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
What is waste?

There are literally hundreds words for different types of waste:

- allowance
- BOD
- broke
- contaminated solids
- core loss
- customer returns
- damage
- drainings
- 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 whatever you call it: take the opportunity to cut waste and increase profits!
Where are you now?

- Only a change in technology would eliminate waste completely
- We are optimising our processes and achieving big cost reductions
- Waste is coming down as we change the way we work

- We have identified our waste and monitoring it
- We plan to reduce waste
- Waste is cost and regulatory issue
- Waste is only disposal issue
- Waste is not an issue
Passive environmental strategies

Dilute & disperse
Reactive environmental strategies: end-of-pipe approaches
Reactive environmental strategies

On-site recycling
Proactive environmental strategies: Cleaner Production

Prevention of Waste generation:
- Good housekeeping
- Input substitution
- Better process control
- Equipment modification
- Technology change
- Product modification
- Efficient use of energy resources
- On-site recovery/reuse
Cleaner Production Definition

Cleaner Production is a Preventive Integrated Continuous Strategy for modifying Processes, Products, and Services to enhance Efficiency which improves Environmental Performance and Reduces Costs. This strategy results in Energy Conservation, Design for Environment, and Reduction Of Risks, contributing to a Competitive Advantage.
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
Properly implemented CP:

usually (continuation)

- results in improved product quality
- increases staff motivation
- relies on active worker participation in idea generation and implementation
- reduces consumer risks
- reduces the risk of environmental accidents
- is supported by employees, local communities, customers and the public
Properly implemented CP:

- often avoids regulatory compliance costs
- leads to insurance savings
- provides enhanced access to capital from financial institutions and lenders
- is fast and easy to implement
- requires little capital investment
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
Cleaner Production practices

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
Cleaner Production practices

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

replace 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. 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
Cleaner Production practices

8. Using Energy Efficiently

Reduce the environmental impact from energy use by:

- improved energy efficiency
- by using energy from renewable sources
# 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 Are the Benefits of Cleaner Production?

- Improving environmental situation
- Increasing economical benefits
- Increasing productivity
- Gaining competitive advantage
- Continuous environmental improvement
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
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
Difficulty in accessing cleaner technologies

External to the companies:

The failure of existing regulatory approaches

-Difficulty in accessing cleaner technologies

-Difficulty in accessing external finance
CP motivators and drivers

Internal to the companies:

- Improvements in productivity
- 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
CP attacks the problem at several levels at once, introduction of a industry/plant level program requires

- the commitment of top management
- a systematic approach to CP in all aspects of the production processes
How can governments promote CP?

- Applying regulations
- Using economic instruments
- Providing support measures
- Obtaining external assistance
CP applicability for local governments

- Corporate decision-making
- Local environmental management strategies
- Community and industry partnerships
- Sustainable economic development
- Public environmental education
- Specific local environmental problems
- Local environmental monitoring
Environmental evaluation will assist financial institution’s staff to:

• avoid financing activities included in their exclusion list
• identify the relative environmental risks level and assess client’s ability to manage them
• understand the financial institution’s exposure to environmental risks and liabilities and to respond adequately
• monitor the env. derived risks of the transactions and respond to changes in the bank’s exposure to those risks
• evaluate risks and potential liabilities in foreclosure or re-structuring activities
Environmental Assessment of a Project

Loan Application

Environmental assessment of the project

Based on Cleaner Production Concept

Environmental performance improved

Appraisal
• Cash flow
• Financial position
• Management
• Adequacy of security
• Loan structure
• Sectoral outlook
• Competitiveness

Loan proposal

Agreement

Based on Pollution Control Concept

Environmental impact of secondary pollution should be analysed

Environmental performance reduced

Environmental Due Diligence
• Screening
• Appraisal
• Preventive Risk management

Environmental performance improved

Monitoring and Reports

Progress

Environmental performance improved

+(-)

(+)

(-)

+(-)

(+(-)

(-)

+(-)

+(-)
Factors Affecting Exposure to Environmentally-derived Risks

- The nature of environmental risks inherent in business activity of the client
- The size and term of, and the security for, the transaction
- The client’s ability and commitment to adequately manage these risks
If CP project is presented to financial institution, it should be clear that 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
Other Business Activities the Financial Institutions Should Be Aware

- Trade finance
- Retail banking
- Equity investments
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.
What have we learned?

- The CP approach reduces pollutant generation at every stage of the production process.

- CP can be achieved through:
  - good operating practices
  - process modification
  - technology changes
  - raw material substitution
  - redesign and/or reformulation of product

- The economic advantages of CP are:
  - cost effectiveness
  - increased process efficiency
  - improved product quality
  - cost of final treatment and disposal is minimised

- Effluent treatment, incineration, and waste recycling outside the production process are not regarded as CP.
Broader Application of CP

CP is closely linked to:

• Environmental Management Systems
• Total Quality Management
• Health and Safety Management
Cleaner Production and Sustainable Development

Sustainability

Economic Instruments
Co-regulatory agreements
Command & control

Government Agenda

Sustainable development
Agenda 21
Factor X
Environmental space

Business Agenda

EHS Auditing
ICC Charter
EMS

Compliance
Cleaner Production
Eco-efficiency
Responsible Entrepreneurship

Time
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)
Eco-efficiency and Sustainability

Recent, on-going and planned Cleaner Production and Eco-efficiency Projects in Portugal
Some Results of Recent Projects in companies
BENEFITS

• Financial results
  – annual savings > 128 250 €
  – investment = 1 030 137 €

• Environmental benefits
  – annual savings > 175 000 € (4 options)
    » wastewater discharge = 114 000 m³/year
    » sludge produced = 500 t/year
    » other wastes > 7 t/year
    » water consumption = 89 000 m³/year
    » CO₂ emissions = 550 t/year
0 - 6 months: 25%
6 - 30 months: 25%
30 - 35 months: 50%

Pay-back time

In-site recycling: 35%
Off-site recycling: 15%
Source reduction: 5%
Good housekeeping: 45%

Cleaner Production techniques

Hovione, S.A. (Fine Chemistry)
BENEFITS

• Financial results
  – *annual savings* = 69 000 €
  – *investment* = 71 000 €

• Environmental benefits
  – *reduction of*
    » energy consumption = 88,4 tep/year
    » water consumption = 1 000 m3/year
    » raw materials cons. > 12 000 kg/year
  – *reduction of the generation of*
    » hazardous waste > 3 000 kg/year
    » wastewater = 1 000 m3/year
### Pay-back time

- **0 – 1 year**: 6%
- **1 – 3 years**: 94%

### Cleaner Production Techniques

- **42%**: Good housekeeping
- **12%**: Substituição de materiais
- **4%**: Off-site recycling
- **42%**: Product modification
BENEFITS

• Financial results
  – annual savings: 470 000 €
  – investments = 145 000 €

• Environmental benefits
  – reduction of:
    » water consumption 4,0 m$^3$/m$^3$ milk proc.
    » wastewater discharge 2,46 m$^3$ effluent/m$^3$ milk proc.
    » energy consumption 316 tep/year
  – production increase of: 1,25 M liter of milk proc.

• Social benefits
  – workers health risks reduction noise and workplace contaminants (4 options)
  – more environmental trained people seminars and training courses
  – improvement of company’s public image
  – donations to charity institutions
  – attitudes changing towards Sustainable Development
  – catalyst to change
**PARMALAT Portugal, S.A. (Dairy Products)**

### Pay-back time

- **0 – 1 years**: 40%
- **1 – 3 years**: 20%
- **> 3 years**: 20%

### Cleaner Production techniques

- **Materials Substitution**: 53%
- **Process Modification**: 26%
- **In-site recycling**: 16%
- **Good housekeeping**: 53%
BENEFITS

• Financial results
  – annual savings > 65 000 €
  – investment = 207 000 €
• Environmental benefits
  – reduction of:
    » environmental noise = 5-10 dB
    » energy consumption
    » water consumption > 35 200 m³/year
  – elimination of SO₂ e Ni emissions to air
  – reuse of CO₂ > 115 800 kg/year
Pay-back time:

- 0 – 1 year: 9%
- 1 – 3 years: 18%
- > 3 years: 64%

Cleaner Production techniques:

- Good housekeeping: 44%
- Materials Substitution: 4%
- Process Modification: 36%
- In-site recycling: 12%
- Off-site recycling: 4%
BENEFITS

• Financial results
  – annual savings > 255 000 €
  – Investment = 110 000 €

• Environmental benefits
  – reduction of:
    – wastewater = 26 700 m³/year
    – toxic materials dispersion = 91 t/year
    – energy intensity = 2%
    – materials consumption = 92 t/year
    – water consumption = 26 700 m³/year
**Pay-back time**

- 0 – 1 year: 35%
- 1– 3 years: 15%
- > 3 years: 35%

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**Cleaner Production techniques**

- Good housekeeping: 48%
- Process modification: 29%
- Materials substitution: 3%
- In-site recycling: 16%
- Off-site recycling: 3%
- Process modification: 1%
**BENEFITS**

- Financial results
  - annual savings > 65 000 €
  - investment = 405 000 €
- Environmental benefits
  - reduction of:
    - environmental noise = 5-10 dB
    - energy consumption
    - water consumption > 35 200 m$^3$/year
  - elimination of SO$_2$ e Ni emissions to air
  - reuse of CO$_2$ > 115 800 kg/year
Cleaner Production techniques

- **8%** Materials Substitution
- **11%** Off-site recycling
- **13%** Process Modification
- **13%** In-site recycling
- **55%** Good housekeeping

* No data available for the pay-back time
On-going Projects
ProSTove - Eco-efficiency and Sustainable Production Torres Vedras

Partners: INETI/CENDES, AERLIS (Business Association), General Directorate of Industry, Torres Vedras Municipality

Objective: to contribute to sustainability at local level focusing on cleaner production projects implementation in companies (micro economic level) and involving the main stakeholders (meso economic level).

Funding: POE/FSE

Duration: 15 months
SuRViE - Contribute to the Glass Region Sustainability

Partners: INETI/CENDES, VITROCRISTAL, AIC (Association of Crystal Industries)

Objective: to contribute to sustainable business development in the glass region of Marinha Grande, through the implementation of cleaner production strategies in companies.

Funding: POE/FSE

Duration: 15 months
ProSSado - Towards Sustainability

Partners: INETI/CENDES, AERSET, CIES

Cooperation: Setúbal Municipality, Quercus (Environmental NGO), Arrábida Natural Park, Sado Estuary Natural Reserve

Institutional support: DGI (General Directorat of Industry)

Objective: To contribute for sustainability in the Sado region.

Funding: POE/FSE

Duration: 2 years
DEUSA - Sustainable Urban Business Development in Aveiro

Partners: INETI/CENDES, General Directorate of Industry, AIDA, AIA, ABIMOTA and APIFER (Business Associations), IST and UA (Universities).

Objective: To support the implementation of cleaner production strategies in companies located in Aveiro as a contribution to regional sustainable development.

Funding: POE/FSE

Duration: 2 years
E3I - Portuguese Business Eco-Efficiency Initiative

Partners: INETI/CENDES, General Directorate of Industry, WBCSD, EPE

Objectives:

• To promote the stakeholders dialogue as a mean for companies’ eco-efficiency improvement;

• Stimulate the companies to adopt and implement eco-efficiency as a leading business concept;

• Reinforce business competitiveness;

Funding: POE/FSE

Duration: 27 months