UNEP

CHANGING PRODUCTION PATTERNS:

LEARNING FROM THE EXPERIENCE OF NATIONAL CLEANER PRODUCTION CENTRES

UNEP

United Nations Environment Programme
Division of Technology, Industry and Economics

UNIDO

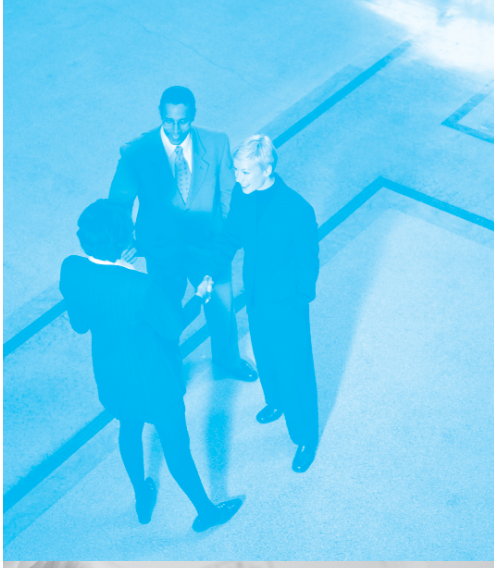
In collaboration with the United Nations
Industrial Development Organisation

UNITED NATIONS ENVIRONMENT PROGRAMME

Division of Technology, Industry and Economics
39-43 quai André Citroën
75739 Paris Cedex 15 - FRANCE
Tel: +33 1 44 37 14 50
Fax: +33 1 44 37 14 74
Email: unep.tie@unep.fr
Internet: http://www.uneptie.org

UNITED NATIONS PUBLICATION

ISBN: 92-807-2073-2



CHANGING PRODUCTION PATTERNS:

LEARNING FROM THE EXPERIENCE OF NATIONAL CLEANER PRODUCTION CENTRES

United Nations Environment Programme
Division of Technology, Industry and Economics

In collaboration with the United Nations
Industrial Development Organisation

TABLE OF CONTENTS

TABLE OF FIGURES

FOREWORD

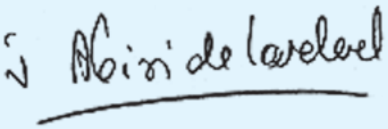
"To a large extent we have built the world-wide consensus on Cleaner Production. However, we have not reached the end of the road and we must foster greater commitment."

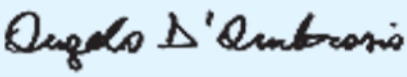
Dr. Klaus Toepfer, Executive Director, United Nations Environment Programme,
at the Sixth International High Level Seminar on Cleaner Production, October 2000

One of the keys to achieving sustainable development is changing the production patterns that waste resources and emit more pollutants than our ecosystem can absorb. It is to promote this change that UNEP established its Cleaner Production Programme in 1989 with the goal of preventing pollution at the source and of managing the raw material (including energy and water) more efficiently. At the time, Cleaner Production was a scarcely known concept advocated by a small group of forward-thinking people from around the world. Only two years later, at the Earth Summit in Rio de Janeiro in 1992, Cleaner Production had already become internationally acclaimed and incorporated into Agenda 21 as a preferred strategy in reconciling the dual needs of environmental protection and economic development. Since then, large companies have integrated the concept of Cleaner Production into good environmental management practices and documented the economic savings and advantages.

However, it soon became obvious these case studies and experiences were not enough to change production practices in developing countries and economies in transition. The challenge is still greater in case of small- and medium-sized companies, which perhaps stand to gain the most in adopting effective environmental protection strategies that are also economically attractive. It was also clear that there is a need to sustain in-company momentum towards Cleaner Production. The need to build local expertise and indigenous capacity to demonstrate that Cleaner Production can simultaneously bring economic and environmental benefits was felt more than ever. What was needed was the technical and financial assistance to help companies getting started. This led UNEP and UNIDO, working in a proactive partnership, to establish the "National Cleaner Production Centres" with the hope that this would serve as a model to be replicated by other countries.

What was started as a catalytic programme has proven to be a big success. The keen expressions from countries for establishing their own National Cleaner Production Centres along with requests for help in this process has been increasing. Furthermore, the expectations and needs of the Centres, once established, have also been growing exponentially. The aim of this publication is to provide some guidelines to those wanting to learn from the experiences, positive or negative, of the UNIDO/UNEP National Cleaner Production Centres, so that they can move forward on their own and thus contribute towards changing production patterns in their countries, benefiting from UNEP's and UNIDO's international network on Cleaner Production.





Jacqueline Aloisi de Larderel,
Assistant Executive Director,
Division of Technology, Industry and Economics,
United Nations Environment Programme

Angelo D'Ambrosio
Managing Director
Sectoral Support & Environmental Sustainability Division
United Nations Industrial Development Organisation

ACKNOWLEDGEMENTS

This booklet would not have been possible without the candid input and enthusiasm of the following individuals:

1. César Barahona, *Nicaragua National Cleaner Production Centre*
2. Gerda H. Caleffi, *Former Deputy-Director, National Cleaner Production Centre of Brazil*
3. Anna Christianova, *Director, Czech Cleaner Production Centre*
4. Brian Lucio Coughlin, *Deputy-Director, El Salvador National Cleaner Production Centre*
5. Ning Duan, *Director, China National Cleaner Production Centre*
6. Viera Feckova, *Director, Slovak Cleaner Production Centre*
7. Permod Gupta, *Director, India National Cleaner Production Centre*
8. José Angel Gutiérrez, *Director, Guatemala National Cleaner Production Centre*
9. Sándor Kerekes, *Director, National Cleaner Production Centre of Hungary*
10. Cleophas Migiro, *Director, National Cleaner Production Centre of Tanzania*
11. Lewin Mombemuriwo, *Former Director, Cleaner Production Centre of Zimbabwe*
12. Sergio Musmanni, *Director, Costa Rica National Cleaner Production Centre*
13. Carlos do Nascimento, *Former Director, National Cleaner Production Centre of Brazil*
14. Rachid Nafti, *Director, CP3-SARL Centre de Production Plus Propre (Tunisia)*
15. Ricardo Arturo Pinel, *Former Director, El Salvador National Cleaner Production Centre*
16. Guillermo J. Roman, *Director, Centro Mexicano para la Produccion Mas Limpia (Mexico)*
17. Tran Van Nhan, *Director, Viet Nam Cleaner Production Centre*
18. Jie Yin, *China National Cleaner Production Centre*

As well as the additional insight and views of:

19. Leo Baas, *Erasmus University (The Netherlands)*
20. Hans-Peter Egler, *Deputy Head, Trade and Clean Technology Co-operation Division, State Secretariat for Economic Affairs/SECO (Switzerland)*
21. Michael Jørgensen, *Technical University of Denmark*
22. John Kryger, *Environmental Manager, Danish Technological Institute (Denmark)*
23. Jan Sage, *Stenum, Managing Director, Stenum GmbH (Austria)*
24. Rene van Berkel, *Curtin University of Technology (Australia)*
25. Frans Verspeek, *Unit Manager, Cleaner Production and Technology Transfer IVAM Environmental Research (Netherlands)*

This booklet was prepared by:

Surya Chandak, *Chief, Cleaner Production and Consumption Unit, UNEP*
Edward Clarence-Smith, *Team Leader, NCPC Programme, UNIDO*
Clare Cocault, *Consultant*

INTRODUCTION

Changing production patterns through Cleaner Production

In the past, industrialised countries have responded to pollution and environmental degradation in four characteristic ways:

- ➜ First, by ignoring or denying the problem;
- ➜ Second, by diluting or dispersing the pollution, so that its effects are less harmful or apparent;
- ➜ Third, by trying to control the pollution and the wastes (the so-called end-of-pipe or pollution control approach);
- ➜ Fourth, and more recently, by changing production patterns with a Cleaner Production approach, preventing pollution and waste at source and reducing raw material and energy use.

Cleaner Production is …

Cleaner Production is defined 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.

For production processes, Cleaner Production includes conserving raw materials and energy, substituting toxic/hazardous processing materials by more benign ones and reducing the quantity and/or toxicity of all emissions and wastes before they leave a production process.

For products, the approach focuses on the reduction of environmental impact during the entire life cycle of a product, from raw material extraction to the ultimate disposal of the product, by appropriate design.

For services, Cleaner Production entails incorporating environmental concerns into the design and delivery of services.

... an ideal opportunity for developing countries and economies in transition to become economically more efficient and competitive by reducing waste, material and energy inefficiencies.

Cleaner Production provides developing countries and countries undergoing economic transition an ideal opportunity to 'leapfrog' over the past environmental mistakes of industrialised countries while at the same time enabling their industries to become more economically efficient and competitive by reducing inefficiencies, waste and material costs.

... providing that they have local expertise to promote and implement Cleaner Production.

However, Cleaner Production will only be truly integrated into a country's industry and government strategies if local capacity is in place to sustain it. To help developing countries and countries with economies in transition build their own local Cleaner Production capacities, the United Nations Industrial Development Organisation (UNIDO) and the Division of Technology, Industry and Economics of the United Nations Environment Programme (UNEP DTIE) have combined their expertise and resources in an innovative joint initiative, the National Cleaner Production Centres (NCPC) Programme, established in 1994.

Figure 1: Examples of Cleaner Production in Practice ▼

Improve Housekeeping	Process Modification	Product Redesign
➜ *Reduce raw material and product loss due to leaks, spills, drag-out, and off-specification solutions.* ➜ *Improve monitoring of operations and maintenance of all facets of the production process.* ➜ *Schedule production to reduce equipment cleaning, e.g., formulate light before dark paints so that vats do not have to be cleaned out between batches.* ➜ *Improve management of inventory of raw materials and products.*	➜ ***Filtration and washing:*** *Use counter-current washing, and recycle used solvent.* ➜ ***Parts cleaning:*** *Use mechanical cleaning devises; improve draining before and after cleaning; use plastic bead blasting.* ➜ ***Surface coating:*** *Use electrostatic spray-coating system; use powder coating systems; use airless air-assisted spray guns.*	➜ ***Consumer Goods Redesign:*** *A traditional flashlight, running on dry cell batteries that are usually disposed of with domestic waste, is redesigned to run on a manually powered dynamo, eliminating the dry cells altogether*
Technology Change	**Input Material Substitution**	**On-Site Recycling**