

# Basic Principles of Clean Production Systems for SMEs

## What will we learn here?

### 1 Understanding Cleaner Production

The Concept of Cleaner Production

The Evolution of Cleaner Production

The Definition of Cleaner Production

Other Terminologies and their relationship to Cleaner Production

Barriers to Cleaner Production

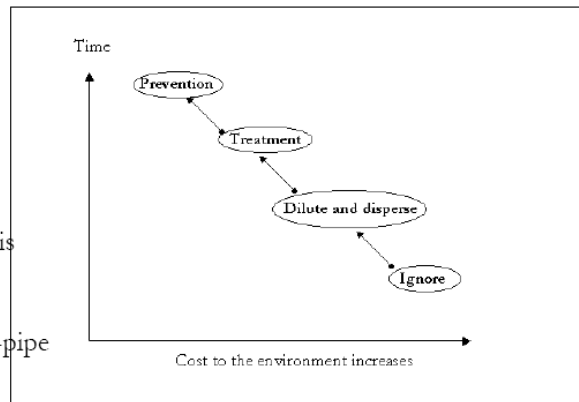
Mainstreaming Cleaner Production



# The Concept of Cleaner Production

## History of Responses to Pollution

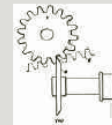
- Ignore the Problem
- The solution to pollution is dilution
- Treat pollution by end-of-pipe approach
- Prevention of pollution and waste generation at source



# Understanding CP through case studies



Case study 1      Reactive Chemical Industries Corporation



Case study 2      PAC Foods Inc.



Case Study 3      Relax Hotels



## Case Study 1 – Reactive Chemical Industries Corporation

RCIC specializes production of additives for the processing of high polymer materials

The story.....

Wastewater discharge kills fish in the river

Monitoring and assessment reveals high Chemical Oxygen Demand (COD) in wastewater

RCIC builds Wastewater Treatment Plant (WTP) – high capital cost

Tightening of COD standards

RCIC goes for dilution, lays down an outfall in river

Standards are further tightened

Corresponding upgradation in WTP not economically feasible

*Change of perspective needed in looking at the problem*

In-plant cleaner production assessment

Implements pollution prevention options within 6 months

RCIC now meets the effluent discharge standards and improves productivity by 15%;

Saves on water and raw materials consumption



## Case Study 1 – Reactive Chemical Industries Corporation

*What can we learn from this case study?*

If *reactive* approach had been avoided, substantial amount time, land, money and other resources could have been saved

Pollution management need not be a liability if *proactive* approach is employed

Minimizing resource use, reducing wastes can improve productivity and profitability



## Case Study 2 – PAC Foods

PAC Foods supplies food-packaging solutions to restaurants.

The story.....

Father starts company three decades ago

Son takes over to find a difficult situation at hand

Solid waste management becoming an important issue

PAC Foods' packaging waste is very high

In response, introduction of '*LessWaste*' Initiative, through team work

First six months sees elimination of 7500 tons of superfluous packaging.

Innovative ideas on redesign of napkins, shipment boxes and paper

containers bring in major waste reduction and toxics elimination

Community appreciates the move

Net savings of PhP2,500,000

Staff involved in '*LessWaste*' Initiative are awarded



## Case Study 2 – PAC Foods

*What can we learn from this case study?*

Cleaner production not limited to manufacturing alone but also for product design

*LessWaste* initiative at PAC Foods was not driven by regulations!

PAC Foods focused on proactive approach

Teamwork and Profit sharing amongst employees lead to better results

Benefits of initiative not limited to PAC Foods premises

- Trees were saved, fuel consumption was reduced, lesser environmental risk and better worker health and community safety due to toxics use reduction

Improved market image means more business



## Case Study 3 – Relax Hotel

Santos Family operated a 40-room hotel called Relax at a hill station The story.....

Lately, Relax was losing its business to increasing competition  
Operating costs were high  
Smiths began with an energy and water audit  
Several options were implemented that lead to savings of PhP 26,000 and 3.4 MWh of energy  
Operating costs came down  
Sharing of these achievements improved hotel image

Santos Family has realized that there was much more they could do using a preventive approach and further improve their profits



## Case Study 3 – Relax Hotel

*What can we learn from this case study?*

Cleaner production is not limited to manufacturing alone but also for the Service sector

Cleaner production can be practiced based on findings of a water and energy audit.

Audits should not be looked at as one time activity but as a recurring action in a larger continual improvement process



## Quo Vadis?

All three case studies suggest a strong link between productivity and cleaner production:

Improvement in Productivity means increase in outputs and decrease in inputs

To be able to understand this linkage, lets look at how both productivity and cleaner production have evolved over time



## Evolution of Cleaner Production



# Evolution of Productivity

## Milestones in Productivity



Quantity (cost reduction approach)

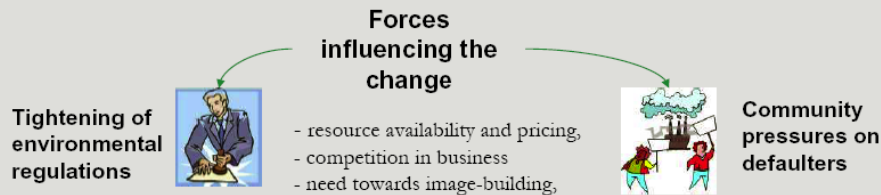
Quality and customer satisfaction (growing customer preferences and competition)

Consistency in production (better quality in larger quantities on a continuous basis– TQM, TPM, ISO 9000)



# Evolution of Environmental Management

As productivity concepts expanded, environmental management also matured and broadened



### Milestones in environmental management

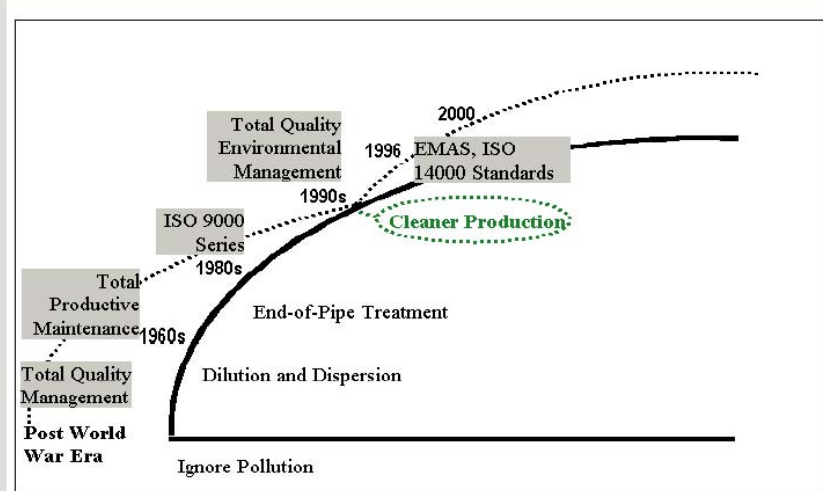
- Ignore,
- Dilute,
- Treat, to
- Cleaner Production

Environmental management internalized in businesses through EMS / ISO 14001

Environmental factor integrated into productivity improvements (TQM to TQEM)



## Tracking the paths of productivity improvement and environmental management



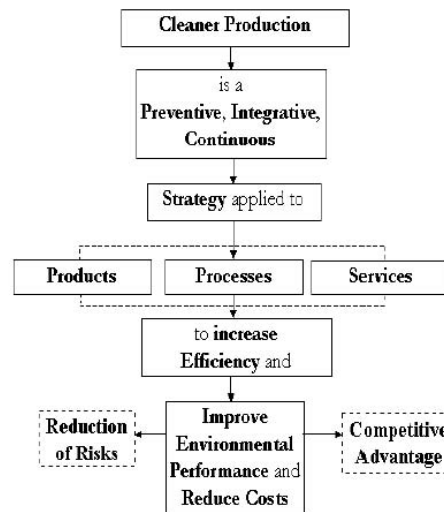
## Definition of Cleaner Production



## Cleaner Production Definition

Cleaner Production is defined<sup>[1]</sup> as 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. Cleaner Production can be applied to the processes used in any industry, to products themselves and to various services provided in society.

[1] United Nations Environment Programme (UNEP) - Cleaner Production. Available at: [http://www.uneptie.org/pc/cp/understanding\\_cp/home.htm](http://www.uneptie.org/pc/cp/understanding_cp/home.htm)



## Key elements of the CP Definition

- Encourages continuous application
- Is **not limited** only to manufacturing industries or businesses of a certain type or size
- **Does not deny or impede growth** but insists that growth can be ecologically sustainable
- Considers **life cycle impacts** of producing goods and providing services
- Includes **health and safety** and emphasizes risk reduction
- Improves **immediate efficiency** as well as **long term efficacy**
- **Win-Win-Win** situation – for environment, community and business



## Cleaner Production Options

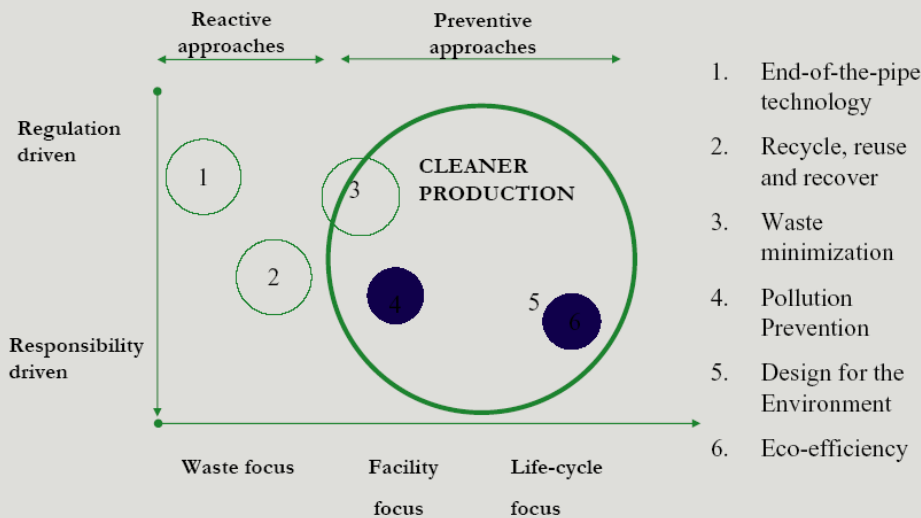
- **Housekeeping** → Improving inventory management, material storage, material handling, organization of workplace, awareness and training to staff
- **Process Optimization** → Rationalize and optimize production processes or operational practices, modify process sequence, modify operating parameters
- **Raw Material Substitution** → Substitute hazardous / banned raw materials with safer and eco-friendly alternatives in the processes
- **New Technology** → Replace outdated, inefficient technologies with innovative, more efficient technologies
- **New Product Design** → Redesign products & byproducts to lessen damage to environment during manufacturing or useful life of products, improve product packaging



## Cleaner Production and Other Terminologies

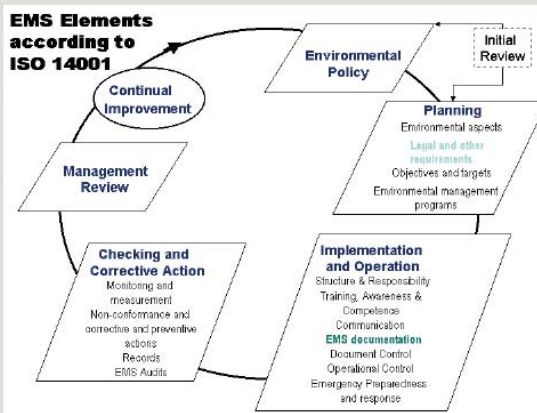


# Cleaner Production and other Terminologies



# Cleaner Production and EMS

- ISO 14001 offers a common standard approach based on the PDCA cycle
- While ISO 14001 integrates the basics of impact assessment and scenario building it does not clearly distinguish between pollution control and pollution prevention
- Thus, ISO 14001 certification is possible with end-of-pipe efforts alone and need not mandate improvement in environmental performance
- Cleaner production places emphasis on pollution prevention rather than control with clear improvement in environmental performance



## Use Cleaner Production within EMS framework

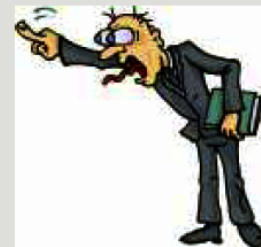


## Barriers to Cleaner Production



## Barriers to implementing Cleaner Production

- Resistance to change
- Lack of information, expertise and adequate training
- Lack of communication within enterprises
- Competing business priorities - in particular, the pressure for short-term profits
- Perception of risk



Source:  
Rahul Datar. *Training Module on Clean Production (Powerpoint presentations)*, UNEP