UNITED NATIONS ENVIRONMENT PROGRAMME

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FINAL REPORT

MINISTERIAL MEETING

AND SECOND SENIOR LEVEL

CLEANER PRODUCTION SEMINAR

27-29 October 1992
Paris, France

Organized by
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i) Preface

In May 1989 the United Nations Environment Programme's Industry and Environment Programme Activity Centre (UNEP IE/PAC formerly UNEP Industry and Environment Office) established the Cleaner Production Programme. The Programme resulted from decisions made by UNEP's Governing Council urging UNEP to help establish an environmental technology transfer network based on recommendations by a group of 23 senior level experts from various countries and international organizations.

The Cleaner Production Programme promotes a new and creative way of thinking about products and the processes that make them. Cleaner production involves the continuous application of an integrated preventive strategy that reduces harmful risks to humans and the environment. For processes, this means conserving raw materials and energy, eliminating the use of toxic raw materials and reducing the quantity and toxicity of all emissions and wastes before they leave a process. For products, this means reducing impacts along the entire life cycle, from raw material extraction to disposal.

The **Ministerial Meeting,** held in Paris, 27 October 1992, follows decisions made at the United Nations Conference for Environment and Development (UNCED) in June 1992 in Rio de Janeiro, Brazil. Agenda 21, the agreement signed at UNCED, recognizes that cleaner production applications change consumption patterns, bolster atmospheric protection, advance cleaner production technology transfer and create a safer environment. The purpose of the Ministerial Meeting was to review the progress of cleaner production in the world, discuss factors critical to implementating cleaner production, and recommend specific action for the future.

The **Second Senior Level Seminar,** held in Paris, 28-29 October 1992, served as a follow-up to the initial "Seminar on the Promotion of Cleaner Production" (Canterbury, UK, September 1990), which formally launched The Cleaner Production Programme. The objective of the Second Seminar was to review UNCED and its implications for the Programme, to evaluate the progress of the Programme and its activities, to exchange information on national and regional cleaner production activities and to discuss future directions for the Programme. The Paris Seminar recognized that cleaner production is an effective way to reconcile economic development and environmental protection as highlighted at UNCED.

During its first two years, the Cleaner Production Programme concentrated on increasing awareness about cleaner production, as well as on training. Since 1991, the Programme has focused on promoting self-sustaining cleaner production programmes in developing countries.

ii) Abstract

This report contains a synopsis of the presentations, observations, and recommendations of the Ministerial Meeting and the Second Senior Level Cleaner Production Seminar. Both were held in Paris, France, 27-29 October 1992, at the invitation of the French and UK governments and UNEP IE/PAC.

Appendices attached to this report contain the following:

1. Agenda (appendix 1).

2. List of participants (appendix 2).

3. List of papers presented (appendix 3).
   NOTE: Copies of papers are available upon request.

4. Discussion Paper prepared for the Ministerial Meeting (appendix 4).

5. "From Canterbury to Paris: An Update on the Cleaner Production Programme" (appendix 5).

The following reports from the six working sessions of the Seminar are available upon request:

- policy and strategy issues
- networking of databases
- industry and cleaner production
- cleaner products
- education and training
- overview of the Cleaner Production Programme's working groups

iii) Executive Summary

I. MINISTERIAL MEETING

1. Twenty-four participants attended, including:

   - Environment and industry ministers / Senior level government officials,
   - Senior industry representatives,
   - Representatives from international organizations (OECD, CEC, European Parliament),
   - Representatives from environmental groups.

   (Appendix 2 lists all participants)

   Dr Mostafa Tolba, Executive Director of UNEP, chaired the meeting, and Madame Ségolène Royal, the French Minister of the Environment, gave the welcoming address.

2. The objectives of the meeting were to:

   - Review progress of cleaner production worldwide,
   - Discuss factors critical to implementing cleaner production,
   - Recommend specific action for the future.

3. A day of discussions highlighted the following points:

   - Despite significant successes, cleaner production remains difficult to implement--particularly in developing countries--due to a shortage of capital and competing priorities.
   - Implementing cleaner production requires: enforced environmental standard regulations; information and education to create awareness--in government, industry and the public; and economic incentives.
   - At present, economic incentives and market mechanisms lack optimal effect because total environmental costs are not accounted for properly. For instance, industry does not calculate the true cost of raw materials, including water. Leading the way, OECD countries should develop new systems of environmental accounting and pricing.

- Effective ways of transferring cleaner technologies from developed to developing countries must be found.

- At local, national and international levels, the participation of the public and the involvement of non-governmental organizations is crucial.

4. A consensus emerged on recommendations to:

- Launch specific demonstration projects to show how partnerships built between government and the private sector can enhance the implementation of cleaner production. Such projects should show both the opportunities for and obstacles to cleaner production. The Ministerial Meeting chose two industry sectors (pulp and paper, cement) in three countries (Egypt, Senegal and Zimbabwe) as pilot projects.

- Develop international guidelines on what information exporters of technology should provide to importers regarding potential environmental impacts, keeping in mind the capacity building needs of countries who intend to use the information.

- Designate institutions or senior level persons in each country as focal points for the promotion of cleaner production.

- Ask the experts during the Senior Level Seminar to discuss the interest in and need for National Cleaner Production Centres, as jointly proposed by UNEP and UNIDO, and to study the possibility of cataloging key cleaner production processes now in use and products being designed in various industry sectors.

II SENIOR LEVEL SEMINAR

1. The two-day Seminar brought together over 200 participants, representing government, academia and research organizations, international organizations, and industry.

2. The objectives of the Seminar were to:

- Assess the progress and successes of UNEP IE/PAC's Cleaner Production Programme, and its shortcomings,

- Advise UNEP on the Programme's orientation for 1994-1995,

- Share information on cleaner production,

- Provide a platform for better networking and define further cooperation.

3. The Seminar consisted of Plenary Sessions and individual Working Sessions.

During the Plenary Sessions, presentations and discussions highlighted:

- Efforts, activities and plans, at the national level or in industry, to effectively implement cleaner production in the United States, Poland, the Netherlands, Denmark, China, the United Kingd0om, and Australia.

- Cooperative activities and programmes developed and planned at the regional level (i.e., in Asia, Latin America, and francophone countries).

- Opportunities for and barriers to the implementation of cleaner production.

4. Working Sessions focused on six areas:

- policies and strategies,
- networking of information through databases,
- industry,
- cleaner products,
- education and training, and
- Cleaner Production Programme Working Groups.

5. Discussions in Plenary and Working Sessions yielded the following observations:

- Satisfaction was expressed with the UNEP IE/PAC Cleaner Production Programme as a catalyst for change that provides a successful networking platform. Some countries and organizations have now launched their own cleaner production programmes, and many activities are taking place within the framework of the IE/PAC programme.

- Though a recognized concept, cleaner production is not always well understood and is only making slow progress in replacing more traditional behaviour.

- Specific cleaner production projects show that many barriers to cleaner production, difficult to overcome, still exist. One barrier in particular, the environment industry's shortcut of selling end-of-pipe technology, needs special attention.

- Small and medium size enterprises are difficult to reach; large enterprises are difficult to penetrate.

- Industry participation in the cleaner production network needs to grow.

- Training and education needs are high. Cleaner production is not only a question of "hardware," but also a question of "software"--know-how, environmental policies and management, equipment maintenance and "good housekeeping" procedures. An emphasis on hardware is misplaced and misleading.

- With strong involvement from industry, National Cleaner Production Centres (NCPCs) should be established to raise awareness, train various stakeholders, provide information, and support demonstration projects.

6. Based on these observations, the following recommendations for action in the near future emerged. UNEP should:

- pursue the UNEP/UNIDO National Cleaner Production Centres project in developing countries;

- continue to provide the platform for networking and, as a part of this networking, continue and improve information exchange through publications, such as the Cleaner Production Newsletter, and through ICPIC;

- develop training activities within the framework of an overall training strategy;

- increase the involvement of existing working groups while initiating new groups in such areas as cleaner products;

- support demonstration activities, in cooperation with partners;

- ensure industry's greater involvement, in particular through trade associations; and

- support the development of and expand knowledge about cleaner production tools.

7. Commitment from Participants:

A number of participants committed themselves, or their organizations, to actively contribute to the Cleaner Production Programme.

They included international organizations such as International Bank for Reconstruction and Development (IBRD), Commission of European Communities (CEC), Economic Commission for Latin America and the Caribbean (ECLAC), Organization of American States (OAS), Agence de

Coopération Culturelle et Technique (ACCT), World Federation of Engineering Organizations (WFEO), and the International Council on Metals in the Environment (ICME).

1. MINISTERIAL MEETING ON CLEANER PRODUCTION

1.1 Introduction and Welcome, An Invitation for Open Discussions

Doctor Mostafa Tolba, Executive Director of UNEP, welcomed ministers and high level leaders to the Ministerial Meeting on Cleaner Production and introduced them to the audience of international experts. He expressed gratitude to France and the United Kingdom for making the meeting possible through their generous funding support.

Dr Tolba described the nature of the meeting as an informal dialogue among leaders of government, industry, NGO's, and international organizations. He asked that the leaders' written statements be set aside so that a more interactive discussion could take place. Participants were to take into consideration what their colleagues were saying around the table.

In light of the free and open exchange of this "roundtable" format, an exact synopsis of what each participant said and in exact order, though possible, would prove at times disjointed and/or repetitious. Rather, this report offers a synthesis of observations and debate formulated around four naturally sequential points: 1)Progress of Cleaner Production 2)Complications 3)Seeking Solutions 4)Recommendations. These points reflect Section I-3 of the Executive Summary.

1.2 Progress of Cleaner Production

-- BUSINESS AND INDUSTRY --

In his opening statement, Dr. Tolba described the "perceptual shift" taking place in the way business regards the environment. Once viewed as a regulatory burden, the ecological challenge now offers a market opportunity for environmental innovation. In the United States alone, for example, US$ 100 billion is spent on environmental goods and services each year.

Lord Strathclyde, of the United Kingdom's Department of Environment, spoke of his country's Committee on Business and the Environment which looks into the opportunities and challenges of environmental measures for business. The aim of the committee is to offer practical guidance on the theme "environmental sense makes business sense."

The challenge of cleaner production in the pulp and paper industry was addressed by Mr Claes Hall, International Development Director of Aracruz Celulose S.A. Because the pulp and paper industry is so competitive, cleaner production can set a

company apart, making it more popular with consumers. According to Mr Hall, international market forces are the strongest driving factor towards developing cleaner production technologies.

-- GOVERNMENT --

Mr J.G.M. Alders, Dutch Minister of Housing, Physical Planning and the Environment, emphasized that the success of cleaner production in the Netherlands is largely due to its long history of cooperation among government, industry, science and non-governmental organizations.

The Netherlands is now using a "back-casting system" where, for example, decision-makers look forward to goals set for the year 2010 and look at what needs to be done between now and that target date to achieve those goals. It is necessary to discuss future goals with every segment of society and ask the questions: What do we need in the first 5 years? in the second 5 years? and so on. The Netherlands government strives for cooperation and always asks what we must do to get where we want to go.

-- THE PUBLIC SECTOR --

Mr Bill Long, Director, Environment Directorate, Organization of Economic Cooperation and Development, observed that, in OECD countries, public demand for cleaner technologies is growing because of better public education. That message needs to be carried elsewhere.

Ms Beverly Thorpe, of Greenpeace International and the only NGO representative, revealed how the public demand to know what kind of pollution occurred in its own backyard, as well as the quantity and types of toxic waste emitted, resulted in the United States Toxic Release Inventory. The TRI gives the public this information. A better informed public is able to engage in more constructive discussions with industry, thereby reducing the amount of pollution created by the industry. She also cited an example of the power of public participation in Argentina, where, until recently, leaded petroleum was used at levels that had been phased out in the United States. After one and a half years of public mobilization and 100,000 petitions to government, Argentina is now set for a phaseout of lead in petrol.

Cleaner production's progress might best be summed up by Madame Royal's upbeat welcoming address, which lauded a "new industrial revolution." Because pollution has no borders, and the industrial nations are the principal polluters, they must shoulder most of the responsibility for "global solidarity". "Our" atmosphere and "our" water must be protected. She called for a reinforcement of solidarity between richer nation and poorer, between "North" and "South." But, she warned, it would be a "criminal error" for a nation to use underdevelopment as an excuse for not pursuing clean production. Here perhaps is the greatest complication in the promotion of cleaner production.

1.3 Complications

-- GREAT DIVIDES --

Even the quickest review of the Ministerial Meeting shows that most of the "success stories" fall on the side of developed nations. Divisions emerge: between developed and developing countries, North and South, Western Europe and Eastern. In addition, Dr Tolba reminded the audience of the need to advise countries such as China, a country with a population of 1.3 billion, on ways of achieving its goal, of raising its living standard comparable to that of OECD countries, and of doing so in an environmentally safe manner.

Mr Jacques Baudin, Minister for Tourism and the Environment, Sénégal, spoke of the conditions facing developing countries. Countries of the South do not have the same concerns as the countries of the North. In the North, people are most concerned with safeguarding their quality of life. In the South, people are concerned with survival. The notion of managing environmental problems "together" is a bristly subject. Africa cannot develop its own technology as the French Minister of the Environment may have been suggesting.

Dr Herbert Murerwa, Minister of Environment and Tourism, Zimbabwe, spoke of the two challenges that face government and industry: to clean up the mess from the past and to prevent further damage to the environment. Zimbabwe appreciates the need for cleaner production and appeals to developed countries to facilitate the transfer of environmentally sound technologies along with education and training to the South.

Certain actions serve only to widen the division. Ms Thorpe noted that product dumping still occurs in developing countries. As the environmental movement in the North becomes more progressive, banned technologies are exported to the South because, as Lawrence Summers of the World Bank said in his infamous memo, "this makes good economic sense" - a tragic attitude on the part of developed countries. Just as tragic, on the part of many people in developing countries, is the notion that pollution is a symbol of civilization.

Mr Mohammed Mahmoud Abdel Wahab, Minister of Industry, Egypt, asked the round table to consider the fact that when a developing country has no choice but to pollute its country, this unfortunate situation will have consequences for the whole world.

-- SHORTAGES OF CAPITAL AND HUMAN RESOURCES --

Mr Hernan Duran, ECLAC, spoke from the audience of Latin America's need and desire to modernize its industry. But it does not have access to the credit it needs to purchase cleaner technologies that could yield good payback in a relatively short period of time. It is necessary to prove that modernizing industry is a profitable business.

Mr Wahab spoke of the basic differences between North and South. The North tells

the South not to repeat its mistakes, but it is financially impossible for the South to import the best cleaner technologies. Even Egypt's end-of-pipe (EOP) experience is not encouraging. The benefits do not justify the expenditure on purely economic grounds. Cleaner production as a substantial re-equipment programme is beyond Egypt's means.

Mr Sergio Reyes Lujan, Subsecretary for the Environment, Mexico, spoke of the obstacles Mexico faces when trying to meet environmental regulations required for international assistance. Even in medium-sized economies like Mexico, the lack of human resources is an increasingly difficult problem to tackle. Requirements for loans such as those from the World Bank require trained professionals who can do cost/benefit analyses and make technical assessments. Mexico does not have the human resources it needs to advance its cleaner production capability.

There was, of course, repeated expression of good will on the part of those who have the knowledge and technology to promote cleaner production in developing nations. For example, Mr Philippe Tripard, of the Union of Chemical Industries in France, supports the transfer of cleaner technologies to Eastern Europe. He believes this should be done as quickly as possible because, if industry expects to get itself in shape before transferring needed technology, it will be too late. A two-tier policy (one for the US and Europe and one for developing countries) is not a good idea.

Dr Edward Bennett, Director, DG XI, Commission of the European Communities (CEC), spoke of integration and partnership as the key focus for the CEC these days. The CEC seeks inward investment and outward movement to address the variety of environmental issues that face Europe. The environmental degradation in Central and Eastern Europe over the past 30 to 40 years requires emergency action.

The hardest task, however, remains--how to get loans and funding, how to justify expenditure, how to reap gains from clean production in a relatively short period of time. Mr Lujan reported Mexico's experience with the Montreal Protocol: months after signing the agreement his country still had not received any funding.

All of this leads to the pivotal question:

-- WHAT ARE THE TRUE COSTS? --

Mr Bill Long, Director, Environment Directorate, Organisation for Economic Cooperation and Development (OECD) presented OECD's position that economic incentives and market mechanisms are not having expected results because environmental costs are not being accounted for properly. For instance, the true cost of raw materials, including water, is not internalized in industry. OECD countries should lead the way in developing environmental accounting and new pricing systems.

Dr Tolba focused on the point that when developing countries speak of the expense of cleaner production they mean up-front costs. As a way of strengthening the cleaner production argument, countries need to look at how much they are saving in health costs when environmentally benign technology is used instead of old technology. The economics of the issue are not truly addressed unless environmental costs are factored in.

Objectives that need to be pursued include promoting worldwide economic growth, pricing resources to reflect their environmental value, integrating economic and environmental policies, and accelerating clean technology innovation and diffusion.

1.4 Seeking Solutions

-- EDUCATION AND THE FLOW OF INFORMATION --

To put it bluntly, as did Mr Hall, access to information, training and education is the most important factor for the successful implementation of cleaner production in developing countries.

Technical cooperation plays an important role in the successful implementation of cleaner production in the pulp and paper industry. Aracruz' technical cooperation programme includes bringing in foreign experts, sending Brazilians to graduate school, forming "know-how" agreements based on production fee and participation in equity, continuing the education of employees, and investing in travel for managers to go and see what is happening in other Aracruz factories around the world. The success of these programmes has been the result of full support from the company's owners and from the Brazilian development bank.

Mr Haarkon Saandvold, International Primary Aluminium Association, spoke of the aluminium industry's education programmes for customers, suppliers, and the public at large in the North and South. Cleaner production needs acceptance from society and go hand-in-hand with market access and financing. Setting priorities and being more specific is essential for successful implementation of cleaner production.

Lord Strathclyde also said information flow is the key to the success of cleaner production. The UK Department of the Environment expressed its commitment to this key point with a plan for linking the IE/PAC ICPIC system, development of the United Kingdom "Technical Cooperation" booklet, a promise of further contribution to UNEP IE/PAC and cleaner production worldwide. He said the success of cleaner production depends on improving management and encouraging technological innovation. A priority of the UK Department of the Environment is to develop an environmental management standard.

Proper management, Mr Tripard stressed, rather than new processes, will do more to trigger cleaner production in the chemical industry. He cited reasons for optimism in the industry. Training and management policies based on cleaner production

principles are being developed by a number of companies. But the chemical industry does not have the economic means to change as quickly as it would like.

Dr Tolba wondered how cleaner production expertise in the North could be made readily available to concerned parties in the South where there are greater barriers to this information.

Mr Alders picked up on the idea of more demonstration projects, noting that countries from Latin America and other parts of the South will be coming to the Netherlands to inspect Dutch processes and programmes. More cooperation between countries is needed to reap the full benefits of demonstration projects.

-- TRANSFER OF TECHNOLOGY --

Dr Tolba asked the round table participants to consider how technology can be developed in developing countries. Industry says it wants to be fairly compensated, but what is "fair" compensation?

Mr Alders expressed hope about the future of technology transfer to developing countries, but the biggest obstacle is deciding how this transfer is best carried out. The OECD is working on tradable emission rights that will help to determine a strategy, but there are more questions that need to be answered. It is necessary to look at the financial aspects of cooperation as well as the definition of environmental space.

Mr Hall noted that, due to fierce market competition in the pulp and paper industry, companies are less open about sharing cleaner production know-how. Because many of the items produced in developing countries are international, market forces have been the strongest instrument guiding cleaner production. And so, eco-labeling, for example, proves to be a positive factor for both companies and consumers.

-- REGULATION vs. MARKET MECHANISMS --

Mr Jean-Charles Rouher, Secretary General, International Chamber of Commerce, said that to advance cleaner production it is necessary to consider the development of international standards and environmental audits.

As Mr Wahab said, another difficulty particular to Egypt and most of the South is keeping an eye on informal industry, the small and medium-sized plants that operate without regard for their impact on the environment.

Mr Lujan noted that Mexico's most successful efforts towards cleaner production have been due to environmental impact assessments that have forced the closing of Mexico's most polluting plants.

The UK Department of the Environment, Lord Strathclyde said, aims to minimize harmful industrial releases and to adopt clean technology rather than end-of-pipe (EOP) technology whenever possible. The Department of the Environment is also trying to determine the enforceability of cleaner production measures while building up its enforcement system.

Ms Thorpe felt that product bans and phase-outs must be mandated by government, not market mechanisms. The EC and GATT, seeking harmonization on free trade, often weaken regulations and take away the power of the local public and government to make decisions.

Still, one hopes that action by choice is preferable to action by regulation, and that informed industries will seek to cater to informed consumers.

Mr Bill Long noted that a good sign these days is that the lines are more blurred about what is a good environmental decision and what makes sense for the corporate bottom line. The shift in science and technology from EOP technology to integrated process technology is often the normal evolution of the technology where the "clean" aspect is part of the whole picture.

If producers and consumers both fully understand these concepts, then market mechanisms have a real chance of promoting cleaner production.

Ms Brigitte Ernst de la Graete, Member of the European Parliament, spoke of the need for better communication and information flow. In order to appeal to the industrial world, the public must be provided by government with more information on industry. Government must ensure that prices reflect environmental costs, state its objectives clearly, and educate and motivate the general public. Consumers must take a more active role, realizing they sacrifice quality by using products that adversely affect the environment.

Hugh Faulkner of the Business Council for Sustainable Development (BCSD) asserted that market forces should decide proper use and transfer of clean technologies. Clean technologies will be the key to competitiveness in the future. Companies that incorporate environmental thinking into their corporate philosophy will be the most competitive in the world tomorrow.

Mr Faulkner sees the dynamics of transferring technology as one of the biggest challenges. A financial commitment to enable the transfer of clean technologies to the South was agreed at Rio. Now, the amount of financial commitment must be determined. BCSD supports letting private sector flows identify what makes good commercial sense and having public sector money pay for the additional costs incrementally and strategically. Faulkner does not support the transfer of free technology because, he says, free goods are not often utilized effectively. In his view, corporations must realize that technical cooperation is an essential part of their relationship with developing countries. But for corporations to be able to devote their energies to such programmes, they need profits to encourage new processes.

Mr Jean-Charles Rouher, Secretary General, International Chamber of Congress, supported Mr Faulkner's point about the need for a structural adjustment to the process of cleaner technology transfer. It is necessary to identify the sectors where technology transfer could take place, and make an assessment of the systems by which companies conduct technology transfer. This should lead to fostering a technology transfer process within a sound commercial transaction.

Somewhere between regulation and market mechanism is Mr Long's strategical advice to industry, government and NGOs:

- Establish clear environmental goals and targets, as Mr Alders said.

- Target specific industries. 70 to 75% of the industrial pollution burden comes from 5 to 9% of GDP; these industries--mostly in chemicals, coal and petroleum, basic metals, and paper and printing--should be targeted first for cleaner production technologies.

- Define the goal of government. The private sector usually determines what technology will be developed and how it will be transferred. Government policies must reflect what environmental/economic instruments make the most sense for encouraging technology transfer.

-- ROLE OF THE PUBLIC AND NGOs --

As Dr Tolba pointed out, letting public demand direct what happens is usually not the fastest course to take. However, Ms Thorpe, Greenpeace, spoke of the crucial role public participation plays in the advancement of cleaner production. Only public participation at a very pronounced level will bring about the shift that is needed in corporate thinking. Part of the problem is that there is no clear definition of public participation in Agenda 21.

Mr John Skinner, Deputy Assistant Administrator, US Environmental Protection Agency, spoke of the success of the US Toxic Release Inventory (TRI), mentioned by Ms Thorpe as an effective tool for public participation. As a result of TRI reporting, 700 US industries have agreed to reduce waste by 50% by the year 1995 (EPA 33/50). Information dissemination is vital for such progress. The payback period for cleaner production investments is usually relatively short. Investment in more demonstration projects geared toward specific industries is needed now.

Of course the public can only participate when free of constraints, and several participants recognized that environmental progress depends on democracy. Mr Baudin, Senegal, stressed that the issues of human rights and democracy must be part of the environmental picture.

Again, Ms Thorpe noted that public participation is considered in the Bruntland Report to be essential for the pursuit of sustainable development. This requires a political system that secures effective public participation in decision making by promoting citizens' initiatives, strengthening local democracy, and empowering citizens' organizations. Public participation is the main force behind progressive legislation.

Dr Bennett, CEC, added that with the strengthening of democracy, the people of Central and Eastern Europe will need to put their economic and political rights to work. The need for European Community Standards in trading with Eastern Europe will also push the cleaner production agenda forward.

TO SUM UP:

Though the most obvious obstacle to the progress of cleaner production and the transfer of technology may seem to be cost, the primary key to progress is education. Industry must be taught the true costs of production, taking into account total, long-term expenses, from raw materials to employees' health care. Developing countries must be taught the skills of management and good housekeeping, as well as scientific and technical skills. Lastly, but perhaps most importantly, the public, as the body of consumers whose demands and buying power can ultimately shape government policy and industrial planning, must be informed what is healthy for them and their environment, and what is not.

The recommendations agreed upon at the end of the Ministerial Meeting all reflect therefore some aspect of education, training or information sharing.

1.5 Recommendations

The ministers and high level leaders developed a consensus on the following recommendations:

- Launch specific demonstration projects to show how partnerships built between government and the private sector can enhance the implementation of cleaner production. Such projects should show both the opportunities for and obstacles to cleaner production. The Ministerial Meeting chose two industry sectors (pulp and paper, and cement) in three countries (Egypt, Senegal and Zimbabwe) as pilot projects.

- Develop international guidelines on what information exporters of technology should provide to importers regarding potential environmental impacts, keeping in mind the capacity building needs of countries who intend to use the information.

- Designate institutions or senior level persons in each country as focal points for the promotion of cleaner production.

- Ask the experts during the Senior Level Seminar to discuss the interest of and need for National Cleaner Production Centres, as jointly proposed by UNEP and UNIDO, and to study the possibility of cataloging key cleaner production processes in use and products being designed in various industry sectors.

Participants also stressed the need to urgently apply market instruments which would allow the inclusion of the cost of environmental impacts in product prices. Such instruments could accelerate the move towards cleaner technologies and new production patterns. They also recognized the importance of adequate sharing of information.

2. SECOND SENIOR LEVEL CLEANER PRODUCTION SEMINAR

2.1 Welcome and Introduction, Objectives of the Cleaner Production Programme, Update Since Canterbury

Jacqueline Aloisi de Larderel, UNEP IE/PAC Director, welcomed the experts participating in the Second Senior Level Cleaner Production Seminar and introduced the UNEP IE/PAC Cleaner Production team.

Mrs Aloisi de Larderel then presented the objectives and main elements of the UNEP IE/PAC Cleaner Production Programme and highlighted the progress that has been made since the Canterbury Cleaner Production Seminar.

UNEP IE/PAC **target groups** are:

- Decision Makers (government and industry),
- Intermediaries (banks, NGOs, academia),
- Plant Managers (who need technical/practical information).

The **programme's objectives** are to:

- increase worldwide awareness of the cleaner production concept;
- help governments and industry develop cleaner production programmes;
- foster the adoption of cleaner production throughout societies; and
- facilitate the transfer of cleaner production techniques and technologies.

The programme consists of **five main elements:**

1)-- International Cleaner Production Information Clearinghouse (ICPIC)

Since its inception in 1990, ICPIC has served nearly 500 persons seeking cleaner production information. The system contains 648 case studies, 156 expert contacts and 1022 bibliographic entries.

Future plans include the development of regional nodes, more frequent updates and the publication of an ICPIC User Guide.

2)-- Publications:

Cleaner Production Newsletter (in English, French, Spanish and Chinese);

Cleaner Production Brochure (in English, French and Spanish);

Audit and Reduction Manual for Industrial Emissions and Wastes (in English, Spanish and French);

Climate Change and Energy Efficiency in Industry.

Specific reports on different topics:
- 4 seminar proceedings with Lund University;
- Report from the Canterbury Seminar, September 1990;
- Report from the Seed-Workshop in Paris, September 1991.

Future plans are to publish a Cleaner Production Booklet, industry specific cleaner production guides and other training materials.

3)-- Working Groups

The Groups have provided new input to ICPIC, facilitated the collection and dissemination of information, arranged seminars and disseminated their own newsletters.

- Active Industry Working Groups: Leather Tanning, Textiles, Metal Finishing, Pulp and Paper, Biotechnologies;
- Other Active Working Groups: Education, Policies and Strategies, and Data Management.

4)-- Training Activities

- Workshops and seminars for government, industry and academia in Tanzania, Kenya, Yemen, China (Xiamen and Shaoxing) and India;
- Follow-up with Kenya, China and India.

5)-- Technical Assistance

A new activity, designed to foster links between experts, launch demonstration projects, and promote cleaner production through such activities as the China/World Bank project and the joint UNIDO-UNEP IE/PAC National Cleaner Production Centres project.

After Mrs Aloisi de Larderel's opening remarks, the Senior Level Plenary Sessions began. Over two consecutive days, morning Plenary Sessions were followed by afternoon Working Sessions. All presentations and discussions focused on:

PROGRESS WITHIN THE FRAMEWORK OF THE CLEANER PRODUCTION PROGRAMME

2.2 Industrial Activities

Chairperson: Mr David Pounder, Department of the Environment, United Kingdom. These sessions covered cleaner production in worldwide industrial activities.

-- GREEN COTTON:
A PRACTICAL EXAMPLE OF CLEANER PRODUCTION --

Mr Leif Noergaard, Owner and Chairman of NOVOTEX, Denmark, spoke of his personal experience with cleaner production. Mr Noergaard outlined the philosophy behind his company and the ongoing challenge of pursuing cleaner production in the textile industry.

In 1987, NOVOTEX stated that part of its company policy was to produce "green products" but soon realized there was no universal definition of what a green product is. So NOVOTEX set out to develop instruments to measure the environmental value of its products.

Every aspect of a product's life must be examined to calculate its environmental value. Mr Noergaard detailed how his company determined these environmental values by taking into account "environmental variables" of production: use of pesticides, fertilizer, irrigation and defoliants, transportation and working conditions. Only by analyzing all these phases could the processes be improved.

Once NOVOTEX was producing a "green product" it was proud of, marketing pr ed another challenge. Though research tells us consumers will pay 10% more for p. ven environment-friendly products, fake "green products" exist on the market, making consumer education a strategic necessity.

From the audience, Mr Cornut, Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME), France, raised the issue of human rights in the cotton fields of

Egypt where children are picking cotton and being exposed to toxic pesticides.

Mr Andrew Blaza, British Confederation of Industry, spoke of agro-industrial technology that is available but not receiving the attention it deserves. According to Mr Blaza, the agro-industrial sector must opt for insect-resistant varieties of genetic engineered cotton.

Mr Ken Geiser, Massachusetts Toxics Use Reduction Institute, United States, said the US is searching for standards of safety (rather than risk) and looking at food standards for a measure of safety and use in cleaner production. The aim is to move from processes to products. Mr Geiser hoped to hear what government actions might better develop markets for clean products.

-- CLEANER PRODUCTION IN UNITED STATES INDUSTRY --

Mr Joel Hirschhorn, a cleaner production consultant from the United States, spoke of cleaner production in his country and how developing countries can learn from the US experience.

Mr Hirschhorn outlined two economic struggles. First, the cleaner production ideal is competing against alternative environmental strategies, such as EOP technology. If cleaner production is to prevail, its true economic benefits must be highlighted. When Mr Hirschhorn recommends cleaner production to his clients in developing countries, he talks exclusively about its economic benefits. Secondly, we are at the beginning of an industrial revolution driven by environmental and social issues. The result will be that some industries will not survive, the biggest loser being the chemical industry. Industries whose products are not green will eventually disappear, though not willingly.

Mr Hirschhorn described three stages in the promotion of clean technology:

- Raising awareness, a process which in the US took ten years of educating the public, industry, etc.

- Securing government commitment to new laws and regulations that recognize the priority of cleaner production. NGOs were responsible for gaining public and worker support to carry out cleaner production to its fullest degree.

- Implementation

Public and worker demands do not give rise to all economic benefits of cleaner production. In the US, a large part of savings is due to regulatory costs. Since the same level of legal and regulatory measures do not exist in developing countries, the other benefits of cleaner production must be highlighted: the benefits of awareness and control of worker exposure and occupational hazards; better worker safety and health improve productivity.

In his consultancy to developing countries, Mr Hirschhorn is not always told what chemicals a company has used in its industrial process. These chemicals are often imported and adequate records are not kept. In addition, savings on energy, water and expensive imported materials are not always accounted for.

In the US, cleaner production progress is not as good as it should be. Mr Hirschhorn advocates Total Quality Management, the philosophy being, if you do not measure something, you will not improve it. More attention to measurements of success will better promote cleaner production.

A materials revolution is taking place. Plastics made from petroleum can now be produced from agricultural products, an important innovation for developing countries which, growing more prosperous, generate more plastics garbage. Also, these countries need to learn about composting. For off-shore drilling, non-toxic drilling fluids, available today in the US, should be made available elsewhere.

Company managers in developing countries must be given better practical information. Their cleaner production awareness is growing, but they do not know where to buy even low-cost technologies that are easily transferred.

From the audience, Mr Lashkari of India, questioning Mr Hirschhorn about the needs of developing countries, sighted an INFORM analysis presented at a cleaner production workshop in Bombay. According to the survey, 87% of those questioned said they required, not new technologies, but better housekeeping and a closer look at in-house processes in the chemical industries. Mr Hirschhorn agreed with Mr Lashkari but added that there are limits to good housekeeping.

With regard to Mr Hirschhorn's point about the inevitable changes in the chemical industry, Mrs Aloisi de Larderel challenged the industry to strive for survival through cleaner production innovation.

On the topic of inexpensive technologies, Mrs Aloisi de Larderel said she expected an inventory of these technologies would be part of UNEP IE/PAC's future programme plan.

2.3 Technology Transfer

Chairperson: Dr John Skinner, Deputy Assistant Administrator of the Office of Research and Development, United States Environmental Protection Agency.

The following Plenary Sessions highlighted, in part, the catalytic role of UNEP IE/PAC's Cleaner Production Programme in advancing the transfer of cleaner production technology.

-- OECD OUTREACH EFFORTS --

Mr Harvey Yakowitz of the Organisation for Economic Cooperation and Development (OECD) outlined future directions of the organization's Technology and Environment Programme.

In the areas of information and technology transfer, the objectives of the programme are to:

- promote access to information about technologies for cleaner production and products;
- identify barriers which impede the transfer of such technologies; and
- promote practices and policies which foster broad and effective transfer of information concerning these technologies and, ultimately, the technologies themselves.

-- UNIVERSITY ENGINEERING CURRICULA --

Dr Don Huisingh, professor at Erasmus University, the Netherlands, focused on the challenge of incorporating cleaner production into university curricula. In the paradigm shift from EOP technology to cleaner technology, effectively targeting an audience--such as students or trainees--is key to the planning process.

Dr Huisingh pointed to the Norwegian/Polish Training Programme for Cleaner Production as one the best developed in the world.

-- NETWORKING IN NORDIC COUNTRIES --

Mr Stig Hirsbak of the Nordic Council of Ministers presented the networking efforts in Denmark, Norway, Sweden and Finland through new publications and information systems.

The Nordic Council of Ministers is pursuing a link with UNEP IE/PAC's ICPIC to create an information system for Nordic countries. This system will be called NORCPIC. Nordic Information Centres will be established to monitor the information going into the system and the progress of the project.

-- CLEANER PRODUCTION FOR FRANCOPHONE COUNTRIES --

Mr Jean-Marc de Comarmond, Managing Director of the Technical Cooperation and Economic Development of the Cultural and Technical Cooperation Agency (ACCT), France, presented the plan for networking among francophone countries. The goal

is to enhance the countries' economic opportunities by increasing the amount of cleaner production information available to them.

A new partnership with UNEP IE/PAC includes a two-phase project for French translation of the ICPIC system. ACCT is also supporting a project to coordinate centres for Technology Research.

Other projects include internationally coordinating environmental issues, heightening the awareness of cleaner production among decision makers, galvanizing private industry into considering cleaner technologies, and distributing cleaner production information worldwide. Bilateral and multilateral partnerships are being sought to help with the execution of many of these projects.

-- INTERNATIONAL CLEANER PRODUCTION INFORMATION CLEARINGHOUSE (ICPIC) --

Ms Kirsten Oldenburg, Senior Consultant to UNEP IE/PAC, reported on the progress of ICPIC since its introduction at Canterbury in September 1990. Ms Oldenburg invited seminar participants to learn more about and become more involved with ICPIC because the strength of the system rests with the user.

Future plans for ICPIC include improving the content and accessibility of the system and exploring user participation through an "active collector" agreement. The possibility of regionalizing the system is also under consideration through options that include establishing subsystems, separate/linked systems, and information centres around the world.

2.4 National Cleaner Production Activities

Chairperson: Mr Michel Petit, Director, French Ministry of Environment.

-- CLEANER PRODUCTION PROJECTS IN THE NETHERLANDS --

Mr Sybren de Hoo of the Netherlands Organization for Technology Assessment (NOTA) spoke about Dutch initiatives for cleaner production. According to Mr de Hoo, the strength of many Dutch programmes comes from excellent dissemination of information and the coordination of a variety of different organizations. Mr de Hoo elaborated on the PRISMA Project, its successful national application and the adoption of its principles in developing a similar project at the EC level--PREPA.

Mr de Hoo reiterated the strength public support lends to the success of cleaner production. Dutch society has played a strong, positive role in the successful adoption and application of cleaner production principles. Also important to a programme's success are contacts with labour and environmental groups.

Mr de Hoo stressed the need, when introducing a cleaner production programme, to

accept and stick with one methodology, which will improve with time and experience, rather than experimenting with many individual methodologies, which eventually prove inadequate.

The PREPARE project began with 5 countries; now 11 to 12 take part. When developing its own country's programme, a new member tries to tailor it to the way the country and its companies are organized and to its culture.

Also in the Netherlands, manuals have been developed for pollution prevention in the metals, paint, and pesticides industries, and the goal is to produce 3 or 4 of these manuals a year.

After Mr de Hoo's presentation, Mrs Aloisi de Larderel stressed the importance of not reinventing cleaner production programmes. They should be created in a way that allows them to evolve over time and reflect the needs of the country they serve.

-- CLEANER PRODUCTION PLAN OF CHINA --

Mr Ke Jingliang of the National Environmental Protection Agency (NEPA), China, stressed that China's most important task is to build its economy. At the same time, since 70 to 80% of China's pollution comes from industry, cleaner production is a necessity. The Chinese cleaner production plan seeks to:

- strengthen publicity and education and enhance the public's awareness about the cleaner production concept;
- connect with ICPIC and establish a national cleaner production centre;
- use the World Bank's technical assistance loan to encourage demonstration projects;
- review policy on how to use existing environmental regulations for promoting cleaner production; make changes in industrial and environmental policies to promote cleaner production incentives;
- strengthen international cooperation.

-- THE CLEANER PRODUCTION EXPERIENCE IN POLAND --

Mr Zygfryd Nowak of the Central Mining Institute, Poland, spoke of his frustration with the Polish Ministry of Industry and Ministry of Environment, neither of which wants to take responsibility for Poland's cleaner production needs. For this reason, professionals from organizations like the Central Mining Institute have initiated collaboration with cleaner production experts from other countries in order to build programmes of their own.

The Norwegian/Polish Training Programme was established two years ago to teach the "preventive approach" at management level and build a network of cleaner production experts. The cleaner production philosophy encourages a company to rethink its technical and economic strategy and to compete more effectively against those with an EOP attitude seeking the same development capital.

The training programme, called "School," covers methods of cleaner production and requires students to design a project for their company. The results of the programme are encouraging, and there has been a high payback on the projects that have moved forward. Poland is now in the process of developing a report scheme for its demonstration projects which prove to society and industry that cleaner production works.

-- NATIONAL CLEANER PRODUCTION CENTRES --

Mr Ralph (Skip) Luken, UNIDO, spoke of the UNIDO and UNEP IE/PAC National Cleaner Production Centres, a project currently being put together. The aim of the centres is to show that economic growth and environmental protection can be compatible through the cleaner production approach.

The centres are being established because of the need to:

- move away from piecemeal approaches to the promotion of cleaner production;
- reduce pollution;
- change national policies and enterprise;
- transfer cleaner technology; and
- demonstrate the financial and environmental advantages of cleaner production.

The centres will draw on the experience of successful cleaner production projects such as PRISMA (their tailor-made programmes), LANDSKRONA (their waste audit approach), the Polish/Norwegian Project (their train-the-trainers approach) and projects in the United States (their variations on themes). A special focus will be placed on small and medium-sized enterprises that are often more difficult to reach.

The project strategy for choosing the centres' locations is to evaluate applicants, select six candidates by the end of February 1993, then visit countries to see what is planned, and make a decision on which sites will begin operation. UNIDO will provide field presence and engineering expertise. UNEP IE/PAC's role will be strategic, providing annual work plans, technical information and training.

Summary of First Day's Plenary Sessions:

Dr Frank van den Akker from the Dutch Ministry of Housing, Physical Planning and Environment, summed up the Plenary Sessions by focusing on the collection and dissemination of information, which necessitates the development of further cleaner production training facilities and the preparation of guidelines for workshops throughout the North and South. He expressed disappointment over the low turn-out from members of industry, since they are essential to the ongoing dialogue that must take place. He hoped however that participants from the chemical industry might take up the challenge of research in the bio-chemical field.

2.5 Regional Activities

Chairperson: Dr Ossama El-Kholy, Senior Advisor to the UNEP Executive Director.

-- REPORT OF THE AUSTRALIAN CLEANER PRODUCTION CONFERENCE --

Mr Darrell Reeve, of the Australian Environment Protection Authority, Victoria, reported on the success of the Asia-Pacific Cleaner Production Conference run within the framework of the UNEP programme. Over 400 delegates came together to gain practical understanding of the cleaner production concept and how to apply it in their organizations.

Participants learned about ICPIC, "cradle-to-grave" responsibility, and cleaner production experiences from an international group of presenters. Field trips to 17 companies who use clean technology enhanced the understanding of concepts.

The conference is regarded as a watershed in the Asia-Pacific region for the advancement of the cleaner production concept. Three countries have offered to host the next conference.

-- FUTURE ACTIVITIES IN THE AUSTRALIAN AND SOUTH ASIAN AREA --

Mr Jonathan Brown of the Australian Embassy, Paris, presented a paper by Mr Mark Hyman of the Commonwealth Environment Protection Agency (CEPA). CEPA helps lead and coordinate the Australian government's environmental programmes. The federal agency's National Waste Minimization and Recycling Strategy sees technology transfer to developing countries--including cleaner production techniques--as an important part of protecting the environment.

Australia is also considering coordinating with UNEP on the development of a region-specific ICPIC node for improved information dissemination.

Many Australian industries, recognizing the economic benefits, have already implemented cleaner production concepts. Community support and government initiatives have also pushed cleaner production forward.

-- NETWORKING AMONG COUNTRIES OF ASIA AND THE PACIFIC --

Mr Anthony Kolb, of the UNEP Regional Office for Asia and the Pacific, commented on the Network for Industrial Environmental Management (NIEM) in Asia and the Pacific. The purpose of the network is to catalyze participating institutions into cooperation and coordination in information exchange regarding environmental management in regional industries. Initially the network focused on the pulp and paper industry.

Mr Kolb highlighted successes and problems encountered in the NIEM programme to show the opportunities and difficulties involved. He also spoke of the network's possible expansion.

Cleaner production cooperation initiatives included:

- interacting with the UNEP Cleaner Production Programme;
- identifying key areas of concern in the regional environment and the appropriate cleaner production approaches that should be practiced;
- reviewing the impact of specific industrial practices;
- encouraging self-monitoring within industry;
- encouraging interaction between community and industry on the local level.

2.6 Working Sessions

The purpose of the Working Sessions was to identify future directions for the UNEP Cleaner Production Programme in six specific areas. Participants prioritized tasks and identified funding possibilities.

-- POLICY AND STRATEGY --

Chairperson: Ms Rebecca Hanmer, OECD Environment Directorate.
Rapporteur: Mr Michael Backman, Department of Industrial Environmental Economics, Lund University, Sweden.

The following proposals and commitments were put forward:

- To find a working model for future dissemination activities, emphasizing policy and strategy for promoting cleaner production in countries with limited experience in the area (The University College, Cork, Ireland). Mr de la Fuente, of the UN Economic Commission for Latin America and the Caribbean, volunteered to act as coordinator for dissemination activities in the countries of his region.

- Collecting information on barriers to implementation of cleaner production. Mr Sybren de Hoo volunteered to coordinate this activity and to investigate possibilities for funding the analysis and more widely disseminating the results.

- OECD and UNEP IE/PAC restated their previous offer to hold a joint workshop in June 1993 to examine the results and information resulting from OECD's Technology and Environment Programme and to develop ways to use it in other countries.

In light of the present limited financial capacity of the UNEP Cleaner Production Programme, the need to strengthen UNEP commitment to the programme was re-emphasized. To realize mutual objectives, however, other organizations should be invited to contribute and cooperate.

-- NETWORKING OF DATABASES --

Chairperson: Mr Myles Morse, Office of Environmental Engineering and Technology Demonstration, US EPA.
Rapporteur: Mr Prasad Modak, Centre for Environmental Science and Engineering.

Experts discussed how users of ICPIC could better be served. Topics included information needs, the high cost of data collection and new levels of system affiliation.

Potential future activities for the group include:

- the review of other data bases and networks;

- acting in an advisory capacity to ICPIC;

- improving data collection by identifying new information resources;

- developing regional marketing strategies for ICPIC based on user files.

-- INDUSTRY AND CLEANER PRODUCTION --

Chairperson: Dr Harry Spaas, DOW Chemical, Switzerland.
Rapporteur: Mr Rob Glaser, International Affairs, Ministry of Housing, Physical Planning and Environment, The Netherlands.

The following proposals were made:

- Introduction of industrial approaches for cleaner production based on a generic system to be developed by a team (or teams) consisting of industrial experts, governmental agencies, and NGOs, and comprising the following elements:

  - definition and application of voluntary industrial management practices and codes based on principles of improved technology and improved housekeeping and operational practices.

  - assessment systems to support the evaluation of alternative production systems, based on a unified set of appraised parameters.

  - training of government, public and industrial officials in the concept of cleaner production, based on the above elements of management and assessment.

- The ICPIC system should be further developed. Links should be established between the nodes and local, business and technological networks. To promote these integrated networks, expert assistance and training should be provided by industry/governmental institutions in the initial phase and consolidated by United Nations institutions.

Initial funding should be provided through government subsidies followed by a self-supporting entity.

-- CLEANER PRODUCTS --

Chairperson: Dr J.C. van Weenen, Univeristy of Amsterdam, The Netherlands.
Rapporteur: Mr James Salzman, S.C. Johnson, United Kingdom.

To date, UNEP IE/PAC has not coordinated a formal Cleaner Products Working Group. Since none exists either inside or outside UNEP, the participants in this working session see a need for such an expert group to address adequately the issues associated with cleaner products.

Possible roles for a "Cleaner Products Working Group" might be:

- An information/education catalyst, sending the message that cleaner products are an integral part of cleaner production.

- A means to networking; the group would collect and disseminate cleaner product case studies and other information for ICPIC, and initiate cleaner product seminars and pilot studies.

- Focusing on less developed country (LDC) issues.

- To increase understanding of government policy, the group could collect and disseminate government policies regarding procurement, material bans and product information.

Regarding resources, a group of experts from this meeting is prepared to explore the possibilities of establishing a Cleaner Product Working Group. A plan detailing target groups, the nature of the work and future ideas would be presented to UNEP IE/PAC for the formation of this group.

-- EDUCATION AND TRAINING --

Chairperson: Dr Don Huisingh, Erasmus Univeristy, The Netherlands.
Rapporteur: Dr N.J. Rao, Institute of Paper Technology, India.

The following recommendations were made:

- Cleaner production education and training materials should be compiled and evaluated. The best available materials should be disseminated and appear in ICPIC.

- A working group meeting should take place in February/March 1993.

- Cleaner production should be placed on the agenda of science and industry association seminars. A workshop should be planned for leaders of industry, regulatory agencies, labour, and government at national and regional levels. The message would be most effective if delivered during a science or industry association seminar. Cleaner production advocates need to take their presentations to the technicians rather than expecting experts from science and industry to come to them.

- The "train-the-trainer" concept should be employed to build knowledge locally, plan regional workshops for educators and resource people.

- Educators' workshops/meetings worldwide should be planned to highlight the importance of cleaner production in curricula.

Regarding funding, Working Session Chairman Don Huisingh, cited the need for funding of US$ 200,000/year to initiate the programme. Funding sources were not discussed.

-- CLEANER PRODUCTION PROGRAMME WORKING GROUPS --

Chairperson: Mr Darrell Reeve, Environment Protection Agency, Australia.
Rapporteur: Dr Ossama El-Kholy, Senior Advisor to the Executive Director, UNEP.

One group of experts met to assess and discuss the progress of all the UNEP IE/PAC Cleaner Production Working Groups. They identified as the Groups' key priority the need to develop closer ties with industry to ensure cooperation.

New activities under way include cleaner production handbooks, videos, and dedicated pages in trade journals. Most groups have focused on cleaner production process audits.

Due to difficulties facing the Solvents Working Group, a recommendation was made that its members be redistributed among the other working groups for better synergy.

Funding is still a problem in almost all groups.

CLEANER PRODUCTION: WHAT NEXT

2.7 Future Directions for the UNEP Cleaner Production Programme

Discussions in Plenary and Working Sessions yielded the following observations:

- Satisfaction was expressed with the UNEP IE/PAC Cleaner Production Programme as a catalyst for change that provides a successful networking platform. Some countries and organizations have now launched their own cleaner production programmes, and many activities are taking place within the framework of the IE/PAC programme.

- Though a recognized concept, cleaner production is not always well understood and is only making slow progress in replacing more traditional behaviour.

- Specific cleaner production projects show that many barriers to cleaner production, difficult to overcome, still exist. One barrier in particular, the environment industry's shortcut of selling end-of-pipe technology, needs special attention.

- Small and medium-size enterprises are difficult to reach; large enterprises are difficult to penetrate.

- Industry participation in the cleaner production network needs to grow.

- Training and education needs are high. Cleaner production is not only a question of "hardware," but also a question of "software"--know-how, environmental policies and management, equipment maintenance and "good housekeeping" procedures. An emphasis on hardware is misplaced and misleading.

- With strong involvement from industry, National Cleaner Production Centres should be established to raise awareness, train various stakeholders, provide information, and support demonstration projects. National centres could draw upon those which already exist at the local level (or on those set up by the industrial sector).

Based on these observations, the following recommendations for action in the near future emerge. UNEP should:

- pursue the UNEP/UNIDO National Cleaner Production Centres project in developing countries;

- continue to provide the platform for networking and, as a part of this networking, continue and improve information exchange through publications, such as the Cleaner Production Newsletter, and through ICPIC;

- develop training activities within the framework of an overall training strategy;

- increase the involvement of existing working groups while initiating new groups in such areas as cleaner products;

    - support demonstration activities, in cooperation with partners;

    - ensure industry's greater involvement, in particular through trade associations; and

    - support the development of and expand knowledge about cleaner production tools.

Commitment from Participants:

A number of participants committed themselves, or their organizations, to actively contribute to the Cleaner Production Programme. They included international organizations such as the International Bank for Reconstruction and Development (IBRD), European Economic Commission (EC), Economic Commission for Latin America and the Caribbean (ECLAC), Organization of American States (OAS), Agence de Coopération Culturelle et Technique (ACCT), World Federation of Engineering Organizations (WFEO), and the International Council on Metals in the Environment (ICME).

Seminar Concluding Remarks:

Mr Michel Mousel, Chairman of the French Agency for the Environment and Energy (ADEME), stated that this event was an important step forward in the implementation of recommendations adopted by heads of governments in June at the United Nations Conference on Environment and Development (UNCED). Mr Mousel also recommended that UNEP IE/PAC's Cleaner Production Programme be reviewed in another two years and that the corresponding seminar should be held in a developing country.

UNITED NATIONS ENVIRONMENT PROGRAMME

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Réf. :

UNEP Ministerial Meeting and Second Senior Level Seminar on Cleaner Production

October 27 - 29, 1992
Paris, France

AGENDA

Tuesday October 27, 1992

8.30 am Registration

MINISTERIAL MEETING ON CLEANER PRODUCTION

9.00 Opening statements:

- Executive Director, UNEP
- Minister of the Environment, France

UNCED identified cleaner production as a way to reconcile the environment and economy. The following presentations will focus on country experiences in adopting cleaner production policies and practices, the opportunities and constraints they represent, and on what innovative partnerships--among government, industry, and environmental NGO's--could be developed to further advance cleaner production.

Presentations by Ministers, Industry CEO's and Environmental Group Leaders.

11.00 Coffee Break

11.30 Continuation of Presentations and Comments

13.00 Lunch (hosted by UNEP)

14.30 Summary of Morning's Presentations

14.45 A Roundtable Discussion, Chairman: Executive Director, UNEP.

The goal of these discussions, based on the morning's presentations, will be to formulate concrete strategies to advance cleaner production at the national level. The discussions will also lay a foundation for the Senior Level Seminar to follow.

16.00 End of the Ministerial M. ıng.

16.30 Press Conference.

Wednesday October 28, 1992

SECOND SENIOR LEVEL SEMINAR ON CLEANER PRODUCTION

09.00 I. **Welcome and Introduction to the Seminar:**

"From Canterbury to Paris; An Update on The Cleaner Production Programme", Mme. Jacqueline Aloisi de Larderel, Director, UNEP Industry & Environment Programme Activity Centre.

09.30 II. **Progress in the Framework of the Cleaner Production Programme.**

The following plenary sessions, which highlight the catalytic role of IE/PAC's Cleaner Production Programme, will provide a review of different ways that Cleaner Production has been implemented. Today's sessions cover industrial activities and technology transfer, a supporting tool.

II a) Industrial Activities

Chairperson: Mr David Pounder, Department of the Environment, United Kingdom.

- Industrial Cleaner Production Activities From a Developing Country Perspective, Ing. J.C. Vargas,. National Association of Chemical Industries (ANIQ), Mexico.
- Green Cotton: A Practical Example of Cleaner Production, Mr Leif Noergaard, NOVOTEX, Denmark.
- Cleaner Production in the Petroleum Industry, (Speaker to be determined).

10.30 Coffee Break

11.00 II b) Technology Transfer

Chairperson: Mr John Skinner, Office of Research and Development, United States Environmental Protection Agency

- OECD Outreach Efforts - The Technology and Environment Programme. Mr Harvey Yakowitz, Organization for Economic and Community Development.
- Incorporating Cleaner Production into University Engineering Curriculum. Dr Don Huisingh, Erasmus University, The Netherlands.

- Cleaner Production Networking in Nordic Countries. Mr Stig Hirsbak, Secretary of Cleaner Production, Nordic Council of Ministers.

- Cleaner Production for Francophone Countries. Mr Jean-Marc de Comarmond, Directeur Général de la Coopération Technique et du Développement Economique, Agence de Coopération Culturelle et Technique

- UNEP International Cleaner Production Information Clearinghouse. Ms Kirsten Oldenburg, UNEP IE PAC.

13.00 Lunch

14.30 III. **Parallel Working Sessions.**

While providing participants with substantive information for their future activities, these discussion sessions will also evaluate the effectiveness of and identify future directions for IE/PAC's Cleaner Production Programme.

Session 1: Policy and Strategy Issues

Chairperson: Ms Rebecca Hanmer, Head of Pollution Control Division, OECD Environment Directorate.

Rapporteur: Mr Michael Backman, Research Manager, Department of Industrial Environmental Economics Lund University, Sweden.

Session 2: Networking of Databases:

Chairperson: Mr Myles Morse, Office of Environmental Engineering and Technology Demonstration, United States Environmental Protection Agency.

Rapporteur: Mr Prasad Modak, Centre for Environmental Science and Engineering (CESE), Indian Institute of Technology

Session 3: Elements of a Cleaner Production Programme:

Chairperson: Dr Harry Spaas, DOW Chemical, Switzerland.

Rapporteur: Mr Rob Glaser, Inspector of the Environment, International Affairs, Ministry of Housing, Physical Planning and Environment, The Netherlands.

Session 4: Cleaner Products:

Chairperson: Dr J.C. Van Weenen, Coordinator of Eco-Design, EEC-EUREKA/PREPARE.

Rapporteur: Mr James Salzman, Environmental Manager-Europe, S.C. Johnson.

Session 5: Education and Training:

Chairperson: Dr Don Huisingh, Erasmus University, The Netherlands.

Rapporteur: Dr N. J. Rao, Institute of Paper Technology, India.

Session 6: Cleaner Production Programme Working Groups

Chairperson: Mr Darrell Reeve, Environment Protection Agency, Australia.

Rapporteur: Dr Ossama El-Kholy, Senior Advisor to the Executive Director, UNEP.

16.00 Coffee Break

16.30 III. **Parallel Working Sessions (continued)**

18.00 Summary of Today's Sessions

18.30 Reception

Thursday October 29, 1992

09.00 II. **Progress in the Framework of the Cleaner Production Programme (continued)**

These plenary sessions are a continuation from yesterday. Today's cover national and regional cleaner production activities.

09.10 II c) National Cleaner Production Activities

Chairman: Mr. Michel Petit, Director, French Environmental Ministry.

- The PRISMA/EUREKA Project. Mr Sybren de Hoo, Netherlands Organization for Technology Assessment.
- Cleaner Production Plan of China, Mr. Wu Zijin, Consultant, National Environmental Protection Agency, China.
- The Cleaner Production Experience in Poland. Dr Zygfryd A. Nowak, Central Mining Institute, Poland.
- National Cleaner Production Centres. Skip Luken, UNIDO.

11.00 Coffee Break

11.30 II d) Progress: Regional Activities, an Asia-Pacific Case Study

Chairperson: Dr Ossama El-Kholy, Senior Advisor to the UNEP Executive Director, UNEP.

- Report of the Australian Cleaner Production Conference, February 1992. Mr Brian Robinson, Environment Protection Authority, Victoria, Australia.
- Future Cleaner Production Activities in the Australian and South Asian Area. Mr John Whitelaw, Commonwealth Environment Protection Agency, Australia.
- Networking for Cleaner Production Among Developing Countries of Asia and the Pacific. Mr Anthony Kolb, UNEP Regional Office for Asia and the Pacific.

12.30 Lunch

14.00 IV. **Cleaner Production: What's Next?**

The outcomes of the final afternoon's sessions will guide the expanding worldwide Cleaner Production Network. Not only will these sessions help to determine the future of IE/PAC's Cleaner Production Programme, but they will also solicit commitments from seminar participants on specific ways to support the Programme and/or national activities that complement the activities of the Programme. Key recommendations will be submitted to the 17th Session of the UNEP Governing Council (May 1993) for consideration.

14.10 ***Summary Reports of the Working Sessions***

16.00 **Coffee Break**

16.30 ***Discussion of and Future Directions for the UNEP Cleaner Production Programme***

Panel: Members of The Cleaner Production Programme's Core Advisory Group

18.00 ***Seminar Concluding Remarks:***

- French Minister
- Senior UNEP Official

MINISTERIAL MEETING AND SECOND SENIOR LEVEL SEMINAR ON CLEANER PRODUCTION
27-29 October 1992, Paris, France

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UNEP IE/PAC

Ministerial Meeting and Second Senior Level Cleaner Production Seminar

October 27 - 29, 1992
Paris, France

Union Internationale des Chemins de Fer
16 rue Jean Rey 75015 Paris France

Cleaner Production

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UNEP gratefully acknowledges the support that IBM has given in providing computer equipment for the ICPIC Training and Demonstrations.

Document N° 7 LCA Seminar Notice

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UNITED NATIONS ENVIRONMENT PROGRAMME

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MINISTERIAL MEETING ON CLEANER PRODUCTION

Paris, France
27 October 1992

Discussion Paper

This paper has been prepared as background for the Ministerial Meeting to stimulate discussions on implementing cleaner production and to explore possible recommendations for action which could be adopted at the meeting and subsequently presented at the 17th Session of UNEP's Governing Council, May 1993.

The paper contains:

1. A general background including:

   A. a presentation of the cleaner production concept,

   B. a summary of the main recommendations adopted in UNCED's Agenda 21 related to cleaner production, and

   C. an overview of some initial steps taken by governments, industry, and UNEP--in cooperation with other international agencies--to implement cleaner production.

2. A description of possible policy frameworks for implementing cleaner production, including a list of issues the Ministers might wish to address.

3. Suggestions for recommendations for action that the Ministerial Meeting might wish to consider for submission to the UNEP 17th Governing Council

1. General Background

A. The Cleaner Production Concept

In contrast to the traditional reactive "cure and restore" approach to environmental impacts, cleaner production is a preventive environmental strategy that leads to innovations in technology and management.

Cleaner production has many facets. In summary, it:

- means to consume fewer resources, less energy, and less toxic raw materials, and to generate fewer and less toxic air emissions, waste waters, and solid and hazardous wastes.

- requires changes in production and consumption patterns. It, thus, applies to both production processes and products and requires a thorough understanding the full life cycle impacts of products.

- cannot be successfully implemented without changing behavior of the public, government, and industry and adopting new management styles in industry and government.

- is the application of good, appropriate technology and attentive management and operation practices. This does not always require high investments, but when it does, returns on investments are often short.

B. Cleaner Production and Agenda 21

Cleaner production is woven throughout Agenda 21.

- Chapter 4, "Changing consumption patterns" urges governments to encourage greater efficiency in the use of energy and resources to, for instance, reduce wasteful packaging.

- Chapter 9 "Protection of the atmosphere" also asks for the efficient use of materials and resources, taking into account all aspects related to the life cycle of products.

- Chapter 17 on the "Protection of the sea" promotes environmentally sound technology and sustainable practices to eliminate the discharge emissions of organohalogen compunds.

- Chapter 18 on the "Protection of freshwater resources" calls for promotion of water conservation and initiation of water pollution prevention and control programmes.

- Chapter 20 "Environmentally sound management of hazardous wastes" calls for "changing industrial processes and consumer patterns through pollution prevention and cleaner production strategies."

- Chapter 21 "Environmentally sound management of solid wastes" says the application of the integrated life cycle management concept is a way to change unsustainable patterns of production and consumption.

- In Chapter 30 on "Strengthening the role of business and industry" one of two programme areas is "Promoting cleaner production."

- Chapter 34 is devoted to the transfer of environmentally sound technologies, which are not only end-of-pipe technologies, but also those that protect the environment, are less polluting, and use resources in a more sustainable manner.

These and other similar statements leave no doubt that cleaner production is an acknowledged, important path toward the resolution of economic development and environmental protection.

C. The Implementation of Cleaner Production

A number of countries have launched cleaner production policies and strategies at the national (and local) level. They have done so because it results in better environmental protection for their society at lower cost.

Similarly, some proactive, large enterprises have developed internal cleaner production programmes. The efficiencies gained have proven that cleaner production is simply good business practice.

At the international level, organizations including UNEP have advanced cleaner production. On the basis of the Governing Council decision 15/37 in 1989, UNEP established the Cleaner Production Programme. The overall aim of this catalytic programme--launched in cooperation with other governments and international organizations--has been to raise worldwide awareness about cleaner production and to transfer information and experiences about it.

Despite this attention over the last decade, cleaner production has been only slowly replacing traditional practices. Thus, society is not gaining the benefits of lower costs for better environmental protection very rapidly.

Agenda 21 does not recommend a clear strategy to implement cleaner production. Thus, based on past experiences, what has proved successful? How can these be applied more generally, more comprehensively? How can this knowledge and know-how be more effectively transferred to others?

2. Policy Frameworks for Implementation

There is a consensus developing that cleaner production can be effectively enhanced by governments only if an appropriate mix of measures is applied to both industry and society. These measures include: regulations, economic instruments, and support measures.

A. Regulations

The changes in behavior and technological innovations needed to implement cleaner production cannot be decreed by government. However, some regulations--because they increase the costs of and strain the capabilities of reactive approaches and because they make industry more aware of the impacts of their operations---have been more successful than other at driving cleaner production.

How important are command and control regulations for cleaner production? For instance, how well can it be adopted in the absence of strong, well enforced end-of-pipe regulations?

Overall, how successful have command and control measures, such as pollutant emissions standards, been in promoting cleaner production?

Should requirements for public release of information--such as toxic release inventories--be prescribed? How can the results be widely disseminated?

How can international agreements prevent the export of outdated or polluting technologies and enhance the export of cleaner technologies?

B. Economic Instruments

Again, there is a growing consensus that the price of the products should reflect their impact on the environment. However, this general principle is often difficult to put into practice and any results are difficult to measure.

How seriously do subsidies on the use of resources, such as water and electricity, discourage cleaner production?

How do current international trade rules affect cleaner products and processes?

What are the affects of fees and taxes applied to the generation of pollutants and wastes on cleaner production?

How can rules on extended producer responsibility (e.g., the packaging "take back" requirements) be written so as to encourage cleaner production?

What are the results of positive incentives to promote adoption of cleaner production, such as tax rebates and funding for research?

C. Support Measures

At national and local levels, the implementation of cleaner production requires an increased awareness and an understanding partnership between the various partners involved--government, industry, environmental groups and the general public.

How can these partnerships be defined and established?

Who should be involved and what are the mechanisms needed to sustain the partnerships over the long term?

What are the most efficient support measures: awards, training, public education, technology research, information, demonstration projects, ...?

How can small and medium enterprises be reached and their practices affected?

At the international level, the implementation of cleaner production requires: technical cooperation and increased transfers of information, cleaner production technology--including know-how and management skills--and flows of financial resources.

How can this support be assured?

What are the incentives for industries to share technology and information across borders?

What processes are needed to facilitate the transfer of additional resources and of cleaner technologies themselves, particularly to small and old industries in developing countries?

3. Possible Recommendations for Further Action

Among others, the Ministerial Meeting might wish to consider and recommend the following concrete actions:

One
Develop international guidelines obliging exporters of technology to provide information on potential environmental impacts to importing countries. To be operational, these guidelines require importing countries to establish a specific environmental review step in existing import license processes.

Two
Designate a senior level person in each country to be the focal point for exchange and dissemination of information on and to promote cleaner production.

Three
Establish in 1993 a new trust fund to support the setting up of National Cleaner Production Centers. This initiative has been jointly defined by UNEP and UNIDO to institutionalize cleaner production in developing countries. The Centers are required to be fully self-funded within five years of operation.

Four
Establish a US$1 million trust fund to inventory key cleaner production processes in use and products being designed in various industry sectors. The objective would be to assess their potential use and constraints to their use (i.e., existence of patents, excessive costs) for SMEs in developing countries and to define concrete demonstration projects (including installation as well as best operation and maintanence practices), with a view to enhance transfer of technologies which are fundamental to promote cleaner production.

UNEP IE/PAC

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Cleaner
Production

SESSION I

"FROM CANTERBURY TO PARIS; AN UPDATE ON THE CLEANER PRODUCTION PROGRAMME"

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FROM CANTERBURY TO PARIS
An Update on the Cleaner Production Programme

1. Introduction

Starting the in 1970's and continuing more seriously in the 1980's, people began rethinking the traditional, reactive approach to environmental protection. Out of this process came a new preventive strategy for which many names have been coined: low and non waste technology, waste reduction, pollution prevention, source reduction, and more.

UNEP IE/PAC chose the term "cleaner production" because it suggested a more comprehensive preventive approach to environmental protection, addressing all phases of the production process and product life cycle. Cleaner production, thus, encompasses such actions as energy and raw materials conservation, eliminating toxic substances, and reducing the amount of wastes and pollutants created by products and processes before they can be emitted to air, land, and water. All these actions have the same aim; to reduce the risks to humans and the environment of industrial activities and consumption and to do so in the most cost-effective way possible.

The Cleaner Production Programme was established by IE/PAC in May 1989 and formally launched in September 1990 at the "Seminar on the Promotion of Cleaner Production." This seminal meeting was held in Canterbury and sponsored by the UK government.

A number of UNEP Governing Council decisions--starting with Decision 15/37 of May 1989--have been instrumental in providing mandates for the Programme (see annex A). Most recently, many chapters of Agenda 21, the report of the U.N. Conference on Environment and Development (UNCED), highlighted the benefits of cleaner producton. Chapter 30, for instance, on Strengthening the Role of Business and Industry devotes one of two programme areas to "promoting cleaner production."

2. General Background

By the time of the Canterbury seminar, the programme had developed the International Cleaner Production Information Clearinghouse (ICPIC), created several working groups, and published two issues of its newsletter "Cleaner Production," which had been distributed in 160 countries.

At Canterbury, sessions were held and discussions ensued on differing perspectives on cleaner production, databases and the transfer of information, tools to promote cleaner production, cleaner products, the working groups, and the programme itself. ICPIC was demonstrated for the first time and many participants were trained on its use.

The question asked at Canterbury was: What next for the Cleaner Production Programme? The answers came in the form of recommendations to UNEP (see box 1).

Box 1. CANTERBURY SEMINAR Summary of Recommendations
--To support the initiation and development of national cleaner production programmes in different regions of the world and to develop the necessary training activities and materials. --Link with the 1992 UN Conference on Environment and Development. --Continue gathering and processing information on cleaner production along the ICPIC scheme. --Develop further the dissemination of information on cleaner production worldwide. --Continue the work of the existing working groups and to establish others in other industrial sectors. --Continue networking with international and other organizations. --Support the establishment of national focal points.

Today, two years since Canterbury, two questions are posed:

(1) Has the programme met the recommendations?

(2) What next for the Cleaner Production Programme?

3. Since Canterbury

The Cleaner Production Programme has raised a lot of interest since Canterbury. It counts numerous governments, industrial firms, and organizations among its partners. Thanks to this support, the programme has grown. It reaches more people through new activities and outreach efforts. It has more staff and can disseminated more substantive information. And, the network of experts that the programme relies upon to assist it in meeting its objectives has increased.

Those objectives are to:

- increase worldwide awareness of the cleaner production concept,
- help governments and industry develop cleaner producton programmes,
- foster the adoption of cleaner production throughout societies, and
- facilitate the transfer of cleaner production techniques and technologies.

4. Current Status/Future Plans

To carry out these objectives, the programme has five major elements. They are ICPIC, Publications, Technical Assistance, Working Groups, and Training Activities. Training and technical assistance are outreach efforts. Information is collected and disseminated through ICPIC and publications. Working groups contribute to outreach and assist with information collection and dissemination.

4.1 International Cleaner Production Information Clearinghouse (ICPIC)

As many know, ICPIC is an electronic system accessible to anyone with a personal computer, a modem, communication software, and access to a telephone line. The system was set up in cooperation with the U.S. Environmental Protection Agency (EPA), who continues to provide funding and technical support. It contains information that explains and illustrates the cleaner production concept and "points" users to more specific sources of information. Cleaner production information is provided by IEPAC and well as ICPIC users. The costs of using ICPIC are the equipment and the telephone link.

Theoretically, ICPIC allows the cleaner production network to exchange information on a continuous basis, 24-hours a day, all over the world. Realistically, access to ICPIC can be limited due to various technical inequities, especially in developing countries. For instance, not everyone has access to a computer. If they do, they do not necessarily have a modem and communications software. Even those equipped may not be able to afford the cost of the telephone link. And, telephone links between Paris and some countries are too weak or irratic to maintain ICPIC connections.

The other limiting factor of ICPIC is its content, the value of the information it contains. Unlike the issue of access, the programme has total control over and assumes responsibility for ICPIC content. Providing valuable, timely information is a major goal of the programme.

4.1.1 Accomplishments

The number of registered users on ICPIC has grown to almost 500 since initiation of the system. Other statistics on users by number, affiliation, and geographic location are shown in annex B.

Largely because of the dedicated efforts of the programme's working groups, the information contained in ICPIC has increased. Today the system's database contains 648 techical case studies, 1022 bibliographic entries, and a contact list of 156 experts. These databases, except the contacts, are shared with US EPA's PPIC, a pollution prevention system. In 1992, the programme reorganized the Bulletins section into an electronic newsletter. The goal is to have new information entered at least weekly. The best of the bulletin information will be used twice a year as

content for the Cleaner Production newsletter to reach those who do not have access ICPIC.

While still structured as orginally designed, ICPIC is nevertheless undergoing a number of changes. A thorough review in 1992 identified many areas for improvement. Some already appear in the system. These include: a redesigned main menu, new introductory information, improved consistency in user prompts, and the elimination of longstanding typographical errors. A major change is that upon entering ICPIC users will now find they can choose between three systems: ICPIC, PPIC, and OAIC. While PPIC has always been available through ICPIC, OAIC is new. It is UNEP IE/PAC's OzonAction Information Clearinghouse, funded by the IMOF of the Montreal Protocol.

Some ICPIC access problems are being addressed by the development of a diskette version of ICPIC. The prototype of this diskette is being user tested in Paris, 27-29 October 1992. Results of the testing will be incorporated into the first version of the diskette. IE/PAC has a query response service that uses ICPIC as one of its many reference sources. This enables people who cannot access ICPIC directly to benefit from its databases.

A long sought document for ICPIC users, an ICPIC Users Guide, will be available at the end of October 1992. The document has been designed so that it can be updated, as needed, by section rather than having to republish the entire document. This first "review version" will have limited distribution. Comments and suggestions received by May 1993 will be incorporated into Version 1.0 (June 1993), which will be widely available through the U.N. document ordering system.

4.1.2 Future Plans

ICPIC is not a static system. To be viable, it must continue to change. New information has to be sought, exisiting information has to be reviewed and updated or removed. The message center, the direct link between users, has to be monitored on a daily basis. Feedback on ICPIC by users is a key part of this process.

For the development of the new OAIC, the ICPIC/PPIC software was upgraded. ICPIC will now be able to adopt some of these changes. One has already been incorporated; that is a new display for the experts in the contacts database. However, as this new format contains space for additional information, the contacts will need to be reviewed again in early 1993.

Already underway is a review of the International Programmes and Legislation databases. These will be revamped and updated, as resources permit, in 1993. The technical case studies, especially the original ones placed into the system, also need to be reviewed. However, this project will require the identification of specific resources before it can be carried out.

Over the last few years, there have been many discussions about expanding the reach and content of ICPIC by creating regional "nodes." To clarify the costs, benefits, and

responsibilities among parties, the Cleaner Production Programme has written a paper outlining a wide range of possible associations (see "ICPIC Associations: Opportunities for Networking").

One such expansion of ICPIC is underway. IE/PAC, US EPA, and Agence de Cooperation Culturel et Technique (ACCT) are now preparing a Memorandum of Understanding to create a Francophone version of ICPIC. After Phase I of this project is completed, ICPIC users will be able to choose French, as well as English language, screens and prompts. Phase II will cover the collection and addition to ICPIC of documents in French. This will begin a process of making ICPIC useful to those who do not speak and/or understand English.

4.2 Publications

Two years ago, the programme's publications were limited to issues No. 1 and 2 of the Cleaner Producton newsletter. Now, the newsletter is at issue No.5 and other publications have been produced. The programme has gained a new image (and new logo) with the printing of a Cleaner Production Programme brochure.

Publications have two purposes: to raise awareness about cleaner production and to supplement training activities. While ICPIC serves the same purposes, publications can be disseminated and used more widely. Another strength is that many publications are available in a variety of languages, as the list below indicates.

Many of the publications have been cooperative efforts. A process audit manual project was spearheaded by the Sectoral Activities component of IE/PAC in cooperation with UNIDO. A climate change document was a joint project with IPIECA. The Department of Industrial Environmental Economics, Lund University, Sweden, held a number of expert seminars in 1991 and 1992 in the framework of the Cleaner Production Programme and proceedings of each are now available.

4.2.1 Publications List

- Cleaner Production Newsletter is published twice a year and is available in English, French, Chinese, Spanish. Newsletter issue 5 was published in Spring 1992. The Fall 1992 issue has been delayed (publication expected by December 1992) so it can include a review of the Ministerial Meeting and Second Senior Level Seminar on Cleaner Production.
- Cleaner Production Programme brochure (1992), available in English, French, and Spanish.
- Access Guide to ICPIC (1991); English and French.
- Audit and Reduction Manual for Industrial Emissions and Wastes (with UNIDO, 1991); English, Spanish, Chinese,
- Climate Change and Energy Efficiency in Industry (with IPIECA, 1991); English.
- "Report of the Workshop on Country-Specific Activities to Promote Cleaner Production" (September 1991); English.

- "Report of the Seminar on the Promotion of Cleaner Production held at Canterbury" (September 1990); English.
- Seminar Proceedings (with Lund University/Sweden); English:
  --Environmental Auditing in Cleaner Production Strategies (April 1991).
  --Packaging and the Environment (February 1991).
  --Global Environmental Labelling (September 1990).
  --Cleaner Production Strategies in the Automotive Sector (December 1991).
  --Extended Producer Responsibility (1992).
- ICPIC User Guide (review version, October 1992); English.

4.2.2. Future Plans

Despite the increase in number of publications, areas for improvement are known. The programme needs basic training materials and documents explaining in some detail the benefits and limitations of cleaner production. And, although some publications have been translated into a number of languages, the process of assuring such translations is adhoc. For instance, while several issues of the newsletter have been translated into Spanish, it is not assured that future issues will be.

To improve the efficiency and impact of training activities, it will be essential for the programme to develop and produce training materials. These materials will be designed so that they can be used by cleaner production staff when conducting training and, in turn, by those being trained. The materials are envisioned to include: a set of overheads on cleaner production with a guide enabling anyone to use them and a booklet discussing cleaner production in detail, its benefits and limitations.

This concept for training materials will allow for insertion of new publications over time. One idea is, for instance, to produce a series of booklets--by industrial sector--on specific cleaner production applications to help reinforce the concepts. In addition to new publications, IE/PAC may increase the frequency of the newsletter. This will be possible, without additional staff resources, by using information from ICPIC's bulletins (as described above) supplemented by other material. Increasing the frequency will, however, increase printing and translation costs.

4.3. Working Groups

The programme's working groups facilitate the collection of information and its dissemination, help to expand the worldwide cleaner production network, and provide expertise for training workshops. Groups on leather tanning, metal finishing, textiles, halogenated solvents, government policies, and harmonization of information were active at the time of the Canterbury seminar. Today's groups include:

- leather tanning,
- textiles,
- metal finishing,
- pulp and paper,
- biotechnology

- o data management
- o education, and
- o policies, strategies and instruments.

4.3.1 Accomplishments

Many of the technical case studies now in the ICPIC/PPIC database were contributed by the textile, leather tanning, and metal finishing working groups. The Pulp and Paper working group has 54 new case studies under review.

Networking--expanding the awareness of cleaner production--has been another accomplishment of working groups. Most of the information in ICPIC's contacts database is the result of working group efforts to identify experts in their fields. The Metal Finishing Working Group spearheaded an Asia and the Pacific regional cleaner production conference, held in February 1992 in Melbourne, Australia. Three of the working groups--textiles, tanning, and metal finishing--now publish their own newsletters.

Experts involved in working groups have participated in training workshops arranged by the Cleaner Production Programme in India, Africa, and China.

4.3.2 Future Plans

A complete picture of the working groups awaits the outcome of a Working Group Leaders meeting, 26 October 1992. From the results, the programme will be able to set an overall strategy for working groups. One new task may be to assist the programme in developing cleaner production technical booklets on individual industry sectors.

Because they operate under MOU's and their tasks are not yet completed, the pulp and paper, textiles, and biotechnology groups will continue. The continuation of other, voluntary groups will depend on identifying tasks and funding and the willingness of their leaders to continue. New groups may be formed; among those under consideration are cleaner products, food processing, and sectors of the chemical industry.

4.4 Training Activities

Training, which has been a major focus of the programme in the last two years, is a new element since Canterbury. In 1991/2, workshops were organized and held in Tanzania; Kenya; Yemen; Xiamen and Shaoxing, China; and Bombay, India. For each workshop, the programme designed the agenda and identified (and sometimes, funded) qualified experts to make presentations. In all cases, the workshops were cooperative efforts between IE/PAC and other organzations (see Cooperation).

One major event was organized and held in Paris in September 1991. The Workshop on Country-Specific Activities to Promote Cleaner Production brought together 50 experts from 17 countries. Over three days, the experts shared information on successful

elements and produced a set of conclusions on the needs for developing countries.

4.4.1 Accomplishments

Real training accomplishments are difficult to measure. Although it consumes a lot of resources, simply holding a workshop is not the accomplishment. Success comes from what occurs afterwards. Is cleaner production implemented in industry? Does government develop some policies or programmes to assist them?

An indirect measure is an evaluation of the follow through that occurs after a workshop has concluded. For example, as a result of the programme's efforts in cooperation with NEPA in China, the World Bank asked IE/PAC to write a proposal for a $5 million Cleaner Production Technical Assistance Project that NEPA will carry out.

Another significant follow up will be to the International Workshop on Cleaner Production for the Chemical Industry, held in Bombay, India, in September 1992. A number of possibilities were identified by the participants to the Bombay workshop.

4.4.2 Future Plans

It seems clear from the participants' and self evaluation of training activities in 1992 that training will continue in a similar fashion and will be, for some time to come, conducted at the same basic level of awareness raising. However, to conserve resources, the programme needs to become more efficient at organizing, delivering, and following up training activities.

The programme cannot cover the world and therefore needs a strategy to help focus its training over time in specific areas, at regional and/or local levels, and based an a broad definition of the "train-the-trainer" concept in which the "trainers" are people who will be applying cleaner production. One way to stretch its resources is to continue to cooperate with other organizations by helping them incorporate cleaner production into their environmental training materials.

A schedule of future training events has not yet been set although the programme already has received sufficient invitations from countries and organizations around the world to fill out 1993. Among the requests are those from: Portugal, West Asia, Egypt, and Latin America. Additionally, the French government has offered funding for a chemical industry workshop.

The programme already draws heavily for expertise (advise and presentations) from its contacts around the world. One problem always arises, however, and that is how to pay the travel costs of such experts. IE/PAC's APELL programme relies on experts from industry whose firms agree to pay their costs of participation. This concept will have to be built into the Cleaner Production Programme's training workshops in the future.

4.5 Technical Assistance

Technical assistance is the newest element of the Cleaner Production Programme. To date, assistance has been limited to matching needs with resources, such as identifying a technical expert for a specific task. As the programme moves into its next two years, however, techical assistance will play an increasingly important role.

Already two projects are in the proposal stage. With UNIDO, IE/PAC intends to launch a National Cleaner Production Centres (NCPCs) project. Plans are to help establish twenty NCPCs in developing countries over five years. This project was conceived as a result of conclusions from the Workshop on Country Specific Activities to Promote Cleaner Production (see above). The NCPC project will be more than technical assistance. In essence, it will extend the programme to a local level.

As already mentioned (under Training), in the second project the programme in help China to implement its Action Plan on Cleaner Production. The proposed Technical Assistance project includes a policy review, institutional building, and demonstration projects. As a new venture, the initial project many be limited to a few provinces. Successful components can then be extended throughout China.

Technical assistance will be a very resource intensive element for the programme, both in staff time and in travel expenses. The two projects--NCPC and China demonstrations--will strain the existing programme staff. In fact, one additional technical staff person will be necessary to carry out both obligations as the projects are scheduled to run concurrently. An alternative would be to reduce the amount of the programme's other training activities.

5. Cooperation

To be successfully applied, cleaner production must be a cooperative effort among industry, government, educators, and the public. IE/PAC's Cleaner Production Programme is, in turn, a cooperative effort among many organizations and governments. In fact, it is cooperation that makes the Cleaner Production Programme and its activities possible.

Some cooperation is in the form of direct support or inkind assistance to IE/PAC by governments and organizations to complement their own activities. Among those are:

- Australia
- Austria
- Denmark
- Finland
- France
- The Netherlands
- Norway
- Sweden
- The United Kingdom
- The United States
- The European Commission

Other cooperative efforts have involved specific projects or tasks. Included among them are:

- **UNIDO**--Audit and Reduction Manual for Industrial Emissions and Wastes and the proposed National Cleaner Production Centres project.
- **OECD**--Letters have been exchanged for the second year in a row between IE/PAC and OECD's Environment Division outlining a series of cooperative efforts between the Cleaner Production Programme and OECD's Technology and Environment Programme.
- **Lund University** (Department of Industrial Environmental Economics), Sweden--organized and arranged funding for a series of policy and strategy issues experts seminars in 1991 and 1992.
- **ANIQ** (Mexican Chemical Industry Association)--arranged translation and publication of two issues of the Cleaner Production newsletter.
- **IPIECA**--partially funded and arranged publication of Climate Change and Energy Efficiency in Industry
- **The Chemical Manufacturers Association of India**--organized and partially funded the International Workshop on Cleaner Production for the Chemical Industry, in Bombay, 3-4 September 1992.
- **National Environmental Protection Agency (NEPA)**, China--along with provisional and local environment bureaus, organized and funded two workshops in China in 1992 and assisted with travel expenses for Chinese participants to various other workshops.
- **World Bank**--preparing a technical assistance loan project for NEPA in which the Cleaner Production Programme is participating. Also, assisted with preparations for and funded travel of international experts who made presentations at the Bombay workshop, 3-4 September 1992.
- **United Kingdom** (Department of the Environment)--preparation of a Cleaner Production booklet with examples from developed and developing countries.

6. Conclusions: What Next for the Cleaner Production Programme?

A future for the Cleaner Production Programme seems assured. The need for its catalytic role is evident. Questions remain, however, about the exact content and relative focus of the five programme elements. While some individual activities are known, a strategy and resultant work plan for the next two years will be developed by the end of 1992. Both will be based on the recommendations made by participants to the Second Senior Level Seminar on Cleaner Production and any Recommendations for Future Action proposed by the Ministerial Meeting on Cleaner Production. In addition, a report will be prepared on the meeting for submission to UNEP's Governing Council, which next meets in May 1993.