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Cleaner Production

A Training Resource Package

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Cleaner Production

A Training Resource Package

This package is one of a series that provides practical support material to teachers and trainers wishing to commence or enrich their curriculum with up-to-date approaches in environmental management.

It is based on extended experience with training workshops by UNEP and other agencies, and is now being made available for wider use in all regions throughout the world.

Acknowledgements

The first version of this training resource package was prepared in 1994 by F. Balkau and J.W. Scheijgrond for UNEP IE.

It was subsequently trialled in workshops and courses in several places, leading to subsequent revisions to produce this current document.

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Users Guide

This is a trainers support package, *not* a reference book. It does not give a systematic, comprehensive overview (there is not enough room to do this); rather, it focuses on some selected aspects that are central to the subject. The structure of the document allows further sections to be easily developed and added as additional modules.

The package is written for trainers to provide them with support material and ideas, rather than as a study book for students. The average trainee will only ever see a few pages or exercises reproduced from this document.

One of the purposes of this package is to provide some case studies and situation scenarios that can be used as a basis for interactive training and simulated decision-making. However, the exercises only explore a small part of the potential of the case studies, and trainers are strongly encouraged to develop further exercises or tasks.

The package is oriented at developing insights and decision-making skills. For teaching the factual knowledge base of the subject, trainers are referred to the reading lists in the bibliography.

Work exercises are predominantly based on interactive groupwork and a team approach to problem-solving. Such work needs to be guided by a tutor who is a recognized expert in the field. This method allows the full complexity of real decision-making to be explored.

Where calculations are required, the exercises are more oriented towards throwing light on useful approaches or management decisions than simply finding the 'correct' answer. Trainers are strongly urged not to see this package merely as a set of arithmetic exercises.

In some instances, answers are indicated. The 'correct' answer depends on the context of the question. It is here that a tutor or external resource expert is useful.

Many trainers find this disturbing. They should remember that real decision-making depends on the wider circumstances surrounding the problem, and that a numerical answer which is politically or socially unacceptable, or administratively unworkable (even though accurate), is not in effect 'correct'.

The simulation of real life situations and decision-making that is the basis of this package makes it most suitable for senior students and trainees, and especially for professional training (or retraining) courses.

In order to extend the training material into a number of industrial situations, this package is supplemented by several sector-specific ***workbooks***. These include typical calculation exercises, simulation of diagnostic reviews, and examination of cleaner production options. For many training applications, it is recommended to use this package *and* one or more of the workbooks for the tanning, brewing, textile and recycling sectors.

Finally, we must stress again that this package does not cover all aspects of the subject. Its prime purpose is to lead trainers into this field, and to help and encourage them to develop their own material, appropriately tailored to their specific learning situation. UNEP is prepared to work further with trainers who wish to extend this package into new directions, or go into greater depths on some subjects.

How to start a training activity based on this package

1 ***Remember that this is a starters kit***, not a complete recipe book. Remember also that the workbook aims to develop insights and decision-making skills, not to convey knowledge or facts.

2 ***Understand the needs of your trainees***. What insights or skills do you intend to develop? Define your learning objectives.

3 ***Refresh your memory*** by reading some of the background papers and studying the overhead transparencies. Write your own notes in the spaces provided.

4 ***Identify some expert resource persons*** who could be invited as tutors to help you in discussion sessions.

5 ***Select some of the exercises*** you wish to present to trainees.

6 ***Examine carefully the case study or scenario*** on which they are based. Be sure that you have at least one solution to the exercise that you can explain and defend.

7 ***Develop other exercises*** or questions yourself.

8 ***Develop your own local case study*** if you can, and use this instead of the one in the package.

9 ***Prepare some background questions*** and preliminary exercises for trainers to carry out before they start the workshop/course.

10 ***In session, summarize the issues*** for trainees using the overheads given, and others you may have. Discuss the problems and difficulties decision-makers face. Discuss where factual information can be found to help in decision-making.

11 ***Commence the work sessions***, preferably in small groups, and preferably guided by a tutor. Discuss and compare results. Be open to ideas and experiences from trainees, and discuss these.

12 ***Return to the learning objectives***, and check that they have been achieved.

13 ***Consider how to follow up*** and reinforce the learning experience by establishing some ongoing projects, or periodic reunions.

To facilitate using this package, the header of odd-numbered pages describes the contents of that particular section. This information is also repeated in the footer of even-numbered pages. You can track your progress through the package by referring to the calibrations on the bar across the bottom of odd-numbered pages:

The shading shows your current position in the text.

Abbreviations and Glossary

Abbreviations

ICPIC	International Cleaner Production Information Clearinghouse
IE/PAC	Industry and Environment Programme and Activity Centre of UNEP
ILO	International Labour Organization of the United Nations
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
US EPA	United States Environmental Protection Agency
WHO	World Health Organization

Glossary

The following definitions are taken from inhouse documents and the UNIDO Training Course *Ecologically Sustainable Industrial Development*. They should not be regarded as official, legally binding definitions, but rather working definitions for the purpose of this package. It should be realized that the rapid evolution of environmental issues and management tools has sometimes led to conflicting or inconsistent use of terminology. Readers are advised to focus on the concepts implied in the definitions rather than engage in semantic and ultimately sterile debate on definitions.

Abatement See *end-of-pipe treatment*.

Audit *(environmental)* is a systematic, documented, periodic and objective evaluation of an environmental situation or organizational factor. There are now many types of 'environmental' audits, including sites or facilities, of regulatory compliance or management systems, or of technical aspects such as energy use or pollution releases. As the methodology has expanded, the terminology has gradually become less precise and varied. Environmental audit can thus be a specific or a general term, often with synonyms such as cleaner production assessment or environmental assessment.

Chemical assessment A chemical assessment is an analytical tool which determines the potential of a chemical to cause harm because of its inherent toxicity and/or ecotoxicity.

Cleaner production The continuous application of an integrated preventive environmental strategy to processes and products so as to reduce the risks to humans and the environment. In international and many national programmes, 'Cleaner Production' has gradually replaced earlier and more ambiguous terms such as *pollution prevention*, *waste minimization*, or *environmental assesment*.

Cleaner Production assessment A procedure for systematically evaluating a manufacturing or production process to identify options for improvement or change so as to reduce pollution releases and other environmental impacts.

Cleaner technologies Production processes or equipment with a low rate of waste production. Treatment or recycling plants are not classed as clean technologies.

Cradle-to-grave The life cycle of a product, from raw material extraction to final disposal.

Disposal Final placement or destruction of toxic, radioactive, or other wastes.

Eco-auditing A management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing. Sometimes the expression ***environmental audit*** is used instead of eco-audit.

Eco-efficiency Maximization of industrial output from a given level of resource input, thus ensuring cleaner production and appropriate use of human, renewable and non-renewable resources.

Eco-labelling The use of labels to inform consumers that a labelled product is environmentally more friendly relative to other products in the same category.

End-of-pipe treatment Treating pollutants at the end of a process – for example, by filters, catalysts and scrubbers – instead of preventing their occurrence.

Energy audit Identifies the costs and physical quantities of energy inputs used, the annual and seasonal trends in energy use and cost, and the energy use per unit of output.

Environmental accounting An attempt to devise balance sheets to measure economic activity in terms of the cost to the environment.

Environmental auditing See ***eco-auditing***.

Environmental impact assessment (EIA) An evaluation of the effects of human development activities or no-action on the various components of environment, executed during the planning phase.

Environmental management system A management system aimed at facilitating improved environmental performance that

Improvement assessment The most important phase of the life cycle assessment. In this phase, the manufacturer can identify opportunities for improving the environmental performance of their product.

Life cycle The combination of processes needed by a product to fulfil the function specified by the functional unit. Life cycle stages include production, use and processing after disposal, including the processing of the waste generated in these stages.

Life cycle analysis An inventory of how much energy and raw materials are being used, and how much solid, liquid and gaseous waste is generated, at each stage of a product's life.

Materials accounting Any analytical technique aimed at identifying and quantifying the materials which enter and exit a given production process or facility.

Payback period A relatively simple profitability measure, which can be used to calculate the time a Cleaner Production project (or any other capital project) will take to pay for itself.

Reclamation The recovery of useful products from waste materials.

Recovery The extraction of material from waste that may be recycled or reused. Recovery may take place at the source of waste production or as a process during waste handling.

Recycling The retrieval of materials or products for reuse in their original form or for reprocessing into other products. Examples include recycling of aluminium cans or paper. Recycling may be within the plant or process, in which case it becomes part of the cleaner production approach, or outside the plant, in which case it is more properly a waste management activity.

Reuse Retrieval of materials or products for their