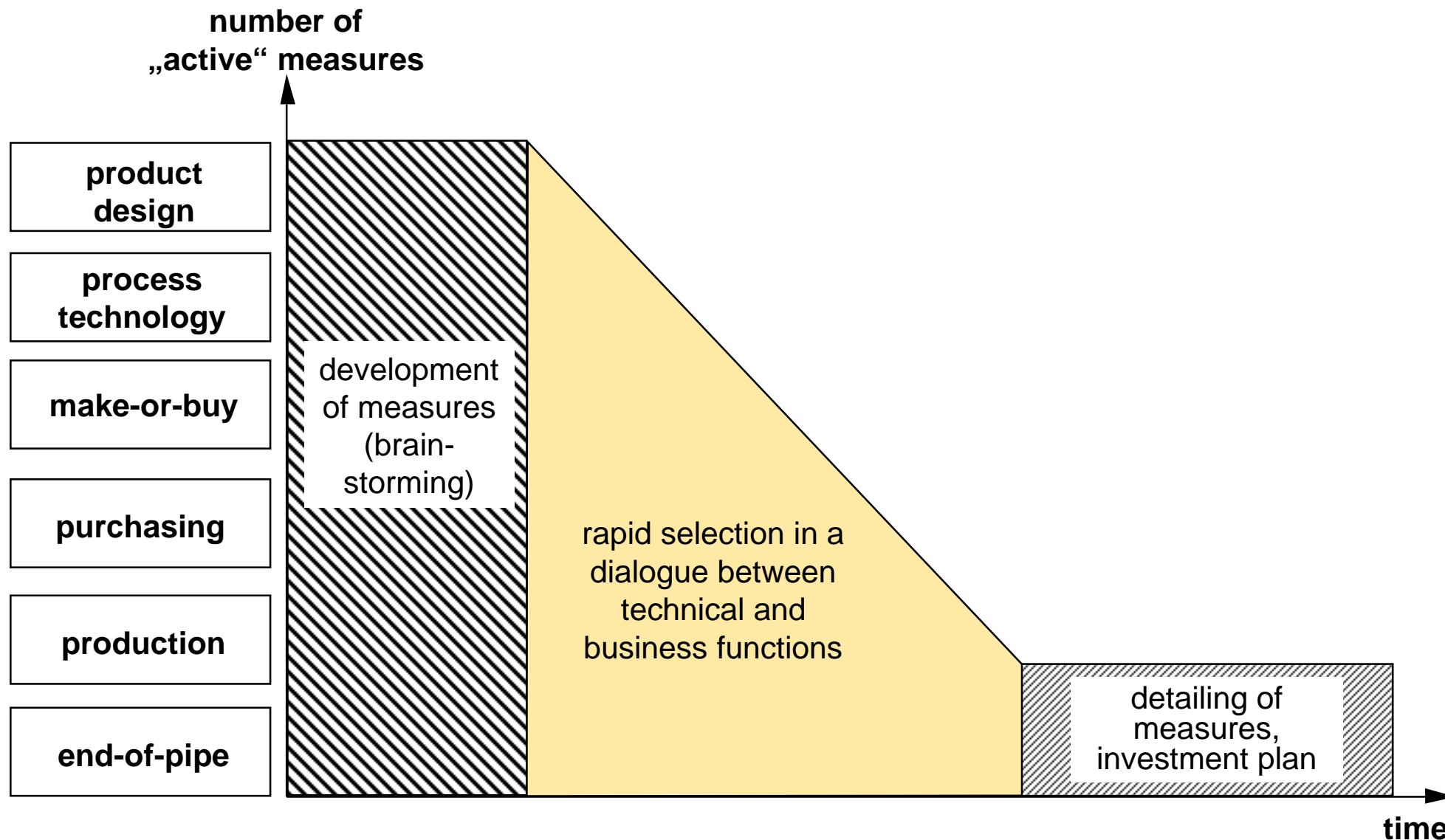


**Measures are developed in cross functional teams and supported by techniques for creativity**



# Achieving cost reduction

- Rapid selection of the more economic measures -







# Achieving cost reduction

- Summary of typical results -



- Reduction of a company's total cost by 1 - 5 % within 12 - 24 months. Cost reduction is achieved by technical or organisational changes with limited investment
- Reduction of resource consumption and negative environmental impacts
- Improved product quality due to product and process innovation

Objective	Effect on	Typical minimum effect	Typical maximum effect
Financial	Profit*	20% increase	100% increase
	Total cost	1% net reduction	5% net reduction
	Payback	12 months	24 months
Environmental	NPO amounts	20% reduction	40% reduction

\* = assuming the company achieves a 5% return on sales before taxes. If the sales margin is less, the effect is higher.



**Environmental Cost Management improves profits and reduces negative environmental impacts significantly**



## Achieving cost reduction



### - Specifics of applying ECM in small and medium enterprises (SME) -

#### Experience to date

- Experience to date is based on companies with 90 employees and above

#### Transparency of costs

- A key factor is identifying NPO amounts and translating them into costs. This is new also to most smaller companies. However, material flows are more transparent due lack of size and of division of labor.
- SME often don't have a developed cost accounting system. Alternative data sources are financial accounting, individual bills, guestimates or collection of exemplary data. This may lead to reduced reliability of the cost data generated

#### Know-How

- SME often have limited know-how in process technology. Availability of low cost external know-how can be of significant benefit
- Applying ECM requires less experience in project management, since fewer employees are involved and processes and requirements are less complex

#### Decision-making capability

- Results can be achieved more quickly, due to more direct communication and decisionmaking

## **Integration with environmental management systems**



# Integration with environmental management systems

- Environmental Cost Management (ECM) and EMAS/ISO 14001-



## Important common goals

- Negative environmental effects from manufacturing processes are primarily caused by NPO (solid waste, waste water, emissions)
- A common goal of environmental management and cost management is lowering the level of NPO (key cost drivers)

## Important common management tools

- Monitoring the amount of NPO generated and (ecological or economic) evaluation of these amounts
- Definition and periodic review of goals and measures for reducing the amount and impact of NPO
- Definition and periodic review of procedures in product development, purchasing, production and waste disposal designed to reduce the amount and impact of NPO



**Integration of ECM and environmental management systems strengthens both. Certification under ISO 14001 then leads to net cost reductions**

## **P3U portfolio of tools and services**



## P3U portfolio of tools and services

- Environmental Cost Management is part of a larger portfolio -



### Tools

- **Good Housekeeping Guide** - an easy-to-implement instrument with five checklists for identifying no-cost/low-cost measures for reducing costs and negative environmental impacts
- **Resource Management Module** - a role-play-based training module that introduces SME managers to environmental management and helps them to apply these insights to their business
- **Environmental Cost Management** - a structured procedure for achieving significant reductions in both the costs and negative environmental impacts of industry
- **Integrated Management Systems** - a simplified yet coherent system for SME to implement basic elements of managing quality, environmental and worker safety

### Services

- Introductory presentations and workshops
- 1-5-day training sessions for managers, technical experts, business associations and consultants
- Coaching managers and technical experts in applying P3U-tools in focus countries. Train-the-trainer services
- Information services on tools, experience, relevant literature and P3U activities



**Prerequisite for all support: demonstrated local commitment and payment for services**