



Nature

Cleaner Production as a Tool for Sustainable Development

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Cleaner Production (CP)



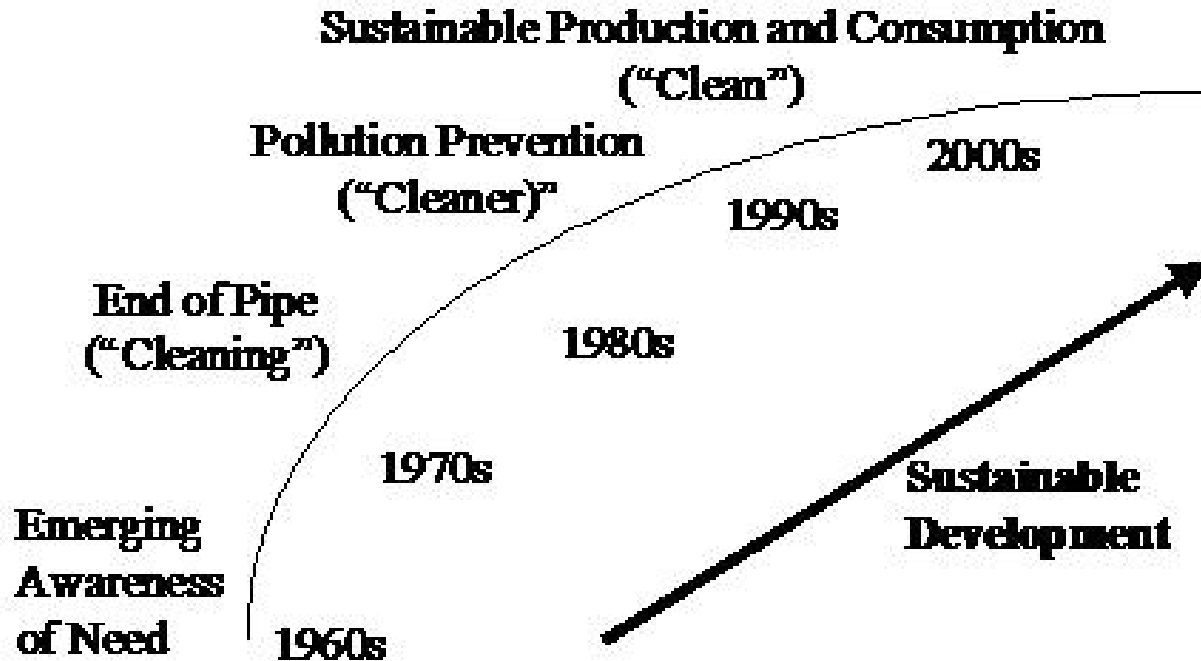
- “The **continuous** application of an **integrated preventive environmental strategy** applied to **processes, products, and services** to increase overall efficiency and **reduce risks to humans and the environment.**”

(United Nations Environment Programme)

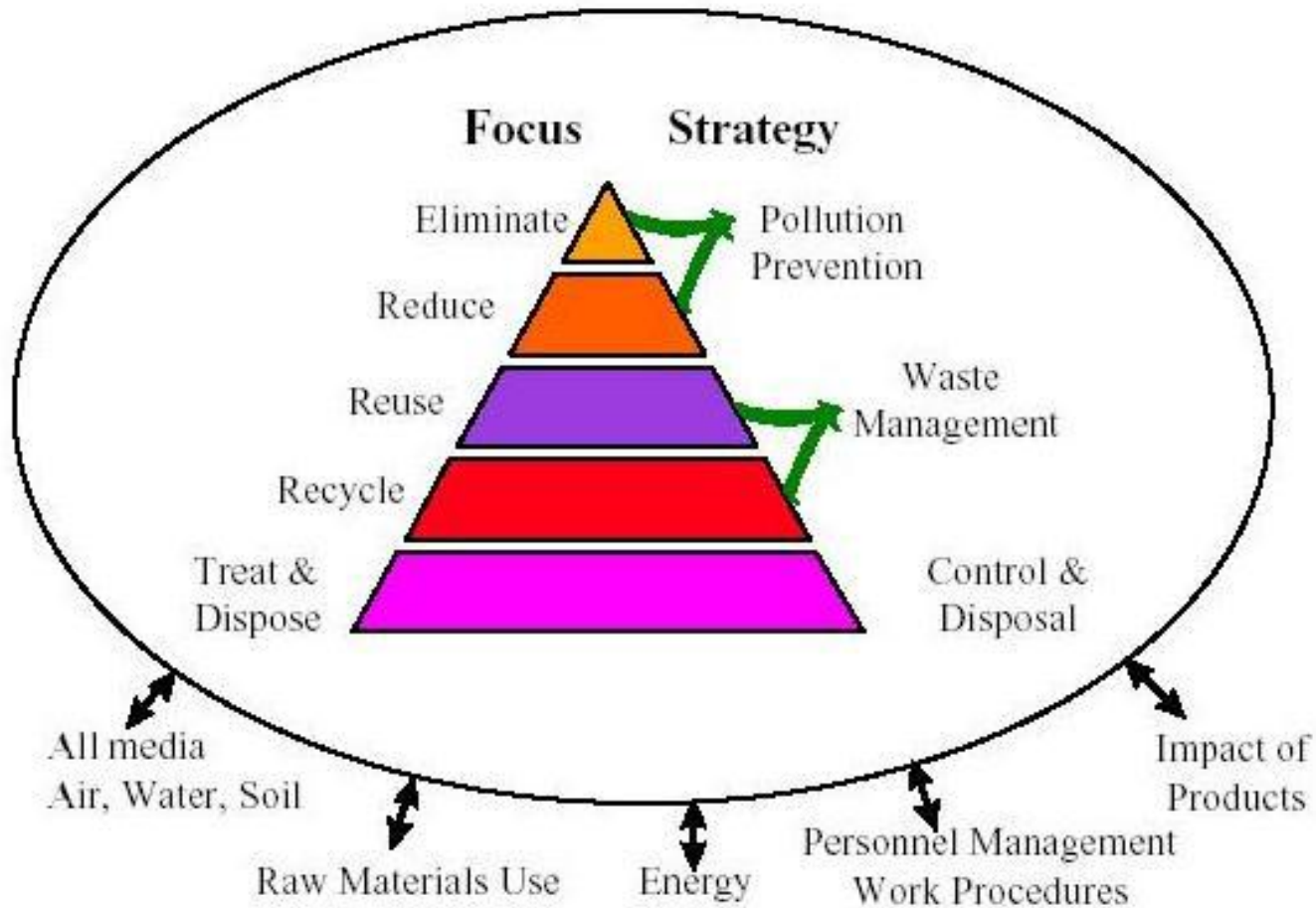
- Cleaner Production is the international term for reducing environmental impacts from processes, products and services by using better management strategies, methods and tools
- A global movement for improving business performance and a profitable, cleaner, sustainable future



Evolution to sustainable production and services



Integrated approach of Cleaner Production

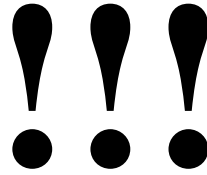


What is waste?

There are literally hundreds words for different types of waste:

- allowance
- BOD
- broke
- contaminated solids
- core loss
- customer returns
- damage
- draining
- dust
- effluent
- evaporation
- furnace loss
- greenhouse loss
- hidden losses
- leakage
- non-conforming material
- overfill
- packaging
- process loss
- rework
- second quality
- stock loss
- washings
- and etc.





Waste is waste what ever you call it : take the opportunity to cut waste and increase profits!



Properly implemented CP

Always

reduces long-term liabilities which companies can face many years after pollution has been generated or disposed at a given site

Properly implemented CP

Usually

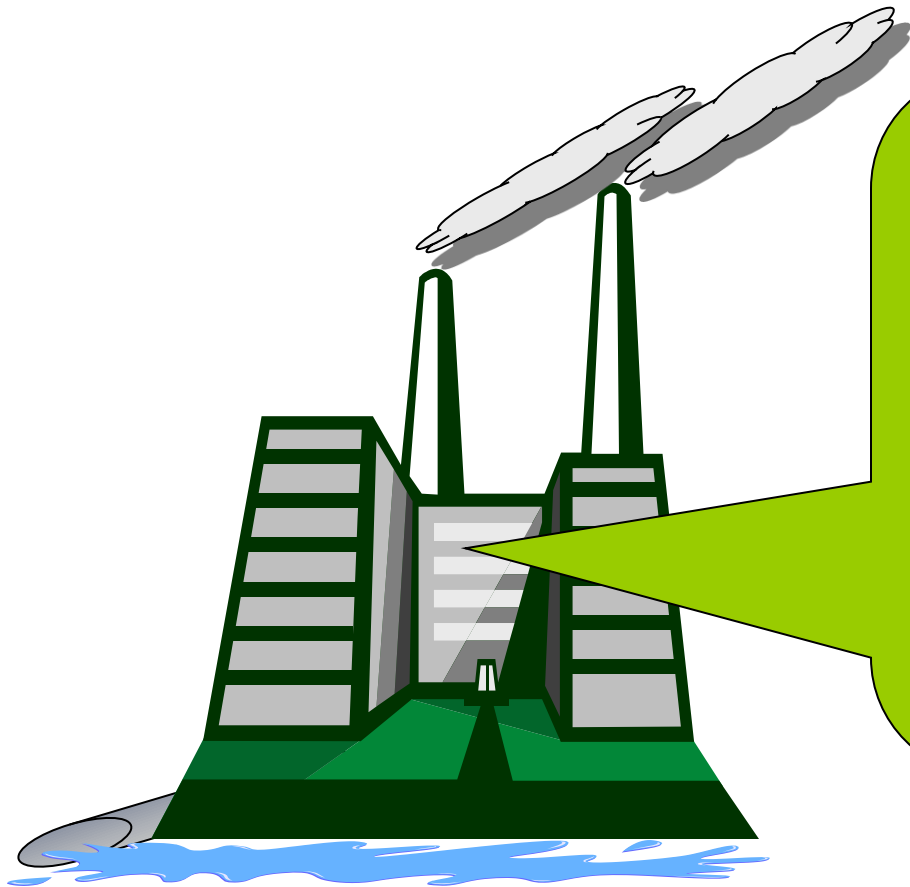
- increases profitability
- lowers production costs
- enhances productivity
- provides a rapid return on any capital or operating investments required
- increases product yield
- leads to the more efficient use of energy and raw materials
- results in improved product quality
- increases staff motivation
- reduces consumer risks
- reduces the risk of environmental accidents

Properly implemented CP

Often

- avoids regulatory compliance costs
- leads to insurance savings
- is fast and easy to implement
- requires little capital investment

Proactive environmental strategies: Cleaner Production

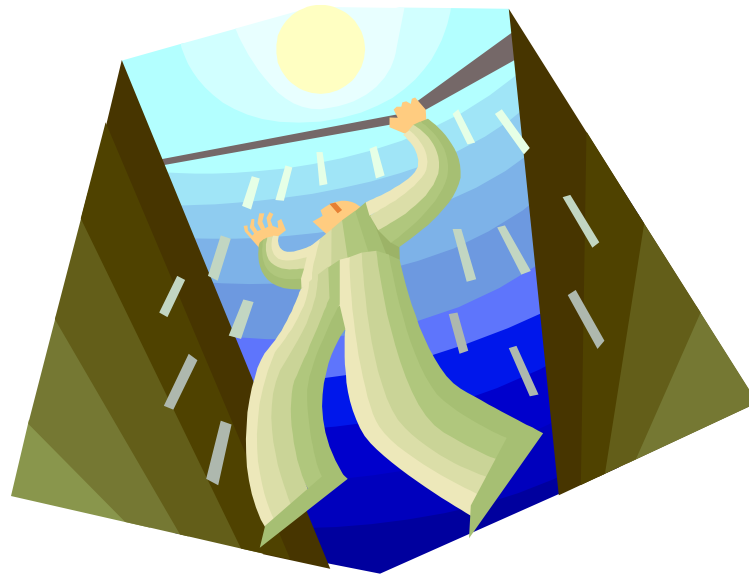


Prevention of Waste generation:

- Good housekeeping
- Input substitution
- Better process control
- Equipment modification
- Technology change
- On-site recovery/reuse
- Production of a useful by-product
- Product modification



How CP could be applied in practice?



Cleaner Production practices

1. Good housekeeping

take appropriate *managerial and operational* actions to prevent:

- leaks
- spills
- to enforce existing operational instructions

2. Input substitution

substitute input materials

- by less toxic
- or by renewable materials
- or by adjunct materials which have a longer service life-time in production

Cleaner Production practices

3. Better process control

modify:

- operational procedures
- equipment instructions

and process record keeping in order
to run the processes more efficiently
and at lower waste and emission
generation rates



4. Equipment modification

modify the existing production
equipment and utilities in order:

- run the processes at higher efficiency
- lower waste and emission generation rates



Cleaner Production practices

5. Technology change

replacement of:

- the technology
- processing sequence
- synthesis pathway

in order to minimise waste
and emission generation
during production

6. On-site recovery/reuse

- reuse of the wasted materials in
the same process for another useful
application within the company



Cleaner Production practices

7. Production of a useful by-product

consider transforming waste into a useful by-product, to be sold as input for companies in different business sectors.

8. Product modification

modify the product characteristics in order:

- to minimise the environmental impacts of the product during or after its use (disposal)
- to minimise the environmental impacts of its production

CP versus End-of-Pipe approach

Cleaner Production

Continuous improvement

Progress towards use of closed loop or continuous cycle processes

Everyone in the community has a role to play; partnerships are essential

Active anticipation and avoidance of pollution and waste

Elimination of environmental problems at their source

Involves new practices, attitudes and management techniques and stimulates technical advances

Pollution Control and Waste Management

One-off solutions to individual problems


Processes result in waste materials for disposal a pipeline with resources in and wastes out

Solutions are developed by experts often in isolation

Reactive responses to pollution and waste after they are created

Pollutants are controlled by waste treatment equipment and methods

Relies mainly on technical improvements to existing technologies



What is not CP?

- *Off-site recycling*
- *Transferring hazardous wastes*
- *Waste treatment*
- *Concentrating hazardous or toxic constituents to reduce volume*
- *Diluting constituents to reduce hazard or toxicity*

What are the benefits of Cleaner Production?

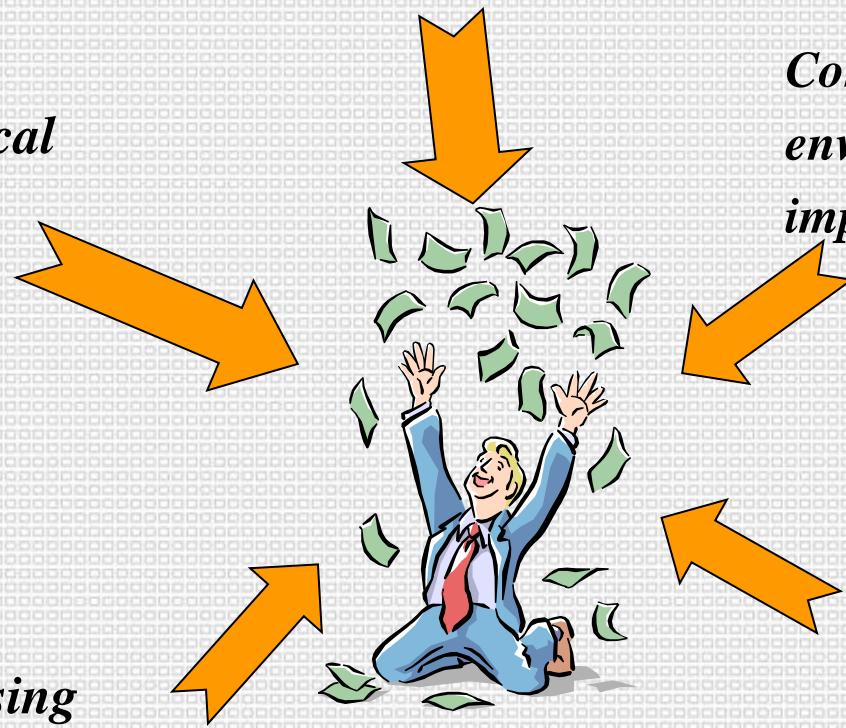
Improving environmental situation

Continuous environmental improvement

Gaining competitive advantage

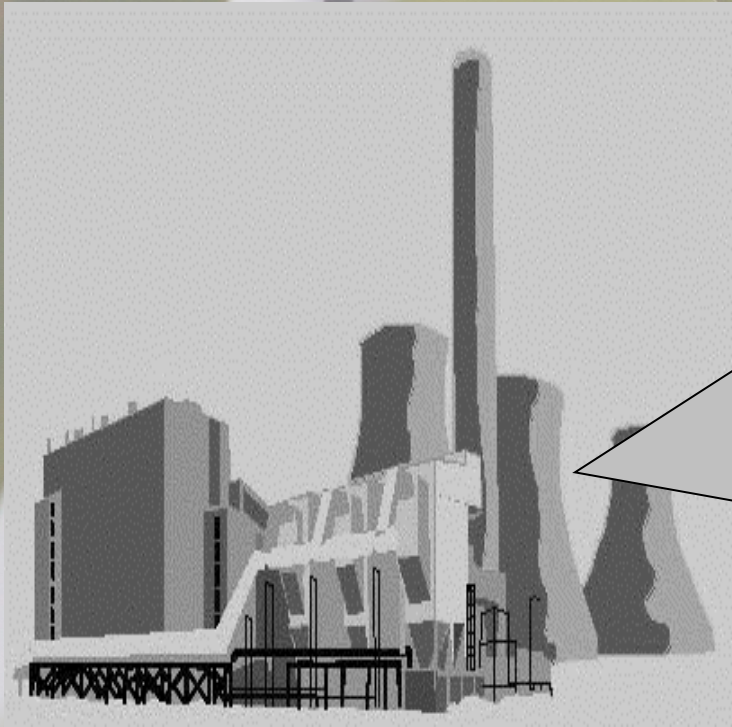
Increasing economical benefits

Increasing productivity



CP barriers

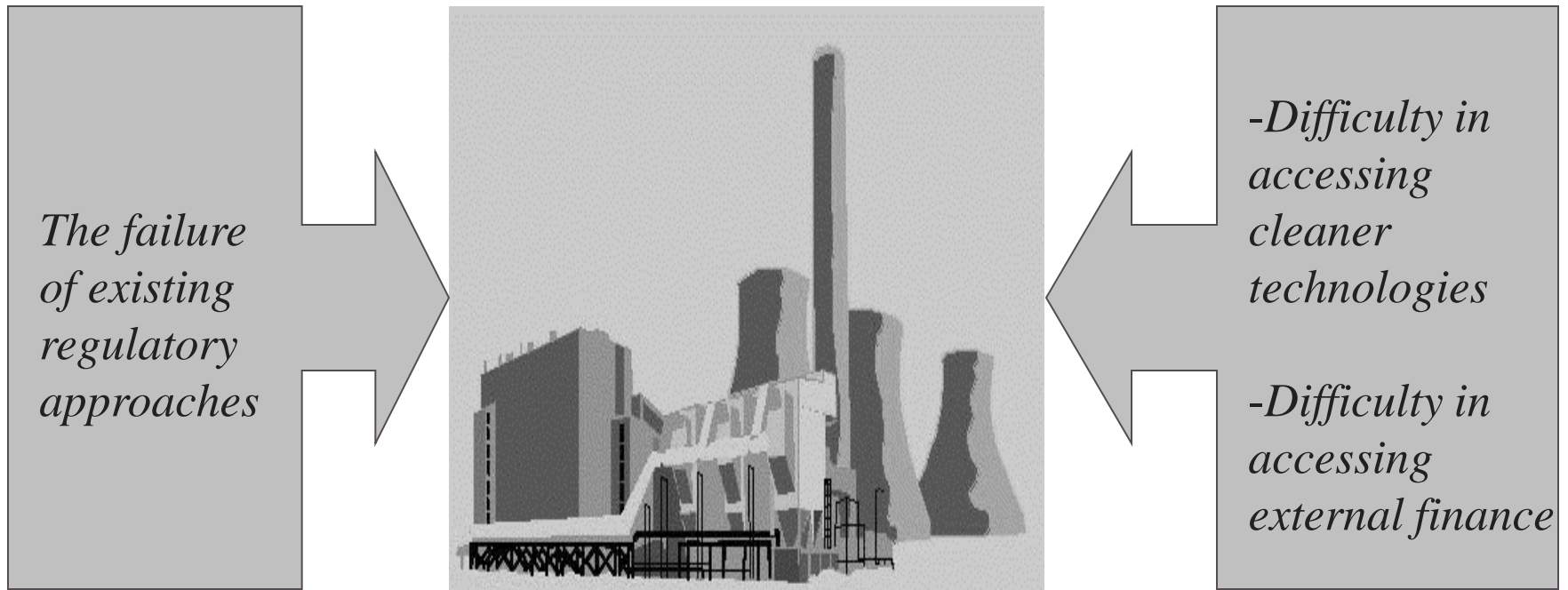
Internal to the companies:



- Lack of information and expertise
- Low environmental awareness
- Competing business priorities, in particular, the pressure for a short term profits
- Financial obstacles
- Lack of communication in firms
- Middle management inertia
- Labour force obstacles

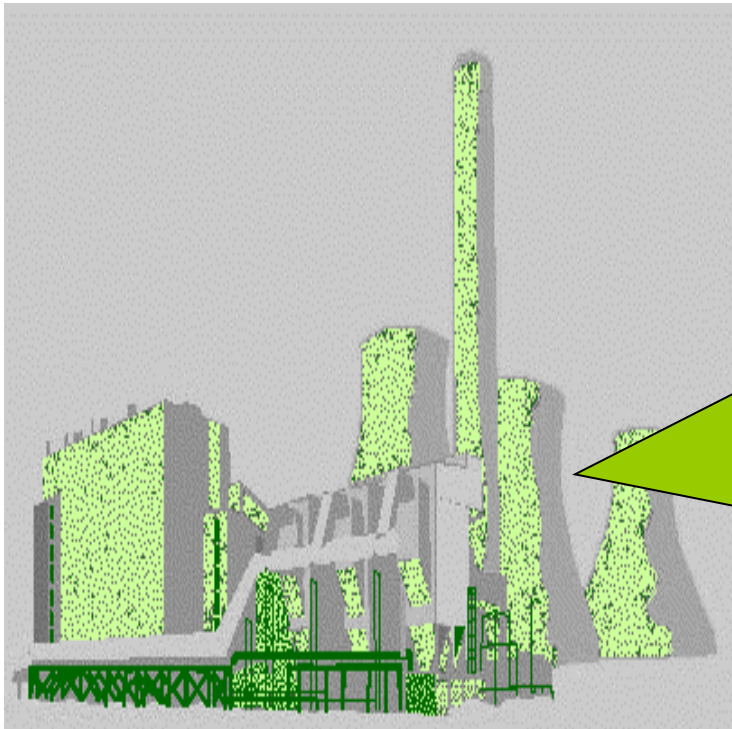
CP barriers

External to the companies:



CP motivators and drivers

Internal to the companies:

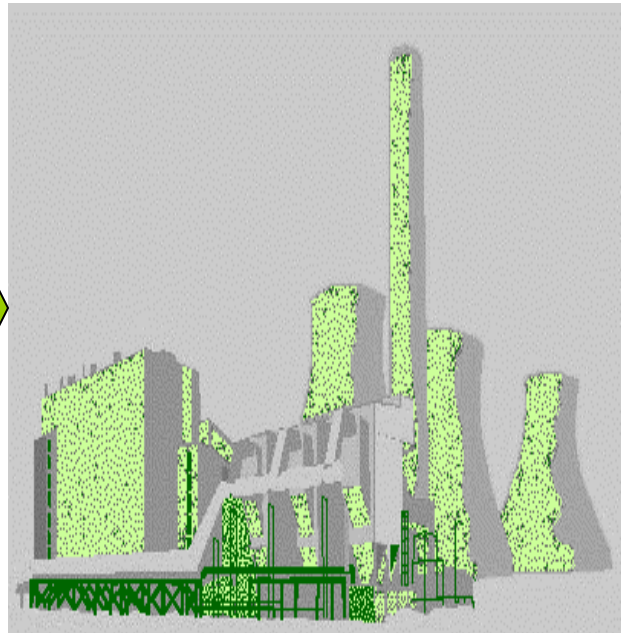


- *Improvements in productivity and competitiveness*
- *Environmental management systems and continuous improvement*
- *Environmental leadership*
- *Corporate environmental reports*
- *Environmental accounting*

CP motivators and drivers

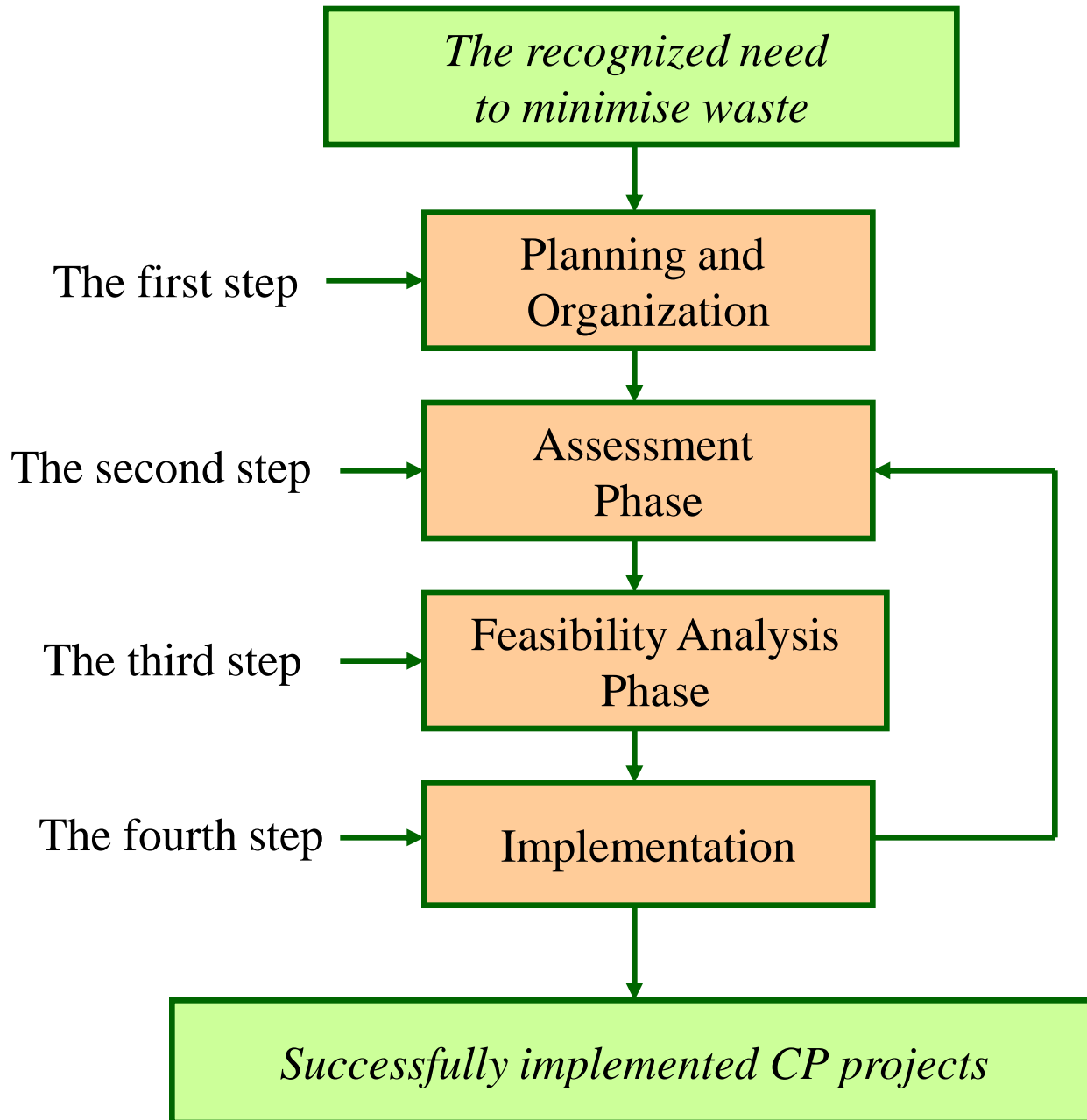
External to the companies:

- *Innovative regulation*
- *Economic incentives*
- *Education and training*
- *Buyer – supplier relations*



- *Soft loans from Financial institutions*
- *Community involvement*
- *International trade incentives*

Cleaner Production procedures



1. Planning & Organization

- Obtain management commitment
- Identify potential barriers and solutions
- Set plant-wide goals
- Organize a project team



2. Assessment

- Identify sources
- Identify waste/ pollution causes
- Generate possible options

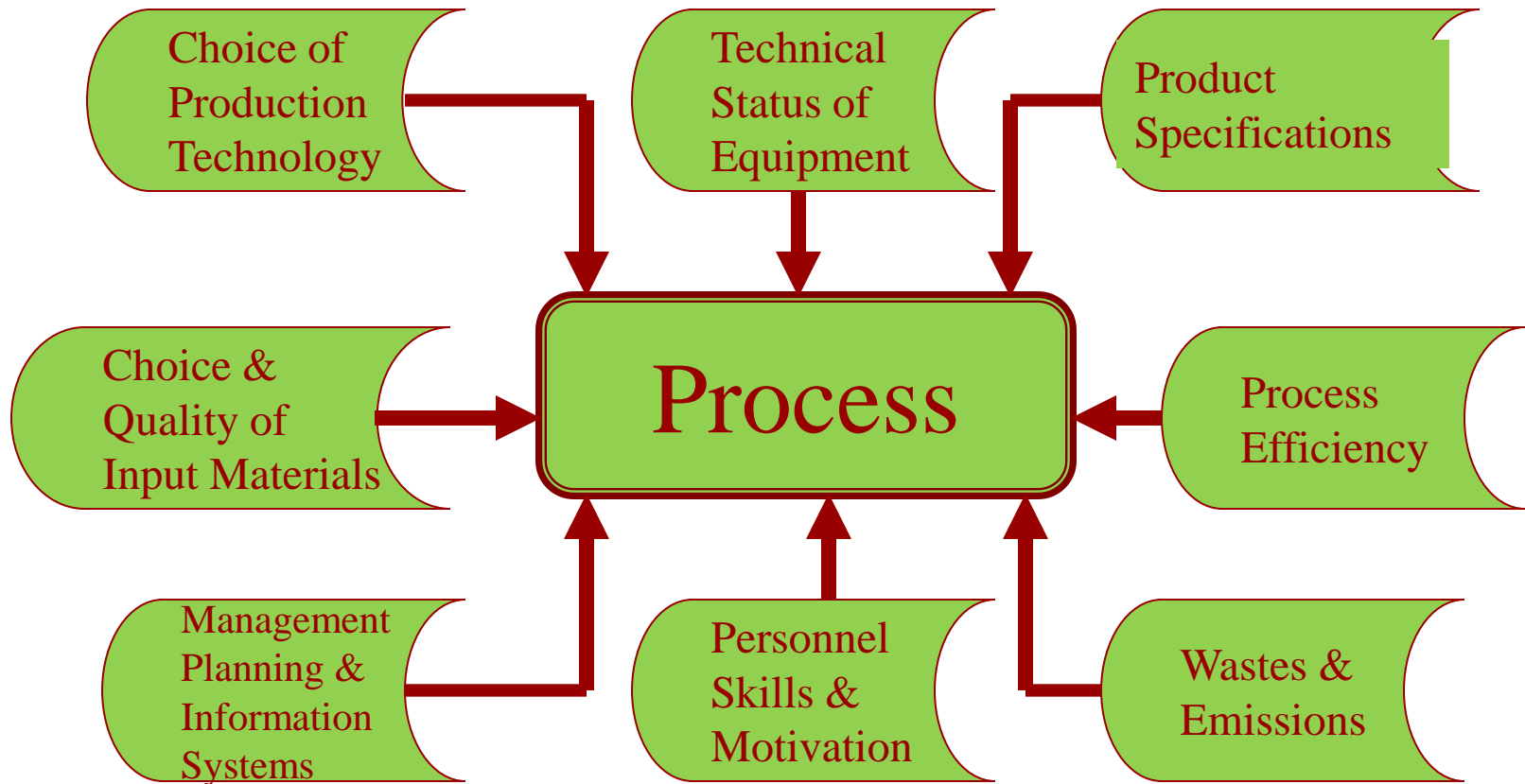
Why are material and energy balances so important?



The material and energy balances are not only used to identify the inputs and outputs of mass and energy but their economic significance is related to costs, such as:

- cost of raw material in waste
- cost of final product in waste
- cost of energy losses
- cost of handling waste
- cost of transporting waste
- cost of solid wastes disposal
- cost of pollution charges and penalties

Possible causes for waste generation



Option generation (1)

- Creative Problem Solving (CPS):
 - Find facts
 - Identify the problem
 - Generate ideas to solve the problems
 - Define criteria to be used to select solutions/ideas
- Screening of ideas / options:
 - Select all ideas/options that may be implemented immediately
 - The remaining options/ideas should then be divided into three boxes:
 - Good housekeeping
 - Interesting options but more analysis is needed
 - Waiting box + Rejected
- Weighted sum method to prioritise options in second group:
 - What are the main benefits to be gained by implementing this option?
 - Does the necessary technology exist to implement the option?
 - How much does it cost? Does it appear to be cost effective, meriting in depth economic feasibility assessment?
 - Can the option be implemented within a reasonable timeframe without disrupting production?

Option generation (2)

Traditional brainstorming

- Formulate problem (problem identification)
- Define objective of the brainstorming session
- Follow the rules of brainstorming:
 - Select a secretary to write down all ideas (The secretary can't take part in the idea generation)
 - Select a group leader (the group leader shall control that the four main rules are followed)
- Close the idea generation after 30-40 minutes



3. Feasibility Studies

- Preliminary evaluation
- Technical evaluation
- Economic evaluation
- Environmental evaluation
- Selection of feasible options

4. Implementation & Continuation

- *Prepare a CP plan*
- *Implement feasible CP measures*
- *Monitor CP progress*
- *Sustain Cleaner Production*

How can governments promote CP?

- Applying regulations
- Using economic instruments
- Providing support measures
- Obtaining external assistance

A close-up photograph of a green leaf with prominent veins, serving as a background for the title text.

What are the benefits of Cleaner Production?

Financial advantages:

- Usually a short Payback Period
- Many low-cost options
- Quick to implement
- Improved cash flows
- Greater shareholder value
- Better access to capital and appeal to financial institutions
- Inherent preventive approach leads to insurance savings

If a CP project is presented to a financial institution, it should be clear that the company already undertook **voluntary** actions aimed at:

- rationalising the use of raw materials, water and energy inputs, reducing the loss of valuable material inputs and therefore **reducing operational costs**
- reducing the volume and/or toxicity of waste, wastewater and emissions related to production
- improving working conditions and occupational safety in a company
- making organisational improvements
- improving environmental performance by the **implementation of no-cost and low-cost measures from the company's funds**
- reusing and/or recycling the maximum of primary inputs and packaging materials



Environmental investment opportunities

- loans to enterprises to finance required or desired investments in technologies resulting in direct and indirect environmental benefits
- loans to municipalities to finance investments in environmental infrastructure
- loan guarantees to both enterprises and municipalities for “soft” credits from national or regional environmental funds for environmental investments
- loans to finance businesses providing environmental goods and services



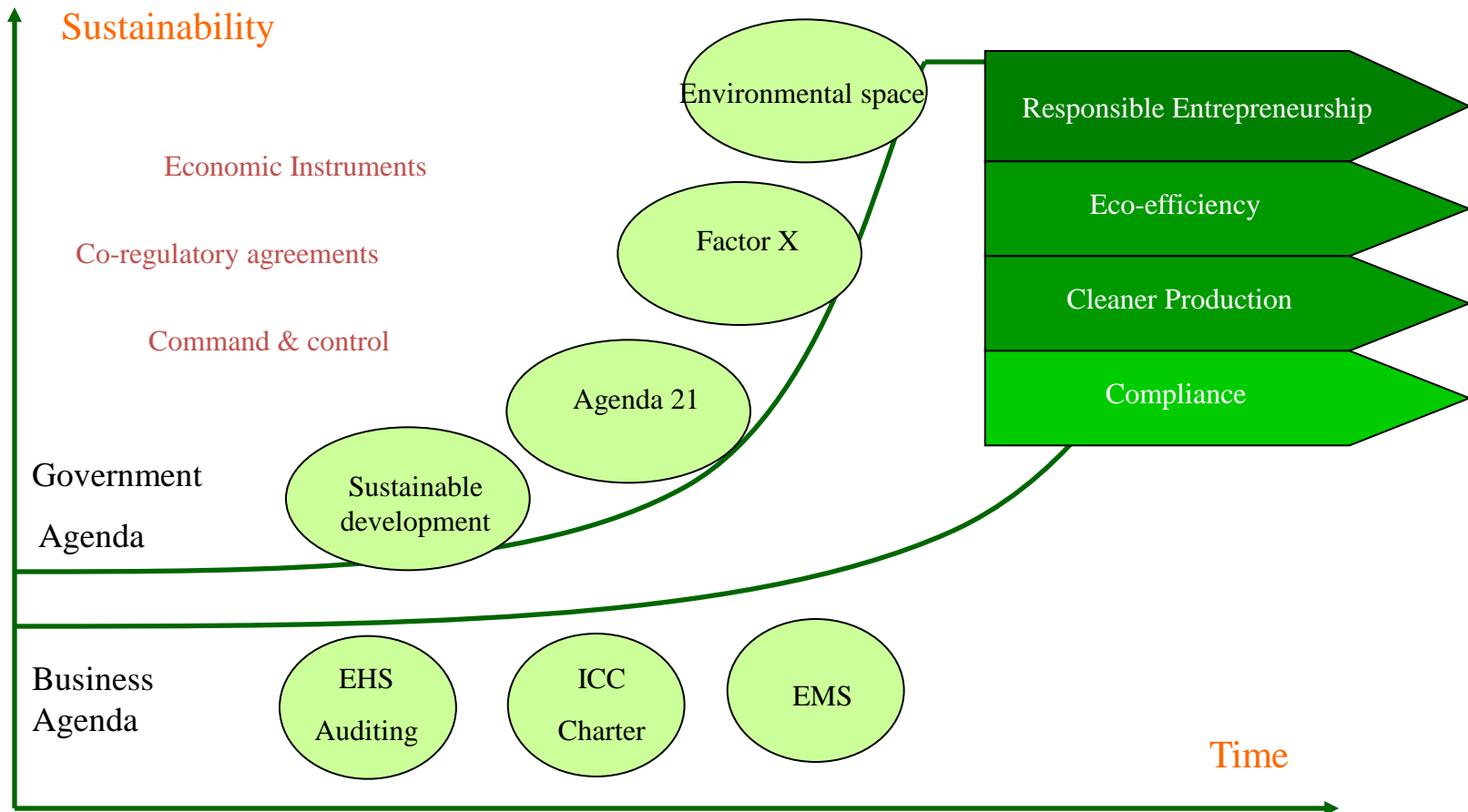


Broader Application of CP

CP is closely linked to:

- Environmental Management Systems
- Total Quality Management
- Health and Safety Management

Cleaner Production and Sustainable Development





Team for CP success

- **Managers, engineers and finance people in industry and commerce**, in particular those responsible for business strategy, product development, plant operations and finance
- **Government officials**, both central and regional, who play an important role in promoting CP
- **Media representatives** who play an important role in disseminating information on good environmental practice



CP is
a journey
not a
destination



“An understanding of the business value to be gained from efficient use of natural resources is an important first step toward sustainability:

toward building a world in which resources are managed to meet the needs of all people now and in the future.”

(J. Lash, President of the World Resources Institute)

Prevention is
Better than Cure

Thank You

