

Industrial Waste Management





OUTLINE

Objectives of this session

1/ Background

- > What are the different type of response to pollution ?

2/ Cleaner Production

- > What are the principles of CP and its benefits ?

3/ Implementation

- > What kind of options can you normally identify with CP?

4/ Methodology

- > How do you carry out the CP assessment?

5/ CP centers

- > What are the activities of Cleaner Production Centers ?



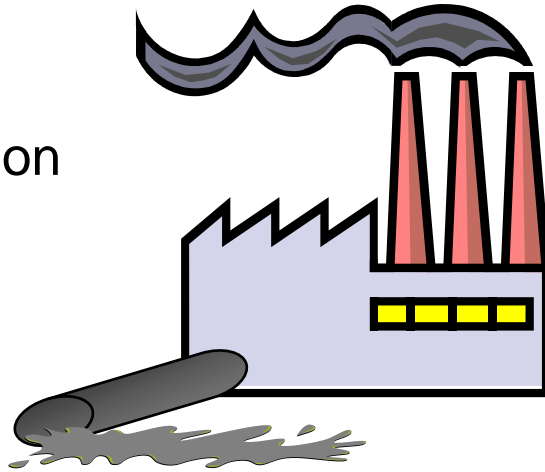
BACKGROUND

Responses of businesses to pollution

PASSIVE

Ignore pollution

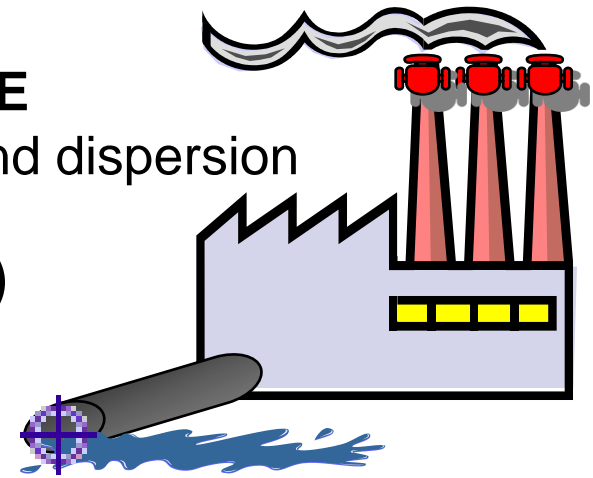
1



REACTIVE

Dilution and dispersion

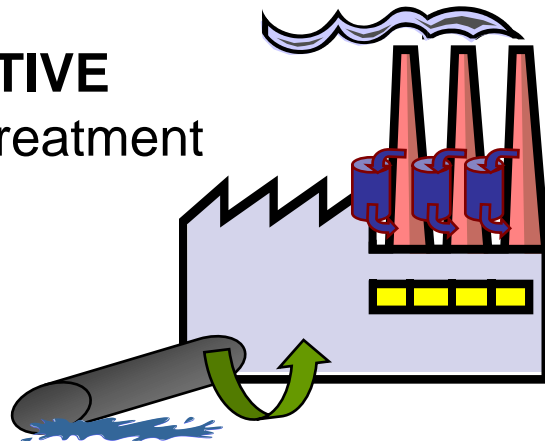
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CONSTRUCTIVE

End-of-pipe treatment

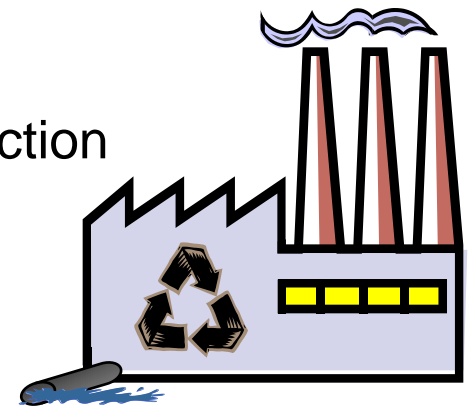
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PROACTIVE

Cleaner Production

4



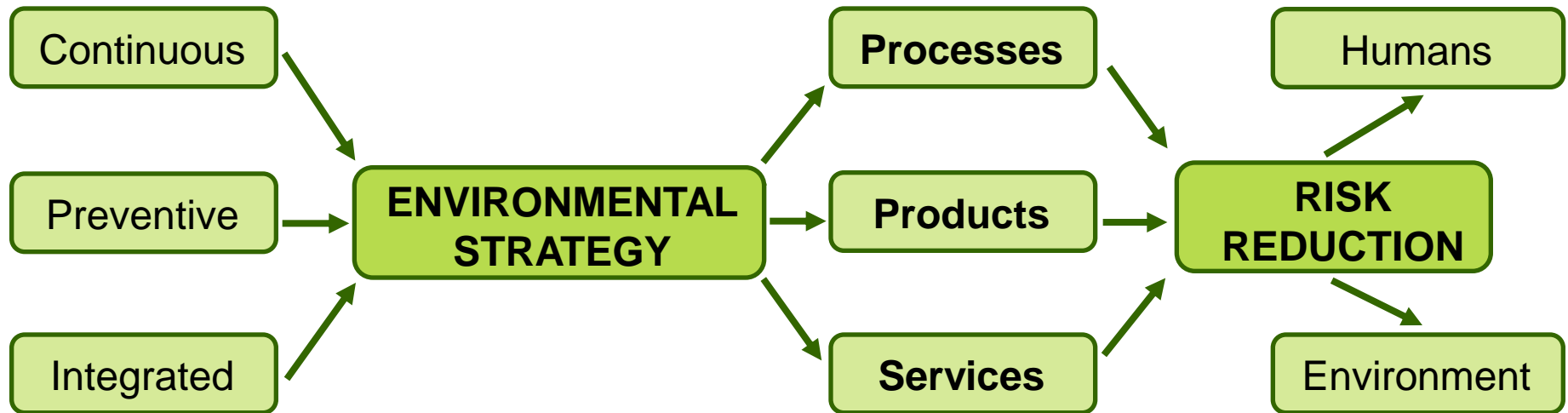


CLEANER PRODUCTION

Definition by UNEP



“ Cleaner Production is the **continuous** application of an **integrated, preventive** environmental strategy towards **processes, products** and **services** in order to increase overall efficiency and **reduce damage** and **risks** for **humans** and the **environment**. ”





CLEANER PRODUCTION

CP is...

In other words, CP is a tool to answer 3 questions:

CP is a method and tool to identify **where** and **why** a company are losing resources in the form of waste and pollution, and **how** these losses can be minimized.

CP assessment \longrightarrow CP options

CP options \longrightarrow Less waste

Less waste \longrightarrow Improved productivity



CLEANER PRODUCTION

Key elements

Cleaner Production in 7 points:

1. CP adds value to the EMS: it places emphasis on pollution prevention rather than control, with clear improvement in environmental performance.
2. CP does not deny or impede growth but insists that growth can be ecologically sustainable.
3. CP is not limited only to manufacturing industries of a certain type or size, it can be applied towards the provision of services also.
4. CP includes safety and protection of health.
5. CP emphasizes risk reduction.
6. CP improves immediate efficiency as well as long-term efficacy.
7. CP is Win-Win-Win factor: it benefits the environment, communities and businesses.



CLEANER PRODUCTION

Economics of Cleaner Production





CLEANER PRODUCTION

Operational improvements to business

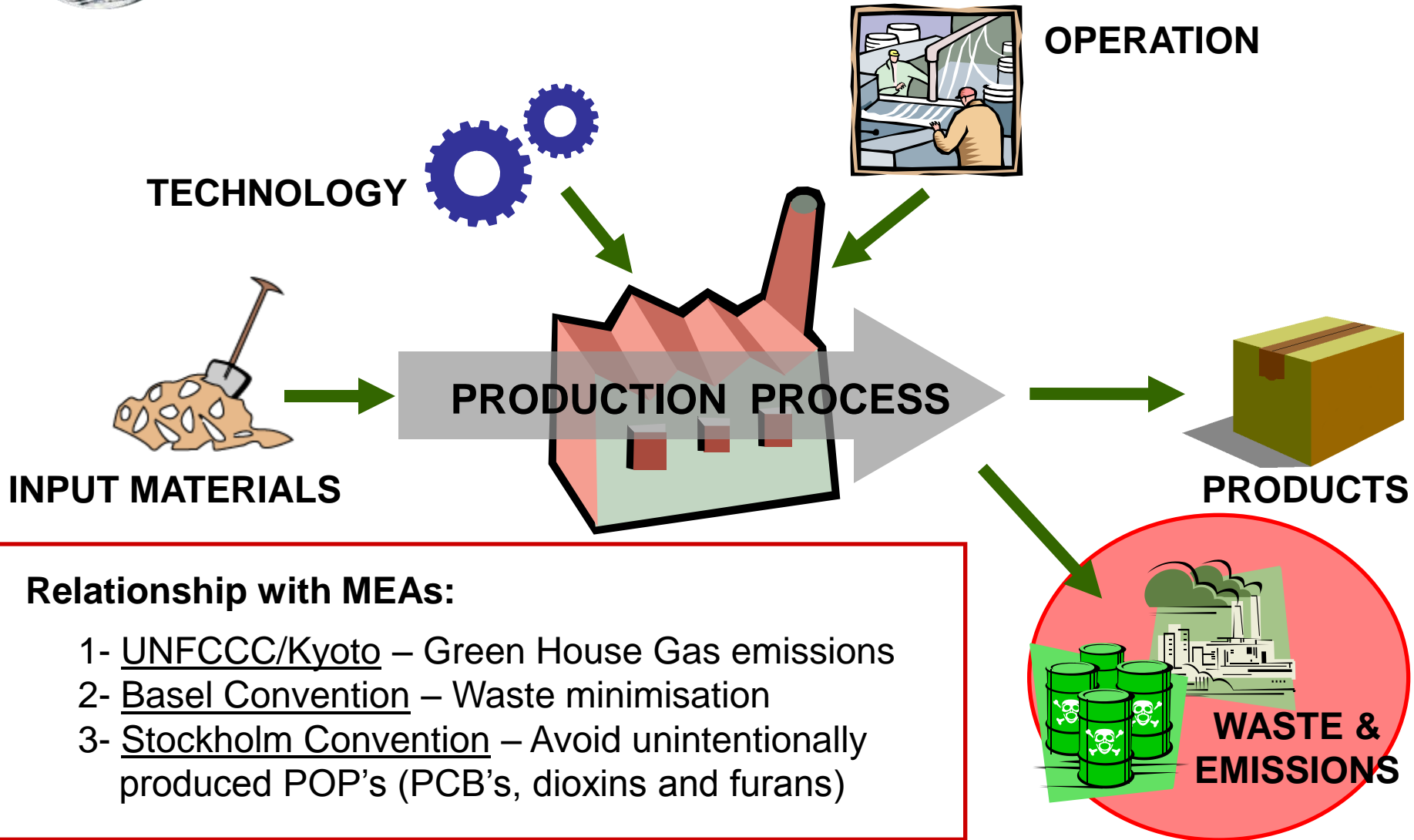
What are the **benefits for industrials** ?

- > CP improves products and services
- > CP lowers risks (liability)
- > CP improves company image
- > CP improves worker's health and safety conditions
- > CP reduces waste treatment and disposal costs
- > CP can be integrated with the business EMS
- > CP saves costs on raw material, energy and water
- > CP makes companies more profitable and competitive
- > CP can help implementing MEAs



IMPLEMENTING CP

Cleaner Production categories



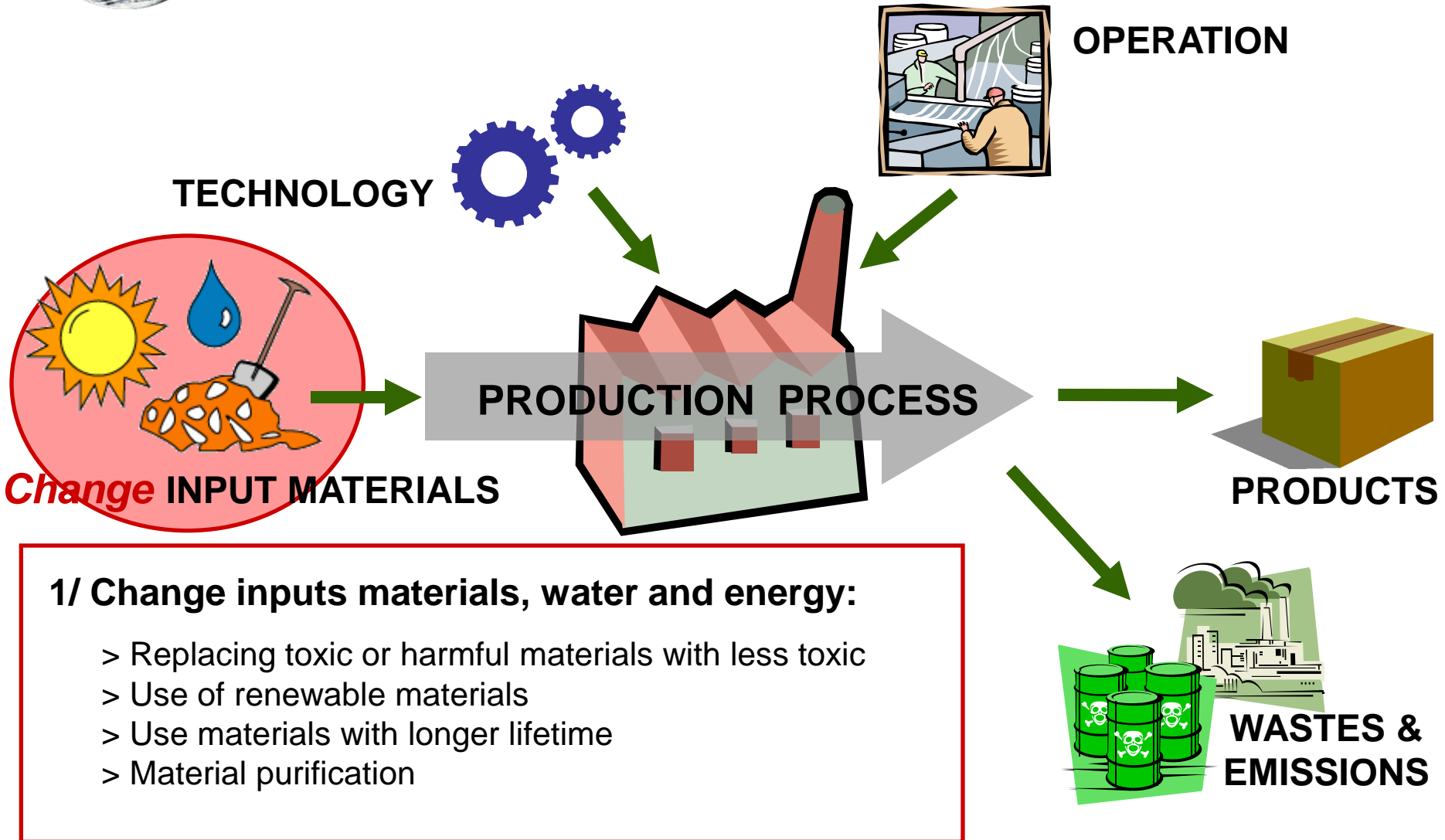
Relationship with MEAs:

- 1- UNFCCC/Kyoto – Green House Gas emissions
- 2- Basel Convention – Waste minimisation
- 3- Stockholm Convention – Avoid unintentionally produced POP's (PCB's, dioxins and furans)



IMPLEMENTING CP

Option 1: Input material substitution





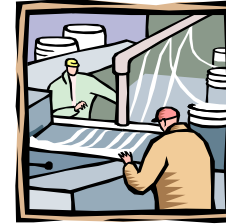
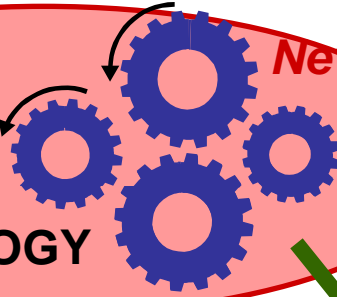
IMPLEMENTING CP

Option 2: Technology change

Improve equipment and process control

New technology

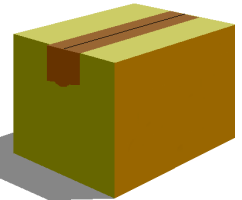
TECHNOLOGY



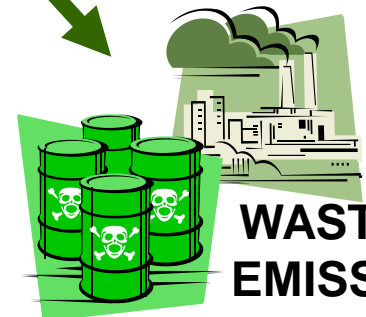
OPERATION



PRODUCTION PROCESS



PRODUCTS



WASTES & EMISSIONS

Change **INPUT MATERIALS**

2/ Technology change:

- > Replacing
- > Equipment modification
- > Optimal process conditions
- > Increased automation
- > Improved process control
- > Improved equipment lay-out

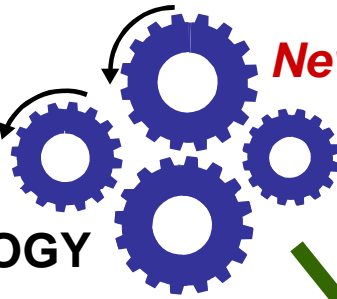


IMPLEMENTING CP

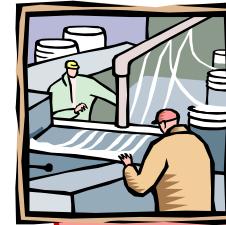
Option 3: Good operation practices

Improve equipment and process control

TECHNOLOGY



New technology



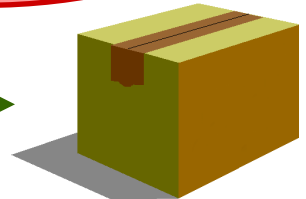
OPERATION

Improved management

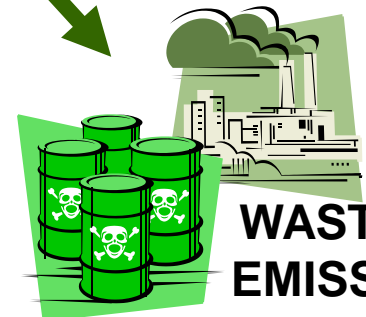
Workers skills & process control



PRODUCTION PROCESS



PRODUCTS



WASTES & EMISSIONS

Change **INPUT MATERIALS**

3/ Improved operation practices:

- > Production scheduling
- > Energy management (peak shaving)
- > Maintenance programmes
- > Working instructions and procedures
- > Training and incentives program
- > Adequate process control operations
- > Proper maintenance and cleaning



IMPLEMENTING CP

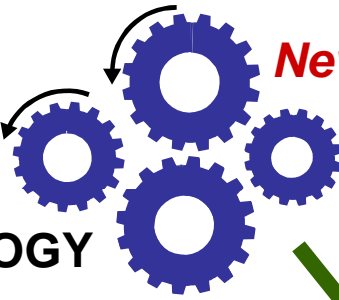
Option 4: Product modification

Improve equipment and process control

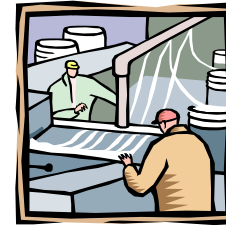
TECHNOLOGY



Change **INPUT MATERIALS**



New technology



OPERATION

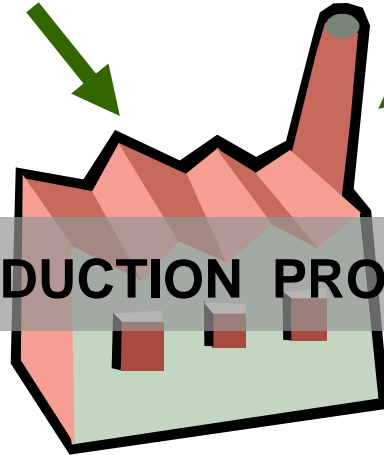
Improved management



Workers skills & process control



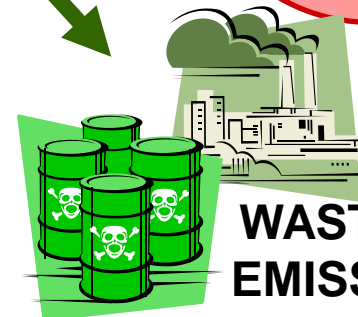
PRODUCTION PROCESS



PRODUCTS modification

4/ Product modification:

- > Recycling friendly design
- > Product Life Extension
- > More efficient, less material intensive packaging
- > Reduction of harmful substances.



WASTES & EMISSIONS

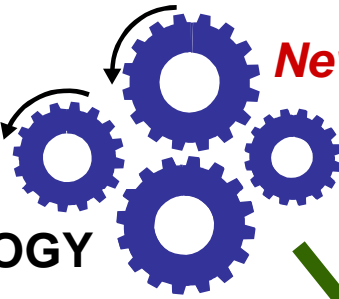


IMPLEMENTING CP

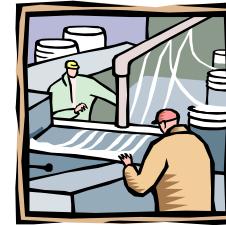
Option 5: reuse and recycling

Improve equipment and process control

TECHNOLOGY



New technology



OPERATION

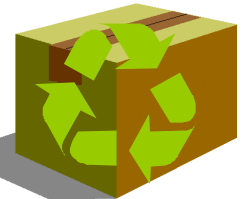
Improved management



Workers skills & process control



PRODUCTION PROCESS



PRODUCTS modification

Change **INPUT MATERIALS**

5/ On-site reuse and recycling:

- > On site recovery and re-use of raw materials in the process, waste water, waste heat and cooling water
- > Transforming waste into useful by-products
- > Waste segregation and storage

WASTES & EMISSIONS

Re-use and recycling





METHODOLOGY

Barriers to CP implementation

INTERNAL BARRIERS

- > Traditional philosophy of CEOs (low awareness)
- > Internal organisation and communication (initial constraints)
- > Limited information, data and expertise on waste and emissions
- > Focus on end of pipe solutions and short term profits
- > Inadequate cost/profit calculations CP options
- > Missing, outdated or unreliable process instrumentation
- > No or limited support of middle management
- > No EMS to achieve continual improvement

EXTERNAL BARRIERS

- > Availability of investment capital
- > Availability of CP technologies

**To be solved by
an organised approach**



METHODOLOGY

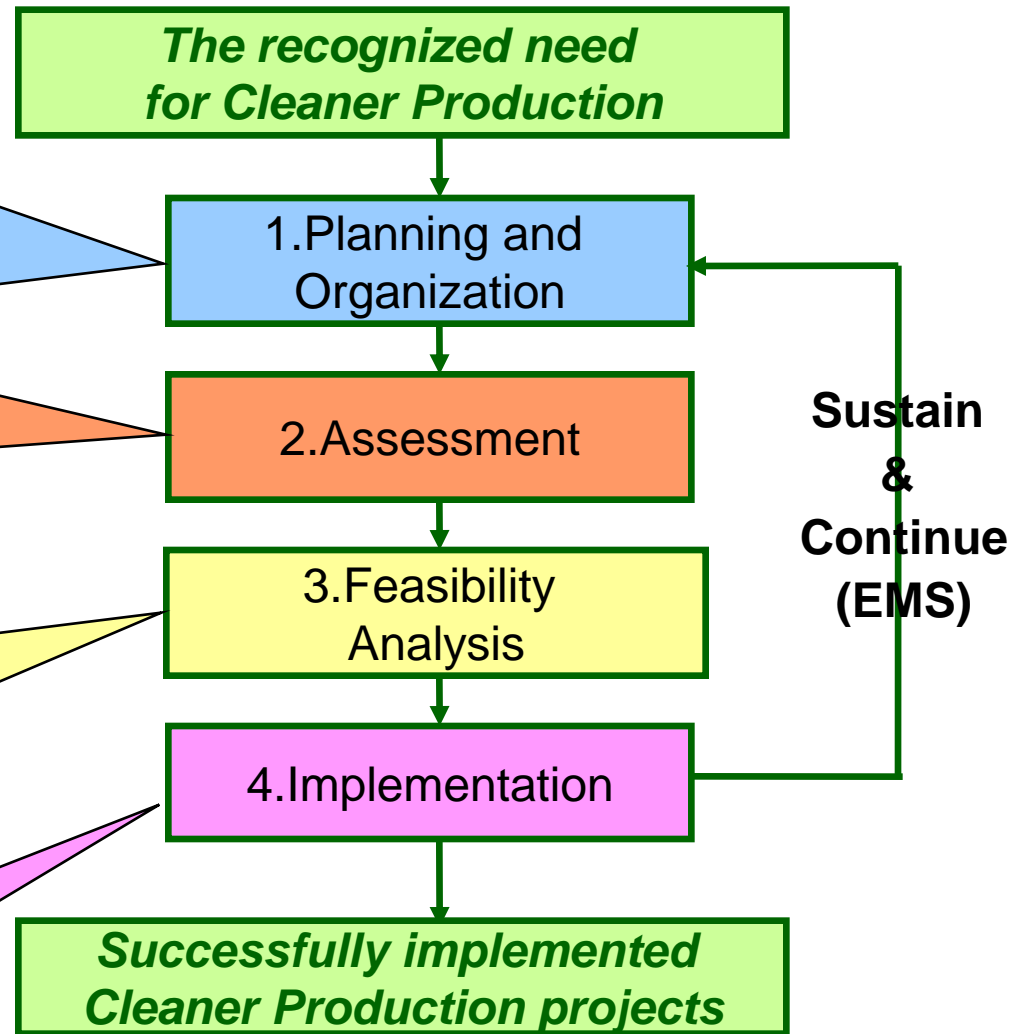
CP methodology

- > Obtain management commitment
- > Organise project team
- > Identify barriers & solutions
- > Set objectives
- > Pre-assess

- > Identify sources (WHERE)
- > Analyse causes (WHY)
- > Generate possible options (HOW)

- > Evaluate options on:
Technical, environmental
and economic feasibility
- > Select best options

- > Option implementation
- > Monitoring and evaluation
- > Sustain and continue

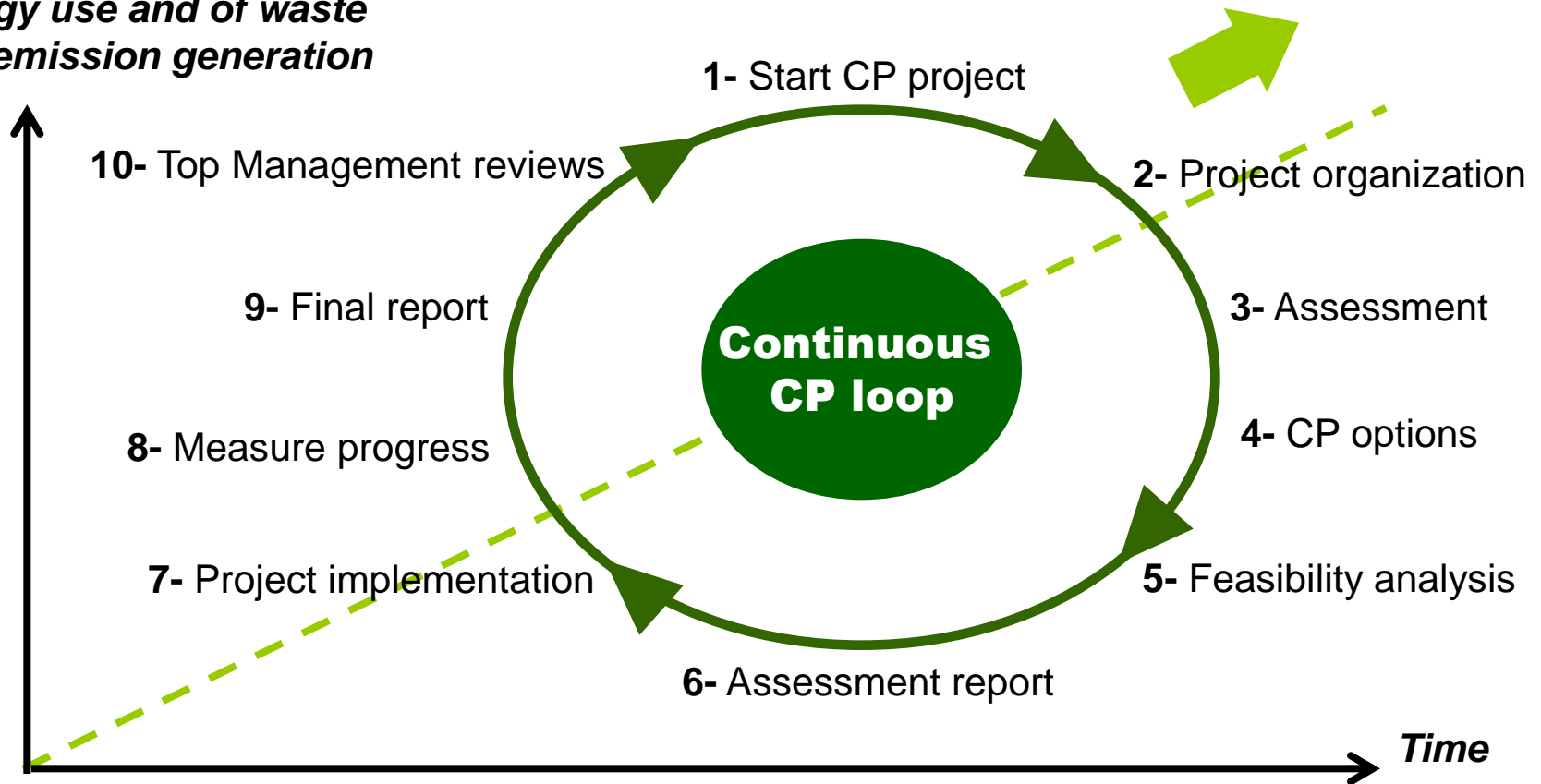




METHODOLOGY

Continuity of Cleaner Production

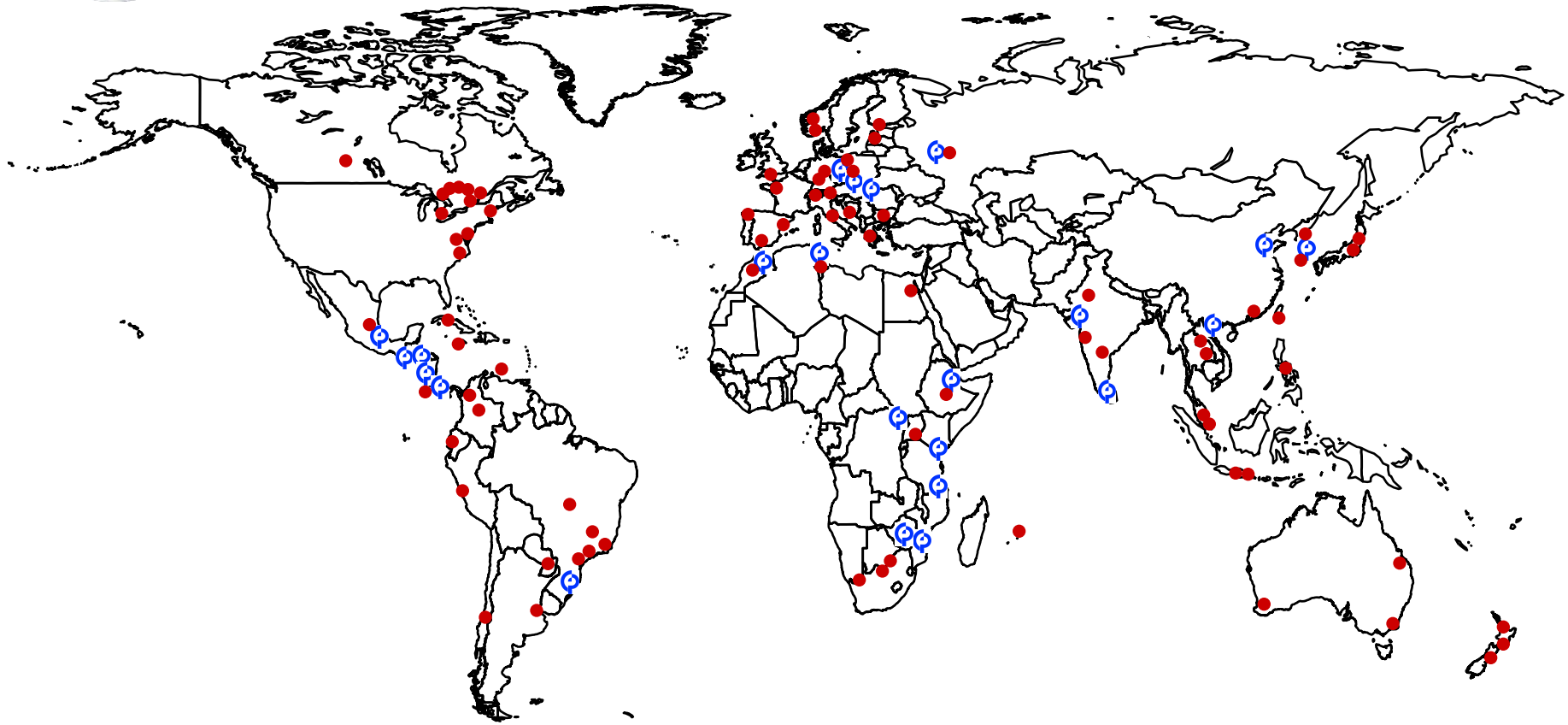
Reduction of material and energy use and of waste and emission generation





CP CENTERS

The global CP-network





CP CENTERS

Activities of NCPCs

SECTORS CONCERNED

Advertising / Automobile manufacturing / Bakeries / Breweries / Cement production / Ceramics / Coffee sector / Chemicals / Edible oil processing / Electroplating / Fertilizers / Foundries / Hospitals / Leather processing / Meat processing / Mechanical manufacturing / Metallurgy / Mining / Municipality / Oil refineries / Pig farming / Plastics / Printing / Pulp and paper / Remanufacturing industries / Rubber processing / Steel manufacturing / Sugar sector / Telecom / Textile manufacturing and processing / Tourism

SERVICES PROVIDED

Environmental reporting / Impact assessment / Monitoring / Audits / EMS (ISO 14.001) / QMS (ISO 9001) / Environmental management accounting / Supply chain management / Implementation of MEAs / Financial analysis / Market analysis / CP Services Marketing / Top management trainings / Foreign investors-E-OHS-Q services / Manuals and Criteria for Deposit Bonds for Environmental projects / Eco-labeling / CSR / Solid waste management / Hazardous waste management / Integrated waste management / Materials exchange systems / Plastic waste management strategies for cities / Eco-industrial park projects / Energy efficiency / Renewable energy / Bio-fuels / Co-processing / Eco-design / National and regional CP and SCP roundtables / Industry sector reviews / Technology Transfer / Data base of CP finance sources, of CP experts, of CP cases / ...



CONCLUSION

About CP trends

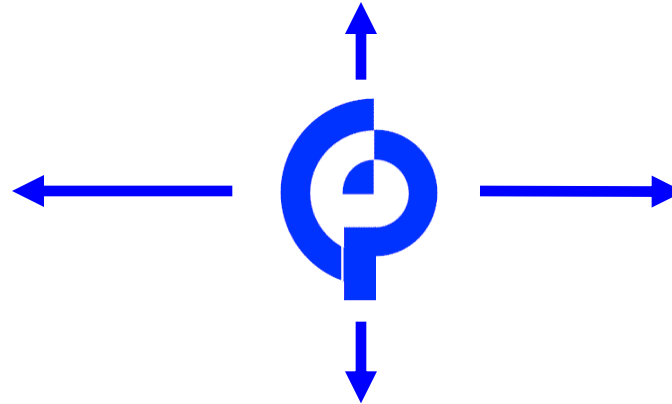
UPWARD DIFFUSION

National policies
Legislation
Action plans
CP Funds

LATERAL DIFFUSION

New Tools

Financial incentives
Environmental reporting
Eco-labeling
ISO 14000
Award scheme



LATERAL DIFFUSION

New Sectors

Industrial estates
Building design
Tourism
Eco-towns

DOWNWARD DIFFUSION

Local authorities
NGO's
CP Clubs
Partnerships