STATUS REPORT:

CLEANER PRODUCTION IN LATIN AMERICA AND THE CARIBBEAN
ACKNOWLEDGEMENTS

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1.0 FOREWORD

When the UNEP Cleaner Production was launched in 1989 to raise awareness of cleaner production, only a small number of committed practitioners had ever heard of the concept. Today, only a decade later, cleaner production is globally recognized as the first priority option for sustainable development not only in terms of production processes, but also for products and services.

It is no longer enough to focus only on the “supply side” — production. There is also a need to focus attention on the “demand side”, that is increasing demand for cleaner products and services — consumption. This means that the various actors in the cleaner production field have come to require different kinds of support, and that the ways of promoting cleaner production have evolved as well. Raising awareness is no longer enough to broaden the implementation of cleaner production. Other complementary activities are now needed as well.

Today, UNEP is facilitating a global network of more than 300 organizations active in Cleaner Production, including regional and national cleaner production centres, universities, technical and research centres, the World Bank and other UN organizations. This global network is essential for the further evolution and implementation of the Cleaner Production concept world-wide.

This Status Report on Cleaner Production in Latin America and the Caribbean Region is an example of one effort to support and strengthen the regional cleaner production network. The report presents highlights of successes and challenges of cleaner production implementation. It can be useful to governments, industry, non-governmental organisations and other stakeholders engaged in implementing cleaner production. The aim of the report is to encourage continued regional co-ordination and cooperation, and to learn from the experience of others in the region. It thus serves as a means for regional and global information sharing and exchange.

The report provides a brief overview of the status of cleaner production in the region. It gives a general description of regional cleaner production activities, followed by highlights of successful initiatives and major barriers to cleaner production implementation. A review on a country-by-country basis in the region (16 in total) is also presented.

UNEP congratulates those in the Latin America and Caribbean region who have taken the lead, shortly after the Asia and Pacific region, to prepare such a report. We hope that similar status reports will be produced for all the regions of the world. Structured along similar lines, these reports could encourage and facilitate comparison of the benefits of cleaner production. We are also looking forward to receiving annual reports, demonstrating the progress of cleaner production in the region. These reports should form the basis for worldwide assessment of cleaner production achievements.

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2.0 REGIONAL CLEANER PRODUCTION ACTIVITIES

In the Latin American and Caribbean region there were no known previous comprehensive CP surveys. In order to carry out this pioneering initiative, a survey questionnaire prepared by UNEP was sent to all countries of the region, asking for information on their CP activities. Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Jamaica, Mexico, Nicaragua, Peru, Trinidad – Tobago and Uruguay, answered the questionnaire. These countries with 459 million inhabitants, together, add-up to a gross national product (GNP) of almost US$ 2 billion i.e. ~93% and 98% of the region’s total GNP and population respectively (World Bank, 1997). This report covers the majority of the Latin American and Caribbean region’s productive and consumer segments.

Considerable attention has been paid to cleaner production (CP) in the Latin American and Caribbean region in the last few years. The promotion of CP in the region’s countries has been significantly boosted by the creation of various National Cleaner Production Centres (NCPCs) supported by UNIDO/UNEP and sponsored by various countries such as Switzerland and the United States. Several technological centres, universities and other organizations have incorporated the approach into their training programmes, in their endeavor to create a more sustainable industry. The demand for establishment of additional CP Centres and NCPCs, as well as other initiatives shown by these stakeholders confirms their interest in implementing CP.

Among the main factors responsible for this regional interest in CP, are the stabilization of the most important economies in the region and the need to maintain their industries’ competitiveness in both the local and foreign markets. The CP concept, primarily used as a tool for saving inputs and reducing further treatment costs, is currently being viewed through a much broader perspective. Thus, more environmentally friendly companies and products are now a basic condition for competitiveness and market survival.

In countries having a strong pollution control structure, this structure functions as an additional incentive to CP. On the other hand, in countries that recognize their shortcomings in relation to the enforcement of the environmental law, CP is offered to the industries as an alternative for environmental quality preservation outside the formal legal framework.

The sponsorship of regional CP conferences by the various countries has improved the information exchange and integration among the region’s countries and has resulted in increased dissemination of CP.

2.1 CP Conferences

2.1.1 International Seminars in Colombia

Colombia has already organized two International Cleaner Production Seminars (respectively held in May 1996 and April 1998) as part of its policy instruments to promote CP, which are included in the terms of its National Cleaner Production Policy. The Ministry of the Environment of Colombia and UNEP jointly organized a Second Seminar with the participation of 9 countries: Argentina, Brazil, Chile, Ecuador, Mexico, Costa Rica, Nicaragua, Venezuela and Colombia. The deliberations in the seminar focused on the following themes:

- CP initiatives in Colombia, Brazil, Chile and Mexico
- Cleaner technology supply in the region
- CP information networks
- Environmental assessment methods
- National Cleaner Production Centres - worldwide experiences
- Cleaner technology solutions
- Main barriers to CP promotion at regional level.
2.1.2 The Mercosur Workshop

On May 11-14, 1998, the “UNIDO/UNEP Workshop on National Cleaner Production Centres of Mercosur” was held in Rio Grande do Sul State, Brazil. The workshop’s goal was to bring together representatives from the Mercosur (Southern Common Market) countries: Argentina, Brazil, Paraguay, Uruguay, Bolivia and Chile, for a presentation of the NCPCs’ programmes and activities. The event was jointly organized by Brazil’s NCPC, Centro Nacional de Tecnologias Limpas (CNTRL), the Rio Grande do Sul State Industrial Federation (FIERGS), UNEP, UNIDO and other local institutions. One of the workshop’s outcomes was the initiative to create a Mercosur CP network, the framework of which was outlined in a letter of intentions.

2.1.3 First Conference of the Americas on CP

A milestone in the region’s implementation process of CP has been the “Conference of the Americas on CP – Building the Roundtable for the Cooperation in the Hemisphere”. The first conference was held in São Paulo, Brazil on August 17-19, 1998.

This conference is considered to be the starting point for the establishment of a Latin American and Caribbean Cleaner Production Network, this being the first opportunity the continent had to discuss CP. São Paulo State’s (Brazil) environmental agency (CETESB) hosted and helped organize the event, held along with the United States Environmental Protection Agency (USEPA). It was supported by some of the continent’s most prestigious institutions, such as UNEP, USAID, Environment Canada, the IDB, the World Bank, OAS, the National Pollution Prevention Roundtable (NPPR) and the São Paulo State University (USP), among others.

The conference was attended by delegates of 23 countries and discussed and supported CP’s consolidation process in the continent. This was done to establish a regular communication process among the several institutions and specialists concerned, discussing barriers, challenges and opportunities, contributing to improve commitment and investment levels in the region, as well as proposing and organizing a strategy for concerted action.

The conference was solely dedicated to CP and its related themes, which were studied and discussed in six sessions:

- CP technical solutions
- Public policy and regulation
- Information and outreach
- Financial mechanisms and economic incentives
- Environmental management systems
- Training and technical assistance

During the event, four workgroups were created to discuss barriers and opportunities for CP in the region and to propose a regional action plan in four main areas:

- Technical solutions and environmental management
- Financing and economic instruments
- Information and training
- Public policies and legal instruments

The main recommendations of the participating countries were consolidated into a document called “The Letter of São Paulo for Cleaner Production/Pollution Prevention”. Other conference achievements include, obtaining the support for the America’s CP Roundtable and the nomination of an Interim CP Steering Committee charged with the responsibility of its organization. The first committee meeting was held during the “Cleaner Production International Seminar: Public-Private Partnerships”, in Santiago, Chile in November 25-27, 1998.

A second CP/P2 conference was also planned to take place in Colombia in 1999. The final draft of this status report on CP in Latin America and the Caribbean was presented and amended at the second conference in Colombia.
THE LETTER OF SÃO PAULO FOR CLEANER PRODUCTION/POLLUTION PREVENTION

Introduction

The representatives of countries and institutions gathered at the Cleaner Production Conference of the Americas, held in São Paulo, Brazil, August 17-19, 1998, understanding the crucial role played by cleaner production and pollution prevention for the achievement of sustainable development in the hemisphere, decided to launch the Roundtable of the Americas for Cleaner Production and issue this Letter of São Paulo.

The Conference designated an Interim Steering Committee to organize and drive the process leading towards the establishment of the Roundtable. The Committee was formed with the representation from governments, industry, National Cleaner Production Centres and NGOs.

The Letter of São Paulo contains major recommendations for the implementation of cleaner production/pollution prevention in the Americas and is in consonance with the guidelines of the “Partnership for Pollution Prevention” adopted by Heads of States under the Summit of the Americas, Miami, Florida, USA 1994, and reinforced by the Summit of the Americas for Sustainable Development held in Santa Cruz, Bolivia, 1996 and the Second Summit of the Americas held in Santiago, Chile, 1998. Its recommendations are addressed to governments, private sector, non-governmental organizations and the other segments of civil society.

Definition

Cleaner Production is the continuous application of an integrated preventive environmental strategy to processes, products and services to increase eco-efficiency and to reduce risks to humans and the environment. It applies to:

Production processes: Conserving raw materials and energy, eliminating toxic raw materials and reducing the quantity and toxicity of all emissions and wastes;

Products: Reducing negative impacts along the life cycle of a product from raw materials extraction to its ultimate disposal;

Services: Incorporating environmental concerns into designing and delivering services.

Cleaner Production requires changing attitudes, ensuring responsible environmental management, creating conducive national policies and evaluating technology options.

Pollution prevention is defined as the use of processes, practices, materials, products or energy that avoid or minimize the creation of pollutants and waste at the source (“source reduction”), and reduce overall risk to human health and the environment.

Recommendations

1. Consider cleaner production/pollution prevention (CP/P2) as a guiding principle for environmental policy and legislation at federal, state and local levels of Government and a component of strategic planning for enterprises and non governmental organizations;

2. Promote the development of partnerships for CP/P2 between different levels of government and the various segments of civil society and industries;

3. Provide regulatory and economic incentives for CP/P2;

4. Motivate the establishment of benchmarks and performance based environmental indicators to measure progress and demonstrate and disseminate information on economic efficiency of CP/P2;

5. Promote collection and public disclosure of information on use and release of toxic substances and target pollutants for action;

6. Promote the development and dissemination of indicators for measuring consumption patterns;

7. Stimulate synergies between industry sectors and voluntary cleaner productions programmes which encourage industry to pursue sustainable development and investment in CP/P2;

8. Support education and outreach for the application of CP/P2;

9. Encourage enterprises to consider the use of traditional practices and the indigenous and ethnic minorities practices of production which are in line with CP/P2;

10. Promote the establishment (or adoption) and implementation of pollution prevention policies and practices within government facilities and offices;
11. Recognize enforcement of environmental regulation as an important motivation for adoption of CP/P2, and also consider that CP/P2 objectives should be included in the development and the implementation of regulation enforcement programmes;

12. Work cooperatively to provide technical assistance, training and local capacity building to emerging economies to create CP/P2 awareness;

13. Increase dialogue, information and technology development and transfer within the hemisphere (north-south, south-south) to promote CP/P2 and to encourage the development of the market for CP/P2 technologies and services;

14. Strengthen traditional and develop innovative financing mechanisms that promote CP/P2 through lending institutions and increase dialogue with the international financial institutions on advancing such mechanisms;

15. Promote CP/P2 for meeting international agreements;

16. Promote the creation and strengthening of mechanisms and institutions to serve as a resource and promoter for the implementation of CP/P2;

17. Enhance information exchange and cooperation in the hemisphere through the establishment of the Roundtable of the Americas.

2.1.4 CP International Seminar in Chile

The seminar was held in Santiago, Chile, on November 25-27, 1998, under the name “Cleaner Production International Seminar: Public-Private Partnerships”, and sponsored by the Chilean Ministry of Economy’s Executive CP Secretariat. Representatives of Chile, Brazil, the United States, Canada, Mexico, Colombia, The Netherlands and Germany attended, in order to discuss several topics of interest, in the following sessions:

- Public-private CP-encouraging instruments
- CP case studies: the key to success
- Technical assistance to industries: the role of the NCPCs and technical assistance units
- Volunteer initiatives: a good example of public-private partnerships

On November 28, 1998 the Provisional CP Steering Committee as nominated at the Conference of the Americas on CP, held in São Paulo had its first meeting in the city of Viña del Mar, Chile. The Committee sanctioned the São Paulo letter’s official text, set up the goals to be reached and the agenda for its next meeting, then planned to be held in Colombia.

2.1.5 Second Conference of the Americas on CP

The Second Conference of the Americas on CP was organized in the context of two international programmes. It was the second in a series of Regional Conferences of the Americas on Cleaner Production; and was the first of a series of regional expert group meetings on national technological strategies as part of a work programme on the transfer of environmentally sound technologies, sponsored by the United Nations’ Commission on Sustainable Development.

The Conference was held during October 5-7, 1999, and was jointly organized by the Ministry of Environment of Colombia, the Environmental Authority of the city of Bogota (DAMA), the National Cleaner Production Center of Colombia, the National Industrial Association of Colombia (ANDI), and the United Nations’ Division for Sustainable Development (UNDESA). It was co-sponsored by the Swiss Government, UNIDO and UNEP. The Conference was attended by representatives of sixteen countries, various representatives of Multilateral and Bilateral Agencies and several delegates of the private sector.
The main goals of this conference were:

- To evaluate and analyse the local needs for CP technologies, as well as of opportunities for research, development and marketing.
- To set up the general rules for the planning of national CP technology strategies in Latin America and the Caribbean.
- To advance the CP implementation process at national level in the LA & C countries.
- To develop case studies on the application of CP strategies and pilot projects about climate change, with emphasis on the mitigation of industrial emissions in the region’s countries;
- To gather data on experiences in the application of other CP strategies in industrial sectors such as mining, energy, biocides, as well as on the management of industrial zones.

Two parallel sessions were held, one targeted at government and multi-lateral agencies and the other at the general public, with the following results and recommendations:

Meeting of Government and Multi-lateral Agencies

Recommendations

- Provide incentives to the private sector, to be included in both the countries’ macro-economic and environmental policies, in order to guarantee the development and utilization of CP technologies. This action must be based on a close coordination among all the several different ministries that are in some way involved in the setting of industry-related policies.
- Direct legislation at favoring CP initiatives, by combining enforcement actions and other more flexible instruments.
- Strengthen voluntary CP partnerships between government and industrial trade associations.
- Develop “green credit” lines in order to provide access to industrialists to CP lending.

Results

- Establish a Council of Representatives from the region’s governments who have attended the Second CP Conference aimed at promoting cooperation in CP/P2 fields.
- Prepare a follow-up meeting in Buenos Aires, Argentina, to be held no later than April 2000, in order to review and define an action plan after the study of a document proposed by the representatives of Chile entitled “Establishment of a Regional Council of Governments for CP in the Americas”;
- Establish an Honorary Steering Committee charged with coordinating the activities of the aforementioned council, as well as the participation mechanisms for the member countries. The countries that have already volunteered to participate on the Committee are: Argentina, Brazil, Chile, Colombia and the United States. It was decided to invite the participation of members of the CTI, as well as from UNEP, ECLAC, World Bank, IDB, OAS and UNIDO/ Sustainable Development Commission in the Steering Committee.
- Develop the final version of a website on CP in the Americas, including versions in English, Spanish and Portuguese, and complete this Status Report;
- Stress the importance of the UNEP’S Sixth High-Level International Seminar on CP, as well as the International Pollution Prevention Summit, which took place in Montreal, Canada, in October 2000, and confirm the commitment of the region’s countries to participate in unison as a regional group in these events.
Meeting of the General Interest Group

Recommendations

- Integrate CP into other fields of environmental management, such as hazardous waste management, industrial environmental performance evaluation, and elaboration of environmental risk assessment
- Encourage the establishment of regulatory mechanisms based on the concept of industrial environmental performance. This also implies the setting and use of adequate environmental indicators, as well as a more pro-active role of the companies in terms of documenting and disseminating data on their environmental performance
- Encourage the use of CP technologies in the remediation of industrial contaminated sites
- Entail the research & development institutions and organizations and other concerned parties in the process of research, dissemination and utilization of CP practices.

2.2 National & Regional CP Programmes

Several regional programmes have been identified, which have a broader or stricter CP approach. Also, several other local projects and initiatives have been recorded in detail in Annex I.

2.2.1 UNIDO/UNEP National Cleaner Production Centres (NCPCs)

Since 1995 the United Nations’ Industrial Development Organization (UNIDO), together with the United Nations' Environmental Programme (UNEP), and in partnership with the governments of The Netherlands and Austria, have provided management support to the creation of several National Cleaner Production Centres (NCPCs) in many countries in South America. These NCPCs act as clearinghouses, exchange sectoral experiences and technical information, and share CP expertise. They jointly develop information strategies and evaluate their world-wide experience in terms of policy advice. They are inter-linked through the NCPC programme net server and electronic mail. Their staffs regularly meet with technical institutes to exchange ideas and information on new CP developments, provide training and upgrade skills. The main activities of these centres are:

- To carry out in-plant assessments in cooperation with enterprise staff, identifying wasteful processes and profitable solutions. Enterprises implement the tailor-made CP measures with the support from the NCPCs. The introduction of economically successful CP measures, together with information dissemination on alternative technologies, constitute the core activities of the NCPCs;
- To provide tools and methods for continuous improvement of the production process through training workshops for enterprises, as well as CP training programmes for governments, universities, business organizations and financial institutions;
- To disseminate information in the local languages, providing on-the-spot access to technical documentation, databases and other sources of information, advising organizations on the appropriate ways to implement CP schemes, and disseminating information through seminars, newsletters, brochures and through cooperation with the national media, industry associations, training institutes and universities;
- To advise government organizations, financial institutions and environmental management agencies on policies and strategies to include provisions for CP measures.
and economic incentives in the national legislation. Through their links with UNIDO and UNEP, NCPC’s are informed about the latest information and expected trends in international and national legislation and can therefore help local enterprises to comply with new or revised legislation.

Impressive results can be yielded with good housekeeping practices. UNIDO and UNEP’s experience with SME’s in developing countries has proved that process modifications can reduce pollution loads by up to 25% through investments of less than US$ 3,000. In many cases investments were recouped in less than six months. The NCPCs in the LA & C region have reported several achievements and carried out many important activities, even though some have been setup fairly recently, according to the table below.

### 2.2.2 USAID’s Environmental Pollution Prevention Project (EP3)

Since 1993 the United States Agency for International Development (USAID) has been enrolled in the development of CP programmes in several Latin American and Caribbean countries. Thus, USAID has helped fund more than fifty P2 projects in thirteen of the region’s countries. Throughout this period, USAID has helped introduce new methods to minimize waste, reduce emissions, increase energy efficiency and recover resources.

One of USAID’s most important CP initiatives has been the Environmental Pollution Prevention Project – (EP3), aimed at addressing urban/ environmental pollution and environmental quality in developing countries. EP3 has made use of four basic approaches to promote CP in the region:

- Technical demonstrations, to help industries recognize the need for, and benefits of CP
- Policy support, to help each host country’s government develop their own CP-oriented policies and regulations
- Information/training partnerships with local NGO’s and other key organizations, for the diffusion of CP
- Information, services and tools -Through its network

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of clearinghouses, EP3 has provided access to pollution prevention and cleaner technology information.

EP3 country programmes have been established in Bolivia, Chile, Ecuador, Jamaica, Mexico and Paraguay. Furthermore, specific technical assistance has also been provided to El Salvador and Peru. The key industry sectors targeted were chemicals, fishmeal, food processing, hospitals/hotels, metal finishing, mining, paper/wood, tanning and textiles. More than two hundred CP assessments were carried out in these and other sectors that resulted in recommendations for management and operational improvements and considerable cost savings; and local companies have reportedly obtained environmental benefits. In Ecuador alone for instance, estimated total annual savings amount to US$ 5.16 million, which was obtained through the implementation of just 40% of EP3’s recommendations.

EP3 has helped in the development of an extensive network of local experts who provide pollution prevention, environmental cost accounting and facility assessment services throughout Latin America, besides having conducted training workshops and seminars to educate key stakeholders on CP’s value.

In Mexico, Ecuador, Bolivia and Peru, EP3 has also established policy dialogues on CP among all stakeholders involved, as an important first step in the path to the widespread adoption of CP practices.

Cleaner Production and Energy Efficiency (E2) are closely related issues that are being more and more merged into an integrated approach adopted by various countries. In Bolivia, for instance, a joint initiative between USAID’s EP3 and the World Bank, through the Energy Sector Management Assistance Programme, has established the local Centre for Promoting Sustainable Technologies.

2.2.3 The Inter-American Programme for Environmental Technology Cooperation

The Inter-American Programme for Environmental Technology Cooperation in Key Industry Sectors is being funded by the Office of Science and Technology of the Organization of the American States (OAS), the International Development Research Centre (IDRC), the Government of Canada and the World Association of Industrial and Technological Research Organizations (WAITRO). The Canadian Environment Industry Association (CEIA) is implementing the programme.

The programme is an initiative that addresses the challenges faced by small and medium sized enterprises (SME’s), in Latin American and Caribbean countries to adopt cost-effective, environmentally sound technologies and management practices.

The programme’s main objective is to improve industry associations’ capacity to deal with the environmental management of their member companies and bring their members together with those organizations that can assist them with follow up initiatives, thus creating a support network in the hemisphere. Its general goals include:

· The creation of a strong hemispheric network of sectorial industry associations that would support, and also promote, national initiatives for sustainable development
· To support the increasing role of sectorial industry trade associations as key information disseminators, educators, public relations with the government, promoters of alliances, projects and each sector’s new approaches to competitiveness
· To identify the SME’s and industry associations’ needs in relation to sustainable development
· To demonstrate that environmentally sound technologies and management practices can be adopted by SME’s in a cost-effective way.
The programme is comprised of six roundtables whose agenda is based on the examination of the issues involved in environmental management activities in six key industrial sectors and also a number of successful case studies presented by the participating companies. The programme also encompasses an initial pilot roundtable. These roundtables pertain to the following sectors: textiles and leather (LATU/Uruguay); agricultural/food (CODETI/Costa Rica); metal plating (ANDI/Colombia); energy efficiency (PCJ/Jamaica) and forestry (SOFOFA/Chile).

2.2.4 The Responsible Care® Programme

The Responsible Care® Programme - conceived by the Canadian Chemical Producers Association (CCPA) - has expanded to involve operational chemical industries of more than 40 countries. It is intended to serve as an efficient environmental management tool.

Based upon a vision of dialogue and continuous improvement, the programme is logically laid out and provides the necessary tools for the development of adequate systems and methodologies for each step or degree of environmental management being pursued by the sector. The strategy adopted is flexible, allowing for the satisfaction of each company's individual needs without compromising its global nature as a programme encompassing the whole chemical manufacturing sector. The main Responsible Care® participating countries in Latin America and the Caribbean are Argentina, Brazil, Chile, Colombia, Mexico, Peru and Uruguay. Ecuador has also recently made official its participation through Fundación Natura. Venezuela’s participation is still unofficial.

2.2.5 Basel Convention Centres

Organized the same way as the UNIDO/UNEP NCPCs, Regional Training Centres (RTCs) are aimed at providing training and technology transfer regarding – among other subjects – the minimization of wastes, particularly hazardous waste. Sponsored by the Secretariat of the Basel Convention, RTCs have been established in Argentina, El Salvador, Trinidad-Tobago and Uruguay. The establishment and support of RTCs is carried out with the help of the Swedish Technical Cooperation Trust Fund.

2.2.6 Preventing Pollution Through Vehicle Rotation Programmes

One alternative used in some Latin American countries to avoid the occurrence of critical air pollution episodes or improve local traffic conditions in their largest cities, has involved restricting the circulation of a certain percentage of the affected region's motor vehicle fleet on a rotational basis. To date, four Latin American countries have adopted such schemes: Brazil (São Paulo), Chile (Santiago), Colombia (Bogotá) and Mexico (Mexico City). The basic principle involves the temporary removal of a certain percentage of the local motor vehicles from the streets, especially during the winter months, when air pollution dispersion mechanisms tend to weaken and the occurrence of low altitude thermal inversion conditions is most likely.

A typical programme usually involves daily restriction of the circulation of the automobiles with some license plate end digits on a rotational basis. Chile's programme differs slightly due to Santiago's potentially more adverse situation. Restrictions on vehicle circulation in Chile vary according to the severity of the air pollution; thus, more than the designated automobiles for that day may have their circulation forbidden.

Even though the main goal of such vehicle rotation programmes may not be the achievement of CP or source reduction, important indirect results have been obtained through their application, such as relevant fuel savings and
time and air pollution abatement, with the associated reduction of its related impacts on public health and climate change. For instance, the results obtained in Brazil with São Paulo’s rotation programme in 1998 have included total emission reduction of 55,000 tonnes of carbon monoxide, 3,000 tonnes of hydrocarbons, 4,400 tonnes of nitrogen oxides, 440 tonnes of sulfur oxides and 275 tonnes of particulate matter. The saving of 234 million liters of automotive fuels has also been estimated.

2.3 National CP Fora, Roundtables and CP Network

The Conference of the Americas on CP was also a very important step in establishing a roundtable for hemispheric cooperation toward the implementation of CP in the region, by encouraging the participation of the whole society through the development of public/private partnerships and the provision of regulatory and economic incentives as well.

As already mentioned elsewhere - an Interim CP Committee was created in order to prepare the organization of the CP Roundtable of the Americas. This committee was comprised of representatives from several of the region’s governments and institutions, as follows:

- Governments: Brazil, Chile, Costa Rica, Jamaica and the USA
- National Centre for CP and Environmental Technologies, Colombia
- Industry: National Industry Confederation – (CNI) of Brazil
- NGO’s: Water Environment Federation – (WEF)

Additionally, some Latin American countries have already established national summits for discussing CP issues. The available information - provided from the contribution of each country’s representative – has highlighted these initiatives:

- The 1998 Clean Technologies Forum – held in Argentina – has helped with designing of a national CP programme. Chile has hosted the Third National Forum on Productive Development, in which its national CP policy was formed. Chile also organised the National CP Month in 1998.
- In November 1999 Brazil hosted the Mercosur’s CP Roundtable, where the interaction amongst NCPCs and other CP issues were discussed.
- OAS’s Inter-American Programme for Environmental Technology Cooperation in Key Industry Sectors’ six roundtables on the sectors of textiles/ leather; agricultural/food; metal plating; energy efficiency and forestry.

So far there is no network in Latin America and the Caribbean specifically dedicated to CP issues. The already mentioned Conferences constitute a network themselves, and other initiatives are underway. A network linking Mercosur’s (Argentina, Brazil, Uruguay and Paraguay) Cleaner Production Centres is presently undergoing implementation. SENAI and CETESB are negotiating another network in Brazil.

Furthermore, the International Centre for Cleaner Technologies and Sustainable Development (CITELDES), based in Mexico, is also involved with disseminating information related to cleaner technologies and sustainable development.

In Brazil, the Brazilian Engineering Institute is promoting an Internet environmental forum. This forum is being sponsored by a private company and covers, amongst other issues, those related to pollution prevention (P2).
2.3.1 REPAMAR – The Pan-American Environmental Waste Management Network

The Pan-American Environmental Waste Management Network (REPAMAR), is a regional initiative aimed at minimization of waste production, improvement of waste management practices and contributing to the region’s sustainable development. REPAMAR involves the three main sectors concerned with the waste problem: the waste generating industrial/services sector, the (regulator) government and the community in its broadest sense, especially in the case of the scientific community.

The network is the direct result of international cooperation with the German government, through its International Agency for Technical Cooperation, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) and the Pan-American Health Organization (PAHO), through its Health and Environment Division (HEP) and the Pan-American Centre of Environmental and Sanitary Engineering (CEPIS).

REPAMAR’s goals include:

- To promote and adapt the waste minimization and recycling philosophy, through the use of adequate technologies compatible with the Latin American & Caribbean region’s development strategies
- To strengthen REPAMAR’s coordination institutions in the Latin American & Caribbean countries, as well as those institutions that locally regulate waste management activities, in order to establish adequate waste management legislation and mechanisms
- To develop, along with the generators, regulators and the community, a series of integrated waste management plans
- To assess and control the occupational risks associated with toxic and dangerous substances
- To gather and disseminate all information related to waste management and CP technologies, through its information and communication centres.

REPAMAR is presently comprised of eight member countries: Argentina, Brazil, Colombia, Costa Rica, Ecuador, Mexico, Panama and Peru. In each of these countries a National Coordination Centre elected by the participating public, private and non-governmental agencies, as well as some universities has been established. The participating agencies have the following duties:

- To develop integrated programmes involving the manufacturing/services sector, government, universities, community organizations, NGO’s, etc., in order to minimize wastes and improve the environmental management of domestic industrial wastes
- To disseminate and apply source reduction techniques in the local industry, in order to promote sustainable growth
- To develop governmental sector and the non-profit organizations’ environmental improvement capacities
- To gather and exchange technical information on waste minimization
3.0 COUNTRY APPROACHES TO CP PROMOTION IN THE REGION

The Latin American and Caribbean region is comprised of a great diversity of countries. Although almost all of them may be considered as having middle income economies (World Bank, 1993), they differ from each other in terms of size, climate, natural resources, topography, demography, infrastructure, income levels, degree of industrialization and general level of education. The degree of industrial output, environmental degradation and awareness also vary considerably.

This variability is reflected in the understanding of and approaches to CP from country to country. In some countries there has been much progress in relation to the former command-and-control/enforcement approach, but the environmental policy emphasis is still focused on basic sanitation rather than a more holistic approach.

In Argentina, Brazil, Mexico and Uruguay, which are considered to have upper-middle-income economies (World Bank, 1993), it is noted that despite several initiatives and a strong governmental awareness on CP related issues, there are few policies specifically dedicated to CP. Some Brazilian States, for instance, have instituted their own CP policies.

In Bolivia, Guatemala, Ecuador, Peru, El Salvador, Colombia, Jamaica, Costa Rica, and Chile, which are considered by the World Bank to be lower-middle-income economies, the variation in terms of the existence of CP support and encouraging policies is high. In the majority of these countries there are no specific regulations written, but there is considerable awareness about the CP concept and motivation to formalize it as a new environmental policy instrument. In Colombia, CP was established as a priority programme in the “National Environmental Policy 1998-2002”. Since 1994, Colombia’s Ministry of the Environment has been institutionalizing a National Cleaner Production Policy oriented toward the public and private productive sectors.

In the island countries, CP initiatives may also be found in the services sector, basically in the case of tourism and offices.

3.1 The Development of CP in the Region

Isolated CP initiatives have been observed in the region since the 1970s, with some investments by certain industrial sectors. More recently, the regional and biased view about pollution and environmental problems has been replaced by a new concept of making business, gradually incorporating the principles of the 1992 Rio Summit’s “Agenda 21”. Just to mention some few initiatives, many of the region’s industries have implemented environmental management systems, process and fuel substitution and phase-out of ozone depleting substances.

The movement towards CP was started by the industrial sector and encouraged by groups of consumers conscious of the environmental challenge. CP was found to be essential to achieve product competitiveness, production cost abatement and environmental impact reduction, attracting potential consumers.

More recently, the governments of the region have become concerned about ways to better support initiatives such as CP, P2, E2 and EMS, through voluntary projects or an adequate environmental policy incorporating preventive concepts to the environmental permitting and auditing processes. Other ways of supporting CP initiatives are by influencing the market through instruments such as green procurement, incentives and promoting a general “greening of the government”.

The uncontrolled growth of urban areas is also pushing environmental enforcement requirements into an “integrated pollution prevention and control approach” in their regulatory framework.

The financial sector, with some notable exceptions, has so far shown little or no engagement in CP.
However, economic mechanisms in the region have contributed significantly to a shift towards CP. The 70’s and 80’s model of funding allocation in which governmental institutions used to give loans to governments, has been shown to be outdated in the context of rapidly changing global economies, intense capitalism and high interest rates. Privately owned, smaller size projects are now being given preference for funding allocation. Good examples are the jointly implemented initiatives, aimed at mitigating greenhouse gas emissions under the Kyoto Protocol. The economic incentives to be prospectively given under the Clean Development Mechanism – a financial compensation scheme between developed and developing countries for projects designed to mitigate these emissions-are causing industrialists to invest in research and development of technologies beyond “business-as-usual”.

The universities have also been playing a very important role in the dissemination of CP and similar concepts in the region. Several Latin American and Caribbean institutions have served the function of providing training and capacity building, in disseminating information about CP and similar concepts; and in providing consulting and technical assistance work. Just for this report, almost fifty of the region’s universities have been identified as conducting some kind of activity related to CP, P2 or EMS’s.

Non-governmental organizations (NGO’s) also play a very important role in disseminating CP concepts in the region. In countries like Argentina, Bolivia and Ecuador, NGO’s have helped introduce these concepts through international partnerships.

3.2 Overview of CP Dissemination in the Region

The table on the next page summarizes the situation found in the countries covered by this report. It is provided as a way to better measure (and monitor) the progress of CP dissemination and implementation in the region.
# Overview of CP Dissemination in the Region

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* = major activity;  • = minor activity;  – = not undertaken;  na = no information available
4.0 SUCCESSFUL CP INITIATIVES

4.1 Comprehensive CP Programmes

The first comprehensive CP activity in the region is the National Cleaner Production Centres (NCPC) Programme, established and assisted by UNIDO and UNEP in Brazil, Costa Rica, El Salvador, Guatemala and Mexico. The NCPCs play an important role in the diffusion of CP, both in their respective countries and in the region as well. In Nicaragua a UNIDO/UNEP NCPC project has been established, which will hopefully lead to the establishment of a real NCPC.

This pioneering initiative has accelerated the process of the establishment of other CP centres in the region. In some countries, technological reference centres are also embracing a similar approach. In Colombia, the National CP Programme was established in March 1998, sponsored by the Ministry of the Environment, some industrial groups and universities, as well as the Swiss Government. In Brazil, for instance, several centres of the National Service for Industrial Education (SENAI) are currently applying CP in order to meet sectorial and regional demands. SENA, together with the Swiss government, is currently also launching a CP Centre in São Paulo.

Past experience from organizations such as USAID, GTZ and WHO, and programmes like EP3, Inter-American Programme, Responsible Care® and the Repamar network have also been very important to what is known today as CP in Latin America and the Caribbean. These agencies are still actively participating in regional environmental projects, switching more and more from end-of-pipe solutions to pollution prevention at the source.

4.2 Economic and Self-Regulatory Instruments

In the Latin American and Caribbean region, two principles are currently being considered in connection with environmental degradation: the “polluter pays” and “user pays” principles.

According to the “polluter pays” principle, an installation must comply to a certain pollution emission limit, paying proportional taxes for permits on the non-toxic loads intended to be emitted above the threshold. This mechanism can be a trustworthy CP promoter as long as the taxes charged are high enough to act as an incentive for companies to invest on emission reductions.

On the other hand, in some cases it will be possible to negotiate a certain amount of pollution quotas, in order to avoid the installation of new polluters in areas already seriously degraded. The “user-pays” principle considers a different approach. In addition to having to comply to the effluent emission limits already set by the environmental regulator, the user will have to pay a tax for the water consumed, as well as for the effluent being discharged, since it is considered that the capacity of the receiving water body is being used for dilution, transport and deputation of domestic and industrial loads. Regarding this principle, the manufacturing sector and also the government will be encouraged to save water and go beyond compliance through both economic savings of both taxes and production costs.

In the energy sector, tax abatement on less polluting processes and cleaner fuels have been reported in Mexico. Brazil has a consistent and widespread programme for ethanol use in vehicles, now running without governmental subsidies, regulated solely by market forces. The prospective scheme for greenhouse gas emissions trading and energy efficiency projects under the previously cited Clean
Development Mechanism is another incentive to CP in private companies.

In 1997, Colombia set up a fee on water polluting discharges of high BOD and Suspended Solids content, in order to promote the efficient use of natural resources and encourage the implementation of pollution prevention measures. Colombia also practices tax exemptions for:

- Entities directly investing in the improvement of environmental quality and control conditions; the sum invested will be deductible from their annual income;
- Imported equipment for pollution prevention and control;
- Tax exemptions on sales of natural gas for household use.

In Colombia the recently adopted voluntary agreements between environmental authorities and industrial groups have proved to be effective in promoting CP. Seventeen such agreements on CP have already been set up in the country. These agreements help raise the awareness about environmental costs of the manufacturing process and promote cooperative actions with industry (in terms of technology development) and encourage pollution prevention measures. This strategy started with the signature of The Framework for Cleaner Production Agreement (June 1995), among the Ministry of Environment of Colombia, the main industrial sectors, and the public mining -energy sector. Other similar Voluntary Agreements have been signed:

- Regional Agreements: With the four priority industrial corridors (Mamonal-Cartagena, East Antioquia, Sogamoso and Barranquilla).
- Sectoral Agreements. With twelve industrial sectors (sugar cane, coal, hydrocarbon, power/energy, small scale mining of gold, flowers, African palm, swine breeding, bricks, pesticides, jute, poultry farming and rice).

4.3 Financing & Funding for CP in the Region

UNEP has recently started a project with the aim of increasing investment in CP in developing countries. Five countries have been selected to participate including Guatemala and Nicaragua in Latin America. The project involves, inter-alia, elaboration of creditworthy investment proposals and convince both financial institutions and the industrial community of the value of CP. The results of this project will be globally used to promote investments in Cleaner Production in developing countries.

With headquarters in Venezuela, CAF Corporación Andina de Fomento (IAF) (The Andean Development Corporation) has been operating since 1970 with capital shared among the Andean countries’ community (Bolivia, Colombia, Ecuador, Peru and Venezuela), as well as some non-regional countries (Brazil, Chile, Mexico, Panama, Paraguay and Trinidad-Tobago), and around 22 private banks in the region. This institution prioritizes sustainable development and regional integration and equally supports the efforts of both the public and private sectors. It has been showing an average annual financing flow to Andean countries’ organizations of US$ 364 million, this total roughly equaling the combined amount of loans by IRDB, IDB and CFI, in the same period. Aiming at CP, as well as enhanced industrial productivity and competitiveness, CAF has established a financial mechanism for Industrial re-conversion projects that has been meeting with considerable success. Colombia has Soft Green Credit Lines for Industrial Re-conversion: Ministry of the Environment-
CAF-IFI, with $200 million dollars; and the DAMA-IFI for loaning EMS certification processes to businesses, located in the city of Bogotá.

The Andean Region Environmental Committee (COMARA El Comité del Medio Ambiente para la Región Andina), representing industry associations from Bolivia, Ecuador and Peru, is committed to promoting CP. Its strategy entails, among other things, the development of financial tools to support CP projects. It has proposed the establishment of the Andean Region Revolving Loan Fund for Cleaner Production (ARRLF-CP). The objectives of the Fund are to facilitate access to credit to Bolivian, Ecuadorian and Peruvian enterprises wishing to implement CP projects, as well as to demonstrate to local bankers and fund providers that financing CP projects is economically viable. Initially the fund's budget is expected to be 6 million US dollars.

The Brazilian “Green Protocol” is the result of a joint effort by a Workgroup created by Presidential Decree in 1995, in order to prioritize the use the government's lending resources for application to projects presenting more self-sustainable and environmental protection initiatives. The federal banks were invited to sign a “Letter of Principles for Sustainable Development”, assuming the responsibility of primarily providing loans to projects embodying sustainability, waste minimization, energy efficiency and the use of recycled materials, among other prerequisites.

In Brazil, the National Bank for Social Development (BNDES) provides financing for several projects embodying pollution prevention, technological improvements, CP, energy efficiency and EMS implementation. Such loans are primarily offered to large sized enterprises. BNDES usually funds 45,000 projects yearly, including environmental ones. It is also an intermediary in the lending of funds of other international financial organizations, as a signatory to UNEP’s Declaration of Banks for the Environment and Sustainable Development.

The Studies & Projects Financing Agency (FINEP) is a governmental agency operating under the aegis of the Brazilian Ministry of Science and Technology. It operates as a lending agent to the country's science and technological sectors. The “Green FINEP”, one of its lending outlets, is specifically aimed at EMS implementation, as well as helping support environmental performance evaluation; environmental auditing; and CP technology development, acquisition, absorption & implementation projects.

Also in Brazil, the São Paulo State Bank (BANESP) operates the Pollution Control Programme's Pollution Control Financing Programme, or PROCOP/PFC, a credit line specifically aimed at financing environmental protection projects. It was established in 1980 with support of the IRDB. PROCOP/PFC operates as a rotating fund, with the payments for previous financing operations helping finance further projects. The State's environmental regulation agency CETESB acts as a technical agent in the project approval process and in the definition of some financing conditions. Since 1995 the credit line has been re-directed towards prioritizing the financing of CP (or P2) projects, through the offer of more favorable conditions to such options.

The Chilean Economic Development Agency (CORFO) was founded in 1939 and is responsible for promoting productive activities Chile, by encouraging competitiveness and investment, contributing to the generation of more and
better jobs and equal opportunities for productive modernization. CORFO directs its activities in areas such as innovation/technological development, company modernization processes, improvement of business management practices, financing/development of financial instruments, and productive development of regions and emerging industries. CORFO provides various financial instruments to the business community, including long-term credit and co-financing which partially covers the cost of business modernization efforts. It requires companies to increase their contribution over time in order to ensure the initiatives being supported are of real use to the beneficiaries. To further improve its efficiency, CORFO has established a collaborative network made up of Chilean and foreign institutions, which contribute to business development efforts. Part of this network includes domestic private organizations whose participation allows a wider coverage of production development, a more skilled administration of the funding process, and a more precise knowledge of business needs. In 1998 CORFO awarded almost $US 50 million in public co-financing and US$ 208.7 million in credits.

4.4 Market Forces

Consumer awareness is a major market driving force towards CP. Advertising and consumer decisions are increasingly stressing the importance of the life cycle assessment (LCA) approach. Companies accredited by ISO 14001 certification are gaining a larger market share.

The International Organization for Standardization (ISO) established the Technical Committee 207 (TC207) on Environmental Management in 1993, aimed at standardization in the field of environmental management tools and systems. The following LAC countries (as of May 1998) actively participate in discussions on ISO TC 207 and have a voting right as well: Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Jamaica, Mexico, Trinidad/Tobago, Uruguay and Venezuela. Barbados participates in the discussions, but does not wish to vote.

Brazil presently counts 126 companies certified according to ISO 14001: six certifying organizations have been established in Brazil and one in Argentina.
5.0 BARRIERS TO THE IMPLEMENTATION OF CP IN THE REGION

Government Related Barriers

- **Lack of Governmental Commitment**: Lack of government commitment constitutes a problem. In order to achieve this commitment, some driving forces are necessary. Public pressure is boosted by increasing awareness over the adverse impacts caused on polluting loads by the business-as-usual approach. However, there are still very few governmental initiatives aimed at guaranteeing the disclosure of information to the community. The means of communication and participation of society in the process are also very few. Additionally, the flaws of end-of-pipe control efficacy are another subject still hidden from public awareness.

Local governmental commitment may also be achieved through external initiatives – such as the Montreal Protocol for phasing out ozone depleting substances – through international agreements. A corollary is that governmental commitments depend upon governmental awareness – itself dependent from capacity building.

- **Lack of Legislative Support and Adequate Legislation**: There are very few and timid mentions to CP in the reported policies and legislative framework of the countries that have contributed to this report. Most of the pollution control enforcement actions in the region are still directed at the industries’ end-of-pipe emissions. The regulatory framework also put more emphasis on penalties than on assistance.

- **Lack of Knowledge on Environmental Quality and Lack of Enforcement Framework**: Several of the region’s nations do not have an adequate environmental monitoring network, which is undoubtedly a barrier to the tasks of establishing environmental planning policies, organizing adequate and effective action plans and assessing the degree of success attained with the CP measures taken. The lack of an effective environmental licensing and enforcement framework - which serve as a powerful tool to encourage the adoption of CP - was also observed.

Industry Related Barriers

- **Lack of Interest and Limited Industrial Participation**: The CP approach has indeed been facing a deal of mistrust by industrialists, mainly due to a lack of knowledge on alternative technologies. The industrialists are also ordinarily more concerned with solving their immediate cash flow problems and obeying existing environmental regulatory framework that is generally oriented towards end-of-pipe solutions. Also, several industrial sectors are poorly organized, make use of inefficient process controls, and/or experience economic hardships. This leads to a need for short-term planning strategies and inability to access credit lines. The industrialists also often mistrust governmental organizations in general and view other fellow industrialists of the sector as competitors, which discourage the establishment of partnerships and joint actions. Barriers of this kind are most seriously felt in the case of SME’s.
- **Difficulties to Invest:** Although CP’s environmental benefits are clear, lack of industrial participation is also explained by the business-oriented approach normally used. It is necessary for the industrialist to consider the financial aspects involved: opportunity costs, risks, returns and capital investment. Many times the companies do not count with enough resources or access to credit lines to help finance technological changes. On the other hand, sometimes the businesses are excessively used to governmental subsidies, or are affected by sudden economic crises and political changes.

- **Poor financial capacity for investment:** The economic crises that from time to time affect the countries in the region indiscriminately impact several different sectors of society. Banks start to offer loans at high interest rates in order to cover their own risks. Universities and research centres suffer from the lack of resources. Local economies suffer from the decreased demand of both domestic and foreign markets. One of the region’s most serious barriers is considered to be the limited access to adequate financing lines and economic incentives, mainly in the case of small and medium sized enterprises.

- **Other Barriers**
  - **Lack of awareness and training:** Awareness and training are quite essential in Latin America and the Caribbean, as well as in the rest of the world, and definitely lacking in the region. This is undoubtedly one of the region’s main barriers to CP, if not the most important one. The necessity to invest on awareness and training initiatives has been stressed by all the contributors to this report.

- **Lack of knowledge and research on appropriate technologies and alternatives:** The Latin American and Caribbean countries do not adequately maintain research and development systems, since it is generally difficult to develop new technologies in the region. On the other hand, it is important to note there are also difficulties to catch up with the advances in developed countries, which have to be adapted to the local conditions. Despite the fact there is already CP information locally available, the region still lacks an adequate information search, standardization and dissemination system.

- **Lack of coordination among actors:** The majority of the CP initiatives are carried out at country or state level, with few synergistic effects having been identified amongst the participants. Some initiatives have just recently become more integrated through roundtables, conferences and networking; however, there is still a long way ahead.
6.0 FUTURE VISION

• **Sustainable development and CP:** In a holistic approach, poverty is a major problem to be addressed in many countries. The continent is now being offered the opportunity of taking advantage of the international experience in the search for new development models. What is needed is to assure the benefits obtained with CP are not going to be offset by additional waste generation and resource depletion through a nations’ development process. It is worth mentioning here that the implementation process of the sustainable development concept in the region will have to count with the unrestricted support and collaboration of all of sectors and agencies pertaining to local governments. In the region it is a fairly well known fact that government agencies and government owned enterprises are among the main polluters. The adequate management and correct disposal of residues, particularly solids and liquids of domestic origin still are a challenge to be faced by the Latin American and Caribbean countries.

• **Expansion and dissemination of CP concepts:** More interaction among nations is also very important, in order to create a critical mass of CP-involved producers and consumers. The support of governments will also be invaluable for the development of an adequate CP legislation and also of regulatory tools, aiming at supporting sustainable CP initiatives. The local consulting companies will also have to be prepared for the opening of the region’s consulting markets. The industries themselves should expand the practice of CP and search for ISO 14000 certification; that would possibly start a chain reaction with their suppliers and help the whole process. Even those companies which are already ISO 14000 certified, are going to face the challenge of maintaining that certification and investing on continuous improvement.

• **Greater involvement of the financial sector:** The financial sector will also have to be incorporated into the process, by developing ways for companies – and particularly SME’s – to have access to the existing credit lines, as well as creating innovative mechanisms for CP promotion in the region. On the other hand, there are some key factors that must be considered to allow the financial sector to effectively come to support CP in the region. It is initially important to stress that complex, incomplete or unclear regulatory frameworks increase the amount of risk perception (and of caution) in the financial market. Furthermore, it is important to conceive good CP projects that prove to be self-sustainable in the long term, while those countries applying for access to foreign resources must show competitiveness at the international level.

• **Focus on resource depletion:** Regarding the region comprised by Latin America and the Caribbean, it would be necessary to concentrate more efforts on CP practices in the agroindustry and mining sectors, since they play a very strategic role in those countries. De-forested practices are also a major source of waste and
natural resources depletion, to be tackled by more aware forms of management. The tourism sector also presents considerable profitability potential. The region's countries are increasingly more aware of this fact and have been searching to develop it. This potential is intimately linked to the preservation of the region's extremely large wealth of natural resources and biodiversity. This sector will yet present many opportunities for the use of CP practices. Some Caribbean islands – such as Trinidad-Tobago and Jamaica – have already reported some of these benefits.

• Application of the Life Cycle Assessment (LCA) approach to CP: Urban traffic is currently a major problem in the largest Latin American cities, contributing to the aggravation of public health conditions and the emission of a considerable amount of greenhouse gases. In the future it is very important that this issue be adequately tackled. It will be necessary to plan and implement sustainable transport systems, searching for alternatives to those already in place and encouraging the utilization of public and alternative transportation means. New fuels and engines will have to be developed and land use practices in those cities will have to be reviewed, with the improvement of their roads and the provision of economic and fiscal instruments. Such recommendations aim to broaden the concept of CP outside factory boundaries, considering the whole life cycle approach.

• The need to introduce CP into the privatization process: The energy sector is also a major pollution source. In spite of the huge potential for renewable sources, burning fossil fuels is an inevitable reality in the short term. Losses at the end-use, transmission and supply phases are going to require more effective approaches by demand-side management (DSM). Regulating the privatization process of the energy, transport and sanitation sectors, already underway in several of the region's countries, may provide the opportunity to include CP and P2 concepts into new regulatory frameworks.
7.0 RECOMMENDATIONS

Institutional Support

Public assurance from the region's high-level governmental representatives about their continual support of CP activities in countries is necessary. The efforts should be directed at trying to get more support aimed at institutional strengthening in each country and the region as well. Now is the time to work for the short-term institutionalization of CP, with specific proposals on the necessary modifications and improvement of the local environmental legislation.

Assistance from NGO's may be paramount for achieving this in some countries — specially those of lower-middle income undergoing incipient industrialization, shifting from single culture agriculture or natural resource exploration to manufacturing. In these countries, the ideal form would consist in carrying out the CP activities with the aid of NGO’s and the support and supervision of the local and national authorities, in accordance with the regulatory framework.

Policies and guidelines are necessary to help in implementing CP at the local level. Evaluation and transfer of environmentally sound technologies must be adapted to suit the national, regional and/or local needs and capabilities. It is recommended that the small businesses be reached with appropriate regulations.

Capacity Building

Training and awareness-raising activities must also involve social and economic sustainable development aspects. Besides the public and the workforce in general, government officials in charge of CP Programmes also need to be continuously trained.

More visibility through training courses and workshops continues to be necessary. Initiatives for the elaboration and inclusion of environmental education programmes at different educational levels (high school, undergraduate and graduate) should be encouraged.

The UNIDO/UNEP NCPCs and the CP centres that support companies with technical assistance and environmental know-how should be encouraged to continue their work.

As far as possible, CP programmes should be linked to the establishment of local CP centres to provide training, information and advice to local industries. This would render the programmes more efficient and increase the chances of CP continuity after programme closure. Special subprogrammes should be devised to give advice to the SME's. In the case of smaller states, there is also a need for CP activities to be developed at an appropriate scale. Industrialists could have access to more practical demonstrations of successful CP examples. Another suggestion would be of measures to integrate CP into ISO 14000, particularly in the cases of Environmental Performance Evaluation and Life Cycle Assessment. Although cost reduction is a major driving force for industrialists, other preparation for CP must also be highlighted: market segmentation, better product and company image, preparation for new and more restrictive standards and regulations.

Networking and Cooperation

CP promoters should help each other in the Latin American and Caribbean region through a joint information database in which it would be possible for them to share their experiences. Also, joint CP projects among several countries could be effective in attaining mutually desired objectives.
The partnerships with industries, NGO’s and other governments should be increased. Good intercommunication among different organisms involved in CP throughout the region is highly desirable and could be fostered through the organisations of seminars, workshops, symposia and other instruments, allowing for more expected regional exchange. It is expected that the current status report will serve as encouragement to such cooperation.

A network for the exchange of CP experiences (case studies and technicians) among different countries should be created in order to share experiences. A CP database adapted to each country’s local conditions could then be assembled. The creation of an international roster of CP professionals will help establish a clear definition of procedures and standards, development of guidelines and definition of monitoring and revision processes. Flexibility of choice helps to lower costs of external consultancies.

Regular meetings, such as roundtables and conferences are the first necessary step in introducing the main actors and establishing official and informal links. Regarding this matter, the First Conference of the Americas on CP was a good occasion for information and experience exchange. Now it is important to keep up the momentum and enthusiasm gained at this conference and assure the institutional involvement of the region’s countries in order to consolidate the CP Roundtable of the Americas.

Financing

Financing for programmes and projects is a very common suggestion in the region. Notwithstanding the prospective economic benefits of CP described in several successful CP case studies reported by almost all contributors to this report, a minimum initial investment is necessary in order to help developing countries with their specific needs. Financial assistance from developed countries is still essential as a way of dealing with initial capital costs and as a hedge against risks. Some measures would involve provision of economic incentives through legislation and acknowledgment of market-based initiatives. It is necessary that policies re-direct public incentive instruments to focus more on CP aspects. Setting of priorities by representatives of the main sectors of the economy, NGO’s and authorities together will help concentrate efforts, both in terms of policies as funding allocation. Offer of grants may be an incentive to lecturers and other professionals.
8.1 ANNEX I - COUNTRY APPROACHES AND ACTIVITIES FOR CP PROMOTION

ARGENTINA

Government Policies and Regulatory Framework

On February 5, 1998 a Directorate of Technology, Processes and Environmental Services (DTPySA) was established within the structure of the Secretariat of Natural Resources and Sustainable Development. Its mission is to help in the process of adoption and further development of the cleaner production and sustainable consumption concepts at the national level.

This step is considered vital for a national environmental policy on sustainable development. Although the legal and regulatory framework has been enhanced in the last years, additional studies and activities should be conducted in order to help improve the available legislation and the way it should be interpreted in order to get more focus on CP activities.

Government Sector Efforts

DTPySA's actions contribute to a better environmental performance by national industry, while at the same time improving its competitiveness. It also aims to strengthen the national innovation system on environmentally sound technologies. DTPySA acts in five main areas:

- Legal: proposes and promotes rules and regulations to improve the legal and regulatory framework in order to favor CP strategies;
- Technological: encourages actions and activities regarding clean technologies, processes and environmental services;
- Economic/financial: searches for financial support, the creation of economic instruments and increasing the lending capability of the local financial institutions to CP projects and programmes;
- Institutional: design information and training programmes to build up and strengthen CP;
- Services: Provision of clean technologies and the Environmental Services Register.

DTPySA has recently launched the National Programme for Sustainable Production, aimed at encouraging the adoption of sustainable production and consumption practices, with special emphasis in the small and medium size enterprise sectors. The programme involves four main functions:

- Building and raising the awareness about the cleaner production concept – passing the message across to a wider audience through information collection and dissemination;
- Developing and improving capacities – education on CP through training for all relevant and interested parties;
- Implementing in-plant CP projects in order to demonstrate CP is a proven strategy for increasing the efficiency of resource use and minimizing waste;
- Promulgating the idea of CP in order to foster changes in culture, industrial practices, government policies and the regulatory framework.

As a federal government organization, the Instituto Nacional del Agua y del Ambiente (National Institute for Water and the Environment INA) participated in the Clean Technologies Forum of 1998. This event was organized by the Secretary of Science and Technology and later became a member of the Working Commission tasked with preparing a proposal for a CP National Programme. In this position INA could give inputs to the design of local cleaner production policies aimed at encouraging technical developments.

INA has already conducted a case study for the reduction of pollution load at a meat processing plant and is currently involved in the development of a waste minimization project in a mining operation discharging into the Pilcomayo River basin. It should be mentioned that about 20 years ago, the Institute developed a waste minimization
case study for the tanning industry. As a consequence, some Argentinean tanneries have since started recovering chromium from their spent tanning baths.

In addition, INA has also been involved in training activities on CP options and assessment methodologies to industry technicians and professionals, besides having participated in the preparation of a waste minimization manual for the metal finishing Industry.

The establishment of a South American Training Centre on hazardous waste minimization, in accordance with the agreements of the Basel Convention, UNEP, is also planned.

The Role of Other Organizations

CP activities carried out by NGO's in Argentina are done in conjunction with organizations like AIDIS (Asociación Argentina de Ingeniería Sanitaria y Ciencias del Ambiente – Argentinean Sanitary Engineering and Environmental Science Association) and APAMA (Asociación Argentina de Preservación del Agua y su Medio Ambiente – Argentinian Association for the Safeguard of Watercourses and their Environment), an institution charged with the protection of the Argentinean water bodies and environment. Currently one of its most important CP projects is EP3, being developed in conjunction with the Water Environmental Federation WEF and the U.S. Environmental Protection Agency USEPA.

With the assistance of such organisations, in the last few years some, Argentinean consulting firms have started commercial CP technical assistance services to local industries and also giving presentations on the theme at universities, environmental study centres and at other relevant meetings (trade fairs, etc.) Most of the work has been carried out within industrial sectors such as the packing industry and pharmaceutical products, but also with Argentinian airports (33). Some progress, measurable as decreased environmental costs, has already been obtained through those activities, although its impact on the global Argentinian market may still be considered small.

A few Argentinian universities/technical schools, have included CP as part of their curricula. Although the subject is already known and is partially introduced in Environmental Engineering courses taught in local universities such as National Technologic University and the University of Buenos Aires, it has not yet been formally included in their syllabus. Recently the Universidad del Litoral, Facultad de Ingeniería y Ciencias Hídricas (Santa Fe Province) is organizing an Environmental Engineering Programme that may give more emphasis to this subject.

Barriers

The barriers are mainly related to lack of funding or support. In Argentina there is no direct funding for the technical assistance or for the Environmental Pollution Prevention Project (EP3) projects, despite some past attempts. There are few economic incentives to promote this practice in the industry which is generally reluctant to invest money, especially in the case of new approaches like this. It is hard to overcome the indifference and motivate industry people to sit and listen to new ideas. There is also a lack of awareness and knowledge about the CP concept and its benefits, particularly in small and medium size enterprises. Most written material is in English, thus compounding the difficulties for SME involvement. There seems to be no immediate answer to overcoming this problem. The most convincing argument would be to tell success stories and disseminate more information.

BOLIVIA

Government Policies and Regulatory Framework

Although Bolivian national policies still do not officially
encourage CP practices, a set of new regulations for the industrial sector – based upon CP – is already planned. The creation of the Bolivian Centre for Promoting Sustainable Technologies (Centro de Promoción de Tecnologías Sostenibles (CPTS)), as a private instrument to help industry, has been a big step towards the institutionalization of CP and the Bolivian government already recognizes its value.

The Role of Other Organizations

CP is a good response in helping to overcome environmental problems in weak economy countries like Bolivia. The most positive Bolivian CP experiences to date have occurred through international cooperation projects like USAID’s Environmental Pollution Prevention Project (EP3/Bolivia) and the World Bank’s Energy Sector Management Assistance Programme. Both were started in 1995 and helped introduce the hitherto unknown CP concept in Bolivia.

At first, both projects were independently run according to their own schedules, starting their work among the most receptive companies. Afterwards, because of their common philosophy of introducing CP to the industrial sector, both started coordinating their activities. This eventually resulted in a merger of both projects and, some time later, in the creation of the Centre for Promoting Sustainable Technologies (CPTS - Centro de Promoción de Tecnologías Sostenibles).

CPTS was established (September 1998, at the same time as EP3/Bolivia officially ended its activities) through an agreement between the Cámara Nacional de Industrias CNI (Bolivian National Chamber of Industries, a stakeholder to EP3/Bolivia) and the Viceministerio de Energia e Hidrocarburos (VMEH Viceministry of Energy and Hydrocarbons, stakeholder to ESMAP), establishing a merger between both projects’ assets in order to form the centre.

In order to achieve its goals of promoting cleaner production in the country’s urban and suburban industrial areas, CPTS’s activities have been mostly aimed toward big- and medium- sized (Bolivian standards) companies and also a few smaller ones. It has been closely working in conjunction with the CNI.

Since September 1995 onwards, CPTS (or its predecessor, EP3/Bolivia) has already carried out assessments at twenty companies, eighteen of which have so far managed to implement at least one of the recommendations made. Eight companies have accomplished implementation of almost all recommendations (they are called the Bolivian CP “Champions”). Estimates show that about 60% of all recommendations were implemented, with savings around US$ 400,000. More recently, CPTS has carried out two more assessments.

CPTS (through its predecessors, EP3/Bolivia and ESMAP) has also been disseminating technical information on CP assessment methodologies and CP options to industries, universities, government agencies, consultants, NGO’s; organized seminars, courses, workshops, and also lent books, posters, reports, etc.

One of the main future challenges for CPTS will be the creation of a funding mechanism to help industries implement CP measures. Other important issues will be the provision of training on CP techniques and methodologies to local consultants/individuals and the introduction of those concepts to the curricula of the pertinent courses of Bolivian universities. More work of technical assistance to the small and micro industrial sectors is also going to be necessary.

Besides EP3/Bolivia, ESMAP and now CPTS, other NGO’s such as FUNDES - a Swiss financed NGO – has also been involved in CP activities. The Swedish International Development Agency (SIDA) has just started, in partnership
with CNI, a programme called “Protección Ambiental en la Industria Boliviana”, aimed at training 120 Bolivian technicians in the field of environmental, sciences (CP inclusive). Also the the Danish International Development Assistance - DANIDA - is finishing the design of a 5-year CP programme to be jointly developed with CNI and the CPTS.

Several companies are presently undertaking demonstration projects with the aid of CPTS. These involve the industrial sectors of tanneries, textiles, slaughterhouses, breweries, bottling plants, meatpacking, sugar mills and electroplating.

Barriers

So far, experience shows that many barriers still prevent a wider adoption of CP practices. Those include the lack of technical capacity, since CP is a relatively unknown issue in Bolivia. The lack of financing resources is also a serious barrier.

Most CP training material is not locally available in Spanish and this is considered a barrier since not all potential users speak English.

One of the main barriers faced in the development of CP activities in Bolivia has been the distrust of companies. Plant personnel were generally unwilling to allow the CP teams access to their plants or give them the information necessary for the assessments. In order to try to overcome this, a first approach was tried, involving a general presentation followed by close work with those companies who had shown some interest in CP. After some time, another approach was used, this time with the aid of the companies which had successfully implemented the recommendations. Both approaches were very useful. In the case of the second approach, a close follow up of the companies’ activities was the key to success.

BRAZIL

During the last few years, interest in CP has been gathering momentum, despite the fact that some industrial groups have already been investing on some CP projects since the 1970’s.

Several important factors have contributed to the private sector’s interest in CP; in particular the Brazilian economic stabilization project, along with the opening of the country’s markets to foreign products, which have been forcing Brazilian businessmen to search for ways to improve and update their industrial processes, in order to assure competitiveness and reach new markets.

The competition for new markets, the need to improve the country’s negative international image in relation to the preservation of its biodiversity heritage, as well as the concern for creation of non-regulatory barriers to Brazilian products has aroused considerable interest for ISO 14000 series of standards.

Government Policies and Regulatory Framework

Another driving force for industries toward environmental compliance has been the recent (1998) promulgation of the “Law on Environmental Crimes”, which rules on companies’ criminal responsibility in case of environmental damage. This law is one more tool that has been added to the already rigorous array of regulatory instruments available to Brazilian environmental agencies. Another landmark has been the establishment, by the 1988 Brazilian Constitutional Revision, of the Public Attorney’s Ministry, tasked with defending the country’s collective (or diffuse) interests. In some Brazilian states, the environmental issue has been or is being put in charge of specific district attorney offices, which in many instances have been working side by side with the environmental agency.

In some Brazilian states CP is an important issue to be considered in the formulation of their individual environmental policies.
In São Paulo State, the CP concept has been considered in the revision of the State’s environmental policy, as well as in the strategic and organizational aspects of the State’s regulatory Agency, the Environmental Sanitation Technology Company (CETESB). This institution is currently working for the integration of pollution prevention into its mandatory pollution control and enterprise licensing activities.

In Minas Gerais State, the importance accorded to CP may be appreciated by the fact that a specific Environmental and Sustainable Development Secretariat has been created, specifically aimed at developing CP activities.

Paraná State’s environmental policies have historically been based on measures prioritizing the avoidance of effluent and waste generation. Its environmental licensing parameters are based on the best available technologies for process and pollution control, actually forcing industrialists to adopt internal waste minimization measures.

All three state agencies also work in the diffusion of CP concepts, provision of technical information and support of several activities, such as the elaboration of technical manuals, joint demonstration and incentive projects with industries.

Private Company Initiatives

The National Industrial Confederation (CNI)

In Brazil, the National Industrial Confederation (Confederação Nacional da Indústria - CNI) is the ultimate agency representing the industrial sector. It coordinates a system comprised of the 27 state industrial federations. The Confederation always seeks to play a leading role in its sector, thus acting as a factor of economic and social progress in the country. One of the greatest challenges faced by humanity is that of harmonizing economic growth and environmental imbalance. In this way CNI – through its Specialist Workgroup on Environmental Issues (COEMA) has set up its own Code of Industry Environmental Ethics. Since 1998 the code has been introduced to Brazilian industries under the name of “Declaration of Industry Principles for Sustained Development”.

Responsible Care® – Brazil

In Brazil the Responsible Care® programme was officially adopted in April 1992 by (ABIQIUM) The Brazilian Chemical Industry Association and its associates were invited – initially voluntarily – to join. From then, the Programme’s framework has gradually been undergoing implementation within the association itself and the participating companies, which have been adjusting their internal programmes according to Responsible Care®’s prerequisites, by following annual goals set by ABIQUIUM. In order to support the Programme’s development, ABIQUIUM periodically publishes technical notes and sponsors seminars and courses to educate the sector’s industrialists, beside also developing other supplemental activities. Since 1998 - and following the trend in countries with up-to-date chemical industry sectors - enrollment in Responsible Care® has become mandatory for ABIQUIUM associates.

Brazilian Industrial Council for Sustainable Development (CEBDS)

The Brazilian Industrial Council for Sustainable Development (CEBDS) was instituted in 1997 and currently encompasses 53 industrial blocks totaling 210 corporations willing to discuss and direct its actions towards developing a feasible sustainable development model. Important partners are the SME’s, as well as the financial sector and the stock exchange markets, which are also planned to be involved in the CEBDS’s activities.

Through specialized discussion groups, organized to deal with the environmental problems of certain sectors, CEBDS has been able to establish successful partnerships and involve several institutions in its
CP activities. The most important partnership is the Brazilian Clean Technology Centre (CNTL), but other relevant institutions, like the Micro and Small Enterprise Support Service (SEBRAE), the National Economic Development Bank (BNDES) and the National Industrial Confederation (CNI) also take part. These partnerships entail the creation of regional offices tasked with introducing local CP concepts and practices, particularly to SME’s. In Rio Grande do Sul State, the agro-industry and metallurgical/mechanical sectors are taking part in such performance-improving actions.

*The Electric Energy Efficiency Programme (PROCEL)*

PROCEL seeks to promote a major rationalization of Brazil’s electric energy production and consumption profiles, eliminating energy wastage and reducing operating costs and the need for local investment. The Programme is funded by Brazil’s Federal Electric Energy Company, Eletrobrás and the Global Reversion Reserve, a federal fund sponsored by several State energy agencies—their participation percentage being proportional to their capital.

PROCEL’s role involves defining strategies in order to mobilize all sectors of the society on the importance of energy wastage elimination. Relevant participants include energy agencies, government agencies, research institutions, schools, trade associations, electric equipment manufacturers and local and foreign financing agents.

The yearly goal for waste reduction is 130 trillion watt-hours, involving customers and energy agencies (in the case of transmission line waste minimization) alike. PROCEL estimates for the period 1986-1997, show the programme has already managed to achieve yearly savings of 4,885 Giga Watt-hours.

The Role of NGO’s

The NGO movement is very well organized and active in Brazil. In São Paulo State, for instance, more than 280 are registered at SMA. In general, however, Brazilian environmental NGO’s have been more active on the so-called “green side”, addressing such “macro” questions as biodiversity, forested areas and watercourse preservation measures.

Innovative Approaches

*Mercury Recovery in Mining Areas*

The minimization of the environmental and public health problems stemming from the use of metallic mercury in mining operations in Minas Gerais State (Mariana) has been attained by FEAM, Minas Gerais State’s Environmental Foundation, as well as other partner institutions. The programme consisted of the development and introduction of a simple mercury distillation apparatus, both cheap, light and easily assembled, allowing mercury and metal recovery rates of 99% and 98%, respectively. Several apparatuses have been donated to the miners. The programme also entails other activities such as the clinical examination of miners, water analyses, environmental impact assessments, risk evaluations, educational workshops, educational activities, etc.

*Cleaner Production in the Construction Sector*

Since 1994 the municipality of Belo Horizonte (Minas Gerais State) has been recycling the city’s construction waste back to its building sites. The system is comprised of a network of collecting units (collecting small amounts of rubble), and two large recycling stations (processing 360 tonnes a day), manufacturing low-cost building materials that are re-used by the building industry in place of the bricks usually utilized for road paving or tile manufacturing. This programme has already recycled more than 87 thousand tonnes of rubble, having reached a 21.7% abatement rate in the cost of paving materials and contributed to a decrease in the number of clandestine rubble dump sites.
The ‘Zeri’ Project – Sub Product Synergy

This is still an embryonic programme of Paraná State, aimed at providing stimuli to the improvement of the State’s local economies. This is going to be done through the so-called “Paraná’s Zeri Network”, which will stimulate local sub-product synergy initiatives and will to be managed by Paraná’s Technological Institute TECPAR. It will also promote the use of renewable energy sources such as biomass and solar energy in the manufacturing processes.

The “Prevenir” Project – The Greening of Suppliers Chain

São Paulo’s Environmental Agency CETESB, in partnership with the United States’ Environmental Protection Agency – (USEPA) has been developing a volunteer CP project involving large American multinational in companies with branches in the State, as well as their suppliers. The project aims to involve the larger multinationals influencing their suppliers in Brazil to adopt pollution prevention practices, providing them with technical assistance, while the regulatory agency will provide recognition to successful initiatives. The project is now undergoing its first, experimental phase, involving the participation of the companies 3M and AMP, along with eight of their Brazilian suppliers. The idea will be to later involve other parties and countries in this initiative.

Public-Private Partnerships

In several Brazilian states it is possible to observe that government institutions have been joining forces with several industrial sectors in the development of CP projects:

- Minas Gerais: in the mining, metallurgy and chemical manufacturing sectors, among others;
- Paraná: in swine breeding, tanning, and pulp and paper, among others;
- São Paulo: in the metal plating, textiles manufacturing, ceramics, foundry, and laundry sectors.

Global Issues

Ozone Layer Protection

Brazil is signatory to the Montreal Protocol on ozone depleting substances and is striving to meet the deadlines set for reducing and banning the production and use of said substances. These actions are locally coordinated by the National Ozone Layer Protection Programme PROZON, managed by the Brazilian Ministry of Environment and embodying a significant level of participation of Brazilian industry.

The actions undertaken range from general environmental education initiatives to the elaboration of specific government policies and laws to enforce the meeting of the Protocol’s deadlines. The Brazilian government has also instituted recognition programmes aimed at those companies that are fulfilling their obligations ahead of time who are searching for alternative substances and technologies to phase out the ozone depleting ones.

Climate Change

Pursuant to the United Nations’ Convention on Climate Change, and coordinating its actions with the Ministry of Science and Technology, Brazil has been fulfilling its duties to that Convention and has actively been taking part in the related meetings and conferences. Brazil has also been participating in the development of the Cleaner Development Mechanism (Section 12 of the Kyoto Protocol). Other offspring has been the Report on National Survey on Anthropogenic Greenhouse Gas Emissions. The report information is going to be disseminated through a National Communication.

ISO 14000

Brazil has been playing an active role in the development and implementation of the ISO 14000 series of environmental standards. The institution charged with casting the Brazilian vote in TC 207 Committee is the Brazilian Technical Standard Association.
(ABNT), while The National Institute of Metrology, Standardization and Industrial Quality (INMETRO), is in charge of the certification work. With the goal of defending and supporting Brazil’s position, ABNT instituted a Support Group on Environmental Standardization (GANA), comprised of representatives from private enterprises, government institutions and universities. More recently, GANA itself has been disbanded and substituted by The CB-38 Committee on Environmental Management. Brazil has taken part all TC207 meetings and has made a significant contribution to the standards’ text and discussion process. The meeting in which the standard on Environmental Management Systems (EMS’s) ISO 14001 was finally approved, took place in Rio de Janeiro, at that time 126 companies already were certified. Six Brazilian institutions have been accredited as EMS certification agents.

Rewards

Some prizes have been established to encourage and recognize voluntary environmental protection initiatives. Over the years, these have increasingly been recognizing CP efforts. The main ones are CNI’s Ecology Prize (in its Rio de Janeiro and National forms), the São Paulo State Industrial Federation (FIESP)’s Environmental Quality Prize (São Paulo State), Paraná’s Environmental Quality Prize (Paraná State) and Citizenship Award (Minas Gerais State).

Cleaner Production Centres

In Brazil, UNIDO/UNEP’s National Cleaner Production Centre located in the Rio Grande do Sul State Industrial Federation (FIERGS) building, along with the local office of the National Industrial Service (SENAI). The centre’s efforts are mainly directed at:

- Disseminating information, first about CP concepts, and more recently, on technical information, through access to the United Nation’s databases and agreements and in partnerships with local and foreign universities;
- Implementing CP programmes in industries. Some results have already been obtained in the metallurgical and agro-industrial sectors;
- Training actions to build a CP capacity;
- Participating in the environmental policy making process, with the goal of supporting industrial sectors, searching for credit lines and improving both environmental legislation and industrial productivity.

CNTL has been actively pursuing international partnerships and is negotiating with the Ecuadorian government on creating a CP centre their country. The agreement for this is going to be signed soon. Another effort has been in Paraguay. Several educational seminars have taken place as part of an agreement between Paraguay’s Ministry of Industry and CNTL/SENAI. An agreement has also been signed with the Argentinian government for future cooperation, and negotiations with Venezuela and Chile are underway.

Another CP centre has recently been established in São Paulo State, the result of partnership work among the local SENAi branch, FIESP and the Swiss Government’s Secretariat for Economy.

The National Air Conditioning, Refrigeration and Ventilation Technology Centre, located at SENAi’s “Rodrigues Alves Technical School”, administers training courses on ozone layer depleting gases (such as Chlorine-Fluor-Carbons) recovery practices. SENAi embodies a total of 23 Technology Centres spread throughout the country, each one of them specialized in a different branch of industrial expertise. These could prove themselves to be fertile ground for the establishment of further CP centres in Brazil.
Universities, Technical Schools and Research Institutions

About thirty Brazilian universities and research institutions are developing CP, P2 and EMS related activities. The table located at the end of the annex, summarizes their main programmes and courses.

Since 1996 the country-wide department network of Brazil’s National Service of Industrial Apprenticeship (SENAI) the educational and technological branch of the Brazilian State’s Industrial Confederations – which embodies CNI and the State Industrial Federations has adopted and is developing its SENA Programme of Environmental Quality. The programme emphasizes pollution prevention and cleaner technologies as the conceptual basis for its work, and has disseminated these concepts throughout Brazilian industry. Other SENAI technology centres developing CP, pollution prevention (P2) and EMS related activities are listed on the table located at the end of the annex.

On Television

The Repórter Eco (Ecological Reporter) is a weekly television news programme aired since 1992 by the São Paulo government-owned Cultura Television Network, addressing key environmental and quality of related issues. In the last few years, CP and cleaner technologies have been fast becoming some of its most popular attractions, a result of the increasingly strong demand for newer technologies allowing sustainable growth and environmental preservation, as well as of the new environmental policies/ regulations, EMS standards, etc. Nowadays about one of two Repórter Eco’s programmes is actually being dedicated to these themes, helping to raise the interest of the industrial sector on the topic.

**CHILE**

Government Policies and Regulatory Framework

The Chilean government considers CP as an efficient approach to foster industrial modernization. In addition to protecting the environment, it also endows production processes with efficiency and competitiveness.

Recognizing the importance of the “Agenda 21” recommendations of Rio’s 1992 World Summit, as well as the environmental policy guidelines and agreements of the Third National Forum on Production Development (with the participation of representatives from the governmental, industrial and trade union sectors), Chile has decided to implement a National CP Policy (PPL).

Since 1997 the Chilean Ministry of Economy has been applying the “National Policy for the Encouragement of Cleaner Production” (Política de Fomento a Producción Limpia - PPL), as ruled by the Board of the Ministry of Production Development. The approach chosen by Chile – its Ministry of Economy having been charged with applying such a policy – may be considered as quite unique in the world.

For the period 1998 - 2000, Chilean policy makers have carried out a CP action programme aimed at four main issues:

- Integration, adaptation and development of CP fiscal and financial incentives;
- CP encouragement based upon a public-private partnership approach, including the creation of a Public-Private CP Committee and the promotion of CP Agreements (called voluntary agreements or covenants) between government and industry;
- Strengthening the country’s technological and informational capabilities on environmental and CP matters;
- Capacity building and strengthening the coordination among several environmental agencies (regulation and enforcement) and those in charge of industrial development.
Some of PPL’s most interesting features are the so-called “CP Agreements”, effected between industry (trade associations or individual companies) and different levels of government. Working on a feasible basis of goals and programmes, it tries to simultaneously improve both the company’s compliance to the environmental legislation and its competitiveness.

The Executive Secretariat for Cleaner Production (Secretaría Ejecutiva de Producción Limpia – SEPL), a branch in the Ministry of Economy - is the executive body created in 1998 to put this policy into practice, proposing CP agreements to ten trade associations so far and supporting the established Public/Private CP Committee. The role of such a committee is to encourage the dialogue among the government, trade associations and worker’s unions to find out ways for a joint effort aimed at sustainable industrial development.

SEPL’s aim is to improve the companies’ productivity as well as environmental efficiency, focusing state resources through flexible enforcement, technical assistance and fostering instruments. CP activities in this secretariat are grouped into 5 areas:

- Public-private cooperation;
- Incentives for the development of a technological infrastructure: such as a Chilean NCPC :
- Support in strengthening of governmental CP- fostering instruments, with the incorporation of better financing opportunities, improvement of traditional financing instruments and creation of new ones, in order to incorporate CP concepts;
- Incentives for preventive environmental inspections, through support with technical assistance (a pilot project with three enforcement institutions) and training (to inspectors and those who will be inspected);
- Improvement of CP awareness in several sectors: academic, private, governmental and non-governmental.

In the Public-Private CP Committee, participation and cooperation is in the following sectors:

- The most important public agencies dealing with environmental policy/ regulation, environmental enforcement, business promotion and training institutions;
- The country’s most important trade associations;
- Central Labor.

Each party would have the necessary authority to commit itself to the decisions taken, as well as the capability to carry out the tasks agreed upon. It would also involve the labor sector in the CP process, which is particularly relevant from the political standpoint.

Among the Committee’s tasks are:

- To assess the development of the National CP Policy;
- To explore and identify priority sectors to implement CP Agreements;
- To improve fiscal and financial instruments;
- To assess the impact of trade agreements – either bilateral or multilateral - on the country’s industrial development;
- To analyze and discuss environmental regulation problems and inefficiencies;
- To keep close relations with international or foreign organizations, aiming at the establishment of information channels or alliances in order to help its work on CP.

Besides having written some guidance notes addressing individual production sectors, the Secretariat has developed some studies - available on call and on the Internet (see Annex III) - with CP recommendations. Priority sectors, current initiatives, driving forces, financial/fiscal instrument analysis, regulatory systems and prize incentives are some of the subjects covered.

The Role of Other Organizations

As previously mentioned, a National CP Centre is being established, comprised of a
Through an agreement with the American Chamber of Commerce, Chile joined USAID’s Environmental Pollution Prevention Project (EP3) in 1993. About 25 companies and 2 hospitals were involved in the project. The companies involved in the project were from the sectors of leather tanning, food processing, slaughterhouses, chemicals, paints, recycling, textiles, mineral processing, printing and hospitals. With an aggregate cost of US$ 1.4 million, the annual savings with the implementation of 40% of the identified optimization opportunities, was around US$ 2 million (to be multiplied by 3 in the next 3 years). One and a half million cubic meters of water was also saved annually. The project had an unexpected ending in 1996, when Chile reached an income level of US$4,500 per capita per annum. As a consequence, it no longer could be considered a developing country and the regional office of the Agency for International Development was closed. The project’s goals were achieved and the experience has served as an important multiplying effect.

In 1995 the “Corporation for Promoting Ecoefficient Small and Medium Latin-American Enterprises” (Corporación de Promoción de la Pequeña y Mediana Empresa Ecoefficiente Latinoamericana – PROPEL), was established. Having advised 45 national companies in 1998, PROPEL has carried out successful CP/ecoefficiency experiences in other countries. The main sectors it has worked with were those of leather tanning and furniture.

Regarding technological information, the Institute for Technological Research (Instituto de Investigaciones Tecnológicas - INTEC) provides technical guidance notes - called “Environmental Management Options Diffusion Documents” - to several industrial sectors: textiles, printing, seafood processing, vehicle repair shops, metal plating, slaughterhouses and wooden furniture.

In 1993 INTEC developed a low-cost technology, substituting the firewood used in bakeries by natural gas. This programme had a noticeable impact, having involved nearly all the establishments in the Santiago Metropolitan Area and reduced particulate matter emissions by more than fifty percent.

Another interesting project involves R&D and is co-funded by FONDEF (national fund for R&D project financing) in the pulp and paper sector, aimed at reducing the use of chlorine through the use of enzymes and improvements in flash oven technologies and other energy efficiency developments, conducted by CODELCO - Chilean Copper Corporation, and also the country’s largest.

Voluntary initiatives in sectors like metallurgy, chemicals, pulp and paper, construction and swine breeding involve objectives and management plans, technology changes and deadlines. There has also been a follow up and assessment process.

Training

The Executive Secretariat for CP (SEPL) has published a CP auditing manual for small and medium size enterprises (available on the web; see Annex III). The National Commission for the Environment (National Environmental Agency) has issued guidelines for pollution prevention and control in such sectors as foundries, poultry production, pharmaceutical laboratories, fruit /vegetable processing, meat processing, laundries, washing machine manufacturing and dairy products.

Available literature in Spanish basically consists of guidance manuals developed through governmental initiatives. Many references in English are also available.

Training programmes on assessment methodologies
have been conducted in accordance with CP agreements. Most of these agreements involve a stage of assessment of the company’s environmental performance.

In 1998 a national “CP Month” was instituted, involving the participation of foreign experts and more than 20 institutions related to the subject.

Periodical meetings have yielded results in the form of the public-private agreements, consolidated the Public/Private CP Committee’s directives and improved the awareness over sustainability issues.

Universities, Technical Schools and Research Institutions

Both public and private universities, University Of Chile and Catholic University of Chile among others, have included CP-related modules into their syllabus. Regarding institutional CP initiatives, the Chemistry Department of the Engineering College, University of Chile, has introduced a Course on Environmental Management and Cleaner Production.

Barriers

The main barriers are:

- Lack of legal incentives for CP. The regulations generally encourage end-of-pipe solutions;
- Lack of knowledge about CP’s benefits. Lack of CP information;
- Lack of a quality accreditation system for the environmental services and technologies offered;
- Poor training options for SMEs. The sector that accounts for the largest amount of the country’s jobs has little CP know-how;
- Lack of financing to industries (particularly to SMEs) for CP projects.

COLOMBIA

Government Policies and Regulatory Framework


Law 99/1993 establishes the integrated institutional framework of the various agencies comprising the National Environment System (SINA), under the direction of the Ministry of the Environment. SINA gathers numerous agencies throughout the country and supports environmental protection efforts in large cities, natural regions and basic research.

CP received the highest level of national environmental priority in the 1994-1998 National Environmental Plan. This plan considers seven basic programmes for the improvement of environmental quality throughout the country:

- Strategic ecosystem protection;
- Better water quality;
- Cleaner oceans and coastline protection;
- Increase of forested areas;
- Better cities and living conditions;
- Population developing policies;
- Cleaner Production

The implementation of the CP programme is based on the development of social strategies agreed between the public and private sectors. Thus, on June 5, 1995, the Ministry of the Environment, together with the main industrial associations of the public and private sectors (comprising 25 industrial groups) signed a “CP Framework Agreement”.

Also, in August 1997 a National CP Policy was established. Its global objective is “to prevent and minimize impacts and risks to humans and the environment, ensuring environmental protection, economic growth, social welfare and industrial competitiveness by introducing the environmental dimension in the productive sectors as a long-term challenge”. The strategies
are oriented to:
- Integrating other national public policies;
- Institutional strengthening of the National Environment System (SINA);
- Establishing the environmental quality system;
- Promoting CP strategies;
- Promoting self-regulation initiatives;
- Implementing economic instruments and tools;
- Evaluating and monitoring CP policy.

In order to progress towards the achievement of sustainable development in the productive sectors in the long-term, the new “National Environmental Plan 1998-2002”, also includes the CP Programme as a priority. The basic objective is to contribute to sustainability and economic growth in the productive sectors.

For this purpose, the CP Programme includes the following instrumental actions:
- Incorporation of the environmental dimension into sectoral policies: agriculture, transport, energy, mining, industry and infrastructure;
- Promotion of specific environmental management initiatives;
- CP Agreements, including community participation;
- Sectoral regulations aimed at pollution prevention;
- Strengthening the National CP Center, including the development of five regional centres;
- Increase CP research and development;
- Increase availability of the “best available technology” throughout the country,
- Enforce more competitive industries;
- Increase the supply and demand of green products.

Government Sector Efforts
Throughout the last few years, much coordination has been or is being carried out with industrial trade associations, through settlement mechanisms besides those already contemplated in Law 99/93. According to this line of work several tasks have been or are being developed:

- Establishment of COMIS (Inter-institutional Committee for CP), in which representatives from the private and governmental sectors participate;
- At the sectoral level, the establishment of Task-Work Committees to ease each sector’s environmental management (e.g. committees for the oil sector, agro-industry, mining, energy, etc.);
- Signing of Inter-Ministry Agreements between the Colombian Ministry of Environment and the Ministries of Defense, Education, Economic Development, and with the National Institute for Road Construction, in order to co-ordinate inter-ministry activities;
- Other Government actions have focused on developing environmental policies and criteria concerning their implementation, particularly the National CP and National Solid Waste Management Policies;
- Co-ordination of Public Policies through Agreements among the Ministry of the Environment and the Ministries of Economic Development, Mining and Energy, Health, Agriculture and Transport;
- Improvement of CP awareness in several sectors through the use of flexible instruments such as CP voluntary agreements (17) with priority sectors, as well as technical assistance and training programmes through the National CP Center and the Regional CP Units (Ventanillas Ambientales and ACERCAR);
- Institutional strengthening of the regional environmental authorities on CP;
- Design of fiscal and financial instruments to promote CP.

Agreements for Promoting Cleaner Production

This strategy began with the Agreement for Settlement as a Framework for CP, inaugurated on June 5, 1995, by the Colombian Ministry of
Environment with the main industrial trade associations and the public mining-energy sector. 

Within this framework, other similar agreements have been signed, the most notable:

- Regional agreements: with the management of Mamonal-Cartagena and Antioquia-East industrial districts;
- Sectorial agreements: instituted with sugar cane producers/farmers, the oil industry, energy sector, the floriculture sector.

According to the main strategy of the National Policy for CP issued in August 1997, about 17 voluntary agreements have already been implemented. The voluntary agreements between industry and government offer opportunities for the:

- Establishment of clear rules by the government;
- Creation of permanent mechanisms for dialogue between government and industrial segments;
- Promotion of self-regulation practices in industry;
- Identification and promotion of successful CP experiences;
- Optimization and unification of environmental administrative processes; and, as a
- Reference point for the establishment of priorities.

Some of the major results were obtained in the following sectors:

Hydrocarbons: Environmental Guidelines (6): Oil drilling operations, oil exploration activities and hyrocarbon transportation; CP pilot projects: waste oil management, biotechnology (30 million US dollars); and establishment of a “National Plan for Oil Spill Control”.

Mining: CP pilot project in brick and lime manufacturing (small industries - Sogamoso); improvement of coal combustion; establishment of two pilot centres in gold mining (small scale); environmental guidelines (4): Exploration and exploitation of coal.


Electric Power: Environmental Assessments associated with hydroelectric projects and thermal power stations; environmental guidelines (4): thermal power stations, transmission and distribution; pilot project in management and disposal of PCB; and training programmes.

The results obtained have led the environmental regional authorities to replicate this strategy in their zones of jurisdiction.

Voluntary Norms of Conduct for Environmental Protection

As an instrument to help industry improve its environmental performance and adopt CP as a policy, the Colombian government
provides encouragement to voluntary initiatives of environmental protection, such as the chemical sector’s Responsible Care®, ISO 14000, Environmental Reporting and others, targeted at both the manufacturing and non-manufacturing organisations of the country. It is also evaluating setting up of other incentives such as rewards for good environmental performance.

Available Reports on Achievements and Perspectives

The Ministry of Environment also considers the reporting of successful approaches an important issue and has printed two documents they hope may be useful in stimulating further CP activities in the region: “Política nacional de producción más limpia” and “Hacia una producción más limpia – avances y perspectivas 1995 – 1998”.

Voluntary Technical Assistance Project - Ventanillas Ambientales (VA)

The Colombian Ministry of the Environment has developed the project called “Ventanillas Ambientales” (VA) to offer technical assistance to SMEs located in urban zones. This project is taking place in the cities of Medellín and Cúcuta.

The Role of Other Organisations

National Centre for Cleaner Production and Environmental Technologies (NCCPET)

In March 1998 the National Centre for CP and Environmental Technologies started its activities of technical assistance to those industry sectors considered to be the most critical in terms of potential damage to the environment and also to those that have limited access to cleaner technologies.

The centre is being funded by the private sector, the Colombian government and international institutions involved in partnership work with Colombia.

NCCPET’s first year of operations has already yielded some results, such as the implementation of more than 25 technical assistance projects (diagnostics included), 3 ISO 14000 assistance activities and the training of more than 500 personnel. The centre has answered 38 requests for information and about 15 advisory works on financial/fiscal matters. Several special projects (i.e., BORSI, UNDESA, etc.) have been carried out and work is continuing with the industrial sectors of metalworking, food/beverage, milk, pulp & paper, mining and concrete production.

Small- and Medium-Sized Enterprise Technical Assistance Unit (Unidad de Asistencia Técnica para la Pequeña y Mediana Empresa) ACERCAR

The Environmental Authority of Santafé de Bogotá is presently developing the ACERCAR Programme. It is going to provide technical support for the prevention and control of the pollution generated by small and medium-sized enterprises (SMEs) located in the city of Santafé de Bogotá, D. C.

Barriers

Barriers to CP in Colombia are mainly related to its regulatory framework or lack of infrastructure:

- The Colombian environmental legal framework and regulations are not specifically focused on CP, nor do they consider all the sources of pollution, or all kinds of waste generated;
- Information on Colombian environmental problems is scarce, dispersed and in some cases not accurate;
- More emphasis is put on the formulation of environmental regulations than on developing ways to make the polluters comply with the regulations issued by the government;
- The use of the end-of-pipe approach still prevails.
There is also a range of other problems common to developing countries. There is no clear idea on how to re-design the production processes based on productivity increases with simultaneous reduction of environmental impacts; there is little knowledge on cleaner technologies suitable for local conditions.

The country always has to contend with a chronic lack of financial and technical resources. Due to the strict budgeting restrictions to public entities, only insufficient funds have been allocated for the formulation of environmental policies, projects and programmes.

COSTA RICA

Government Policies and the Regulatory Framework

Although CP’s importance is well recognized in Costa Rica, there are no environmental government policies specifically targeted at CP practices as a whole, however promotion of the concept is actively encouraged. Some supporting policies, such as the energy efficiency law are already in place. Costa Rica is also a signatory to UNEP’s International Declaration on Cleaner Production of October 1998.

The industries considered to be the most troublesome in Costa Rica are those linked to the food and chemical sectors: dairy; meat products; vegetable processing; drinks/ juices; and paints, varnish and lacquers. These five subsectors have priority for the development of CP activities. CP work in Costa Rica began in 1995 with the initiation of several projects involving the participation of international consultants/ companies.

The Role of Other Organizations

Costa Rica’s UNIDO/UNEP National Cleaner Production Centre (NCPC)

The Ministry of Science and Technology, with the support of other Costa Rican ministries, started pushing for the idea of developing a National CP Centre in the country. This became a reality when the NCPC began operations in November 1998, with funding provided by the Swiss government.

The centre is aimed at developing CP activities such as in - plant assessments, training, information dissemination, and advice on CP policies and technology transfer. At present, only the first three activities have been initiated. The in-plant assessments have begun with the screening of enterprises through the use of quick scan evaluations. The main target groups focused have been identified by a study by the Chamber of Industries of Costa Rica.

Training activities to date have been limited to the internal training of the centre’s staff, comprising six technicians. A second stage will involve the training of external consultants and industry personnel to spread the concept of CP, while a third stage will include the rendering of services on legislative matters, technology transfer opportunities and feasibility studies for NCPC customers.

The centre’s dissemination of information on CP includes sector-oriented seminars to both government officials and industrial plant managers.

The printing of the centre’s news bulletin is also planned. Some CP materials have been prepared, including a study on opportunities for cleaner technologies in Costa Rica and two sector oriented CP manuals, focusing on the food and the printing industries.

Other related activities, such as energy efficiency audits and consultancies, have been provided to approximately thirty companies.

Other organizations providing services on cleaner production, waste minimization and eco-efficiency are the Central American Institute for Business Management (INCAE) and the National University (UNA).

Additionally, three public universities are introducing CP topics in their engineering and chemistry courses.
Barriers

A major problem is considered to be the language barrier - most of the material for courses and activities is not translated into Spanish and Costa Rican technicians have limited or no English skills. A good basic package of training materials in Spanish is needed. Other barriers include a general lack of knowledge on the subject and about what the potential benefits to the companies involved is needed.

The country is also hampered by a lack of a powerful environmental legislation whose enforcement measures could serve as an additional incentive to help support CP in Costa Rica.

CUBA

Government Policies and Regulatory Framework

The importance of CP has long been recognized by the Cuban authorities. Its Ministry of Science, Technology and Environment (MSTE) has recently established a “National Environmental Strategy” and other ancillary policies, aimed at identifying the environmental problems in the manufacturing sectors, correcting their flaws/mistakes and leading them to an improved level of environmental protection.

Joint work is being developed with other strategic ministries, in order to conceive common annual work programmes embodying an assessment of the environmental situation of the industrial sectors; their condition regarding waste management; settlement agreements with industries and other relevant data.

Government Sector Efforts

The Environmental Agency - a branch of the MSTE - is the institution that most closely deals with environmental protection issues in the country. Since the mid-1980’s the Agency has been focusing on CP activities as a policy. Its main objectives include:

- Pollution reduction and prevention;
- Improvement of production efficiency;
- Rational use of natural resources, raw materials and products.

The Agency’s main tool for CP promotion in the country has been the dissemination of information, through national workshops/meetings; lectures to specialists of some Cuban ministries and industries considered to be strategic; and dissemination of information relating to environmental education activities.

Some technical assistance work for the manufacturing sector has also been carried out, in the form of technical and methodological advice, aiming at better industrial environmental management. The Agency has also been active in the co-ordination of some sectorial pollution reduction programmes. A degree of success has been attained through the mitigation of the waste streams generated by the sugar cane, livestock, milk, fishing and food related sectors, with the consequent mitigation of the negative environmental impacts associated with them.

In the next five years, the Agency is planning to elaborate and implement sectorial CP programmes aimed at the country’s major productive sectors.

Barriers

The main barriers mentioned involve lack of material and financial resources to carry out the programmes being proposed.

There is a problem of insufficient environmental education, or insufficient awareness about what the environmental problems are and how to deal with them.

A relative lack of modern, environmentally friendly technologies is a major barrier, as well as is Cuba’s insufficient or obsolete technological and environmental standards.

Also, up to now the few demonstration projects implemented have not provided...
enough momentum to raise enthusiasm about CP in Cuba.

ECUADOR

Government Policies and Regulatory Framework

The prevention and control of industrial pollution in Ecuador has traditionally been done in accordance with laws and regulations based on command and control. The Law on Control and Prevention of Environmental Pollution (1976) established the Environmental Protection Committee (CIPA) now a branch of the Ministry of Urban Development and Housing, responsible for the development of environmental policies and criteria concerning natural resource use and pollution control in Ecuador.

In 1996, the Ministry of Environment was created and was also given the task of environmental protection in Ecuador, causing a conflict of jurisdiction between the two ministries.

More recently (July 1999), country authorities promulgated a Law of Environmental Management (Ley de Gestión Ambiental), which takes into consideration pollution control and prevention aspects, as well as CP. It is foreseen that new legislation will to serve as the basis for a major renewal and regulation of pollution control and prevention practices in Ecuador.

The Ministry of Environment, in its role of environmental management, is of the opinion that CP is a priority issue to be considered in the development of its National Policy for Sustainable Growth, thus helping set the pattern for future actions. This is going to be made through the evaluation of past initiatives, such as USAID’s EP3 or future - yet to be developed - projects. This activity will be sponsored by UNIDO. On the other hand, the establishment of a series of national clean industry fora is also being envisaged. These will help define the scenarios for future CP agreements among all of the sectors involved.

It is also worth noting that country counts on a decentralisation law (Ley de Descentralización), which allows each province to play its role regarding the creation of CP policies and regulations, by establishing their own local legislative instruments.

The Ministry of Environment has recently celebrated an agreement with Ecuador’s Small Industrialists’ Chamber (Cámara de Pequeños Industriales, CAPEIPI), which is going to host a future Ecuadorian CP centre aimed at rendering service in the fields of technology development and research. This Centre is going to be established in partnership with Brazil’s UNIDO/UNEP National Clean Technology Centre of SENAI/ Porto Alegre.

The Role of Other Organizations

Other institutions, particularly non-government organizations (NGO’s) play an important role in disseminating CP principles throughout Ecuador.

OIKOS is an Ecuadorian NGO dealing with CP issues since 1993 – providing consultancy services, CP technical information, training, workshops and seminars, disseminating CP technologies and methodologies. It is sponsored by USAID.

In order to identify the most appropriate options for the improvement of industrial production processes and mitigate the environmental pollution caused by industrial activities, OIKOS has already provided technical assistance to over forty industries from various sectors. Currently, OIKOS is helping some small mining operators use CP measures in their activities.

OIKOS has been disseminating the principles and concepts of CP, ISO 14000 and environmental management systems in Ecuador through seminars and discussions involving several sectors of the society.

The Natura Foundation is another NGO in Ecuador working with CP. Actively
working with representatives of the industrial and governmental sectors, Natura Foundation searches for ways to achieve compliance with environmental laws. In this way, it has developed a "National Programme of Incentives for Industrial Pollution Prevention and Control", to be analysed and implemented by the government authorities. The proposal includes suggestions on economic and non-economic incentives, aimed at increasing the use of cleaner processes in industrial production. The Foundation's work has also contributed to Ecuador's recent official enrollment in the Responsible Care® Programme.

Private Company Initiatives
Some private companies have begun important processes changes using CP. Their efforts are well known in Ecuador. "Curtiembre Renaciente" was the pioneer in the use of CP. Other industries from other sectors such as breweries, cement, rubber and chemical manufacturers in the cities of Quito, Guayaquil and Cuenca have also developed successful internal CP programmes.

The evolution of environmental awareness has influenced the Chamber of Industries of Pichincha, to start a Competitiveness Programme among its members. It also helped the municipality of Quito to develop the project "Ordenanza 2910", seeking prevention and control of industrial emissions and waste. The Industrial Chambers of Cuenca and Ambato, and also the Ecuadorian-American Chamber of Commerce of Quito has been encouraging the use of CP among their members, wherein more than fifty industries decided to voluntarily embrace CP principles.

EL SALVADOR

Government Sector Efforts
The degree of environmental pollution in is very high throughout the country. According to 1990 estimates, about 85% of El Salvador's surface water is subject to both domestic and industrial wastewater discharges, the major part of it without any kind of treatment. Most of the industrial wastewater is attributable to the discharges from small enterprises.
Conditions are likewise critical concerning air emissions - which are mostly related to the transportation sector - and improper solid waste disposal practices that further aggravate the state of pollution in the country. Hospital wastes are also a serious concern.

About two years ago, the Ministry of Environment and Natural Resources (Ministerio del Ambiente Y Recursos Naturales, MARN) was established. Although its “Law on the Environment” (Ley del Medio Ambiente) is already in place, up to late 1998 its ancillary regulations were still being promulgated.

The stage is set for CP to prove its worth in El Salvador, since MARN is still in a relatively embryonic phase and no end-of-pipe type of control systems have been installed in any significant numbers.

Furthermore, since 1997 the country is giving some signs of finally having emerged from a period of relative economic stagnation, and further economic growth is being forecasted. On the other hand, the recent privatization of its energy and communications companies creates concerns for future rise in the cost of such commodities, which is also a factor influencing the adoption of CP measures.

The Role of Other Organizations
El Salvador's UNIDO/UNEP National Cleaner Production Centre or Centro Nacional de Producción Mas Limpia, CNPML has recently been established with the goal of supporting Salvadorian businesses in the incorporation of CP measures. CNPML is aided by strategic alliances with several local and foreign partners, including Asociacion Nacional de la Empresa Privada (Private Enterprises Trade Association ANEP) and Asociacion Salvadoreña de
Industriales (Salvadoran Industry Trade Association ASI), which is also its host organization. The centre’s activities are primarily targeted at Salvadoran manufacturers and agricultural industries, since these sectors have the highest pollution potential.

CNPML’s main activities will be:
- In-plant environmental evaluation/technical assistance work;
- Technology transfer, through feasibility studies, incentives for investments on CP measures, data on CP technologies available abroad and ways to get access to financing;
- Dissemination of information on technologies, case studies and equipment;
- Training activities for the enhancement or build-up of local capacities;
- Technical assistance in the fields of environmental, economic or financial policies, environmental legislation and incentives to CP.

CNPML has elaborated a plan for the centre’s first five years, including a set of goals. These involve carrying out environmental evaluations in at least fifty companies.

The centre is planning to set up a mechanism for the continuous introduction of up-to-date CP technologies in at least fifteen among these fifty industries, including financial assistance.

It also plans to enhance the local capacity on CP through training of Salvadorian consultants, besides functioning as an integrated CP information centre with an extensive computerization plan linked to the global CP network and to other CP centres around the world.

Furthermore, it also has future plans to include CP concept in Salvadoran municipal and national environmental legislation, aimed at attaining sustainable growth conditions.

GUATEMALA

Government Policies and Regulatory Framework

The Guatemalan Government recognizes the importance CP may have in making its industries more competitive and environmentally friendlier. Considering the country’s present economic situation, there are no plans for legislative amendments in the near future.

The Role of Other Organizations

Most of the consultancy work to industry in the fields of energy efficiency and CP is done by private organizations. About fifteen such organizations are known to exist, but they are mostly experienced in doing environmental impact assessments, which are mandatory in the case of new industries. Agencies such as USAID (USA), the German Agency for Technical Cooperation GTZ (Germany), the Canadian International Development Agency (CIDA, Canada), and other agencies from countries like Sweden and Norway, have offices in Guatemala and conduct their own CP programmes.

A Guatemalan UNIDO/UNEP NCPC has recently (July 1999) been officially opened. Contacts are already being made with interested industries from various sectors such as soap/detergents, iron galvanizing, laundry services and tanneries.

The NCPC has made a workplan aimed at five different target groups: soap/detergents, edible fats/oils, pulp & paper, metal finishing and dairy products. At least two in-plant assessments are planned for 1999, along with one seminar/workshop, despite the fact that the NCPC is still in its formative phase.

Concerning training and education, two out of four technical universities have included CP as part of their curricula. The NCPC has recently participated in a workshop with other universities aimed at including mandatory CP subjects in the curricula of courses such as Engineering and Architecture.
Barriers

The economic situation of Guatemalan industries in general, is not very good. Interest rates are high and although many enterprises are aware of the productive and environmental improvements they must introduce to make themselves more competitive and comply with environmental legislation, they cannot find the financing to carry out such projects.

JAMAICA

Government Policies and Regulatory Framework

In Jamaica, environmental policies are handled by the Natural Resources Conservation Authority (NRCA). Within this framework, CP is, to a small extent, encouraged by local policies.

Government Sector Efforts

For some years NRCA has been involved in CP activities, though with a limited scope. NRCA has tried to raise Jamaican public perception on CP, mainly through the distribution of copies of articles from publications and making presentations to industries and NGO’s.

Besides this, NRCA is also involved in other related activities, such as making CP policy recommendations.

Green Globe Certification – Environmental Audits for Sustainable Tourism (EAST) Project

The EAST Project is aimed at greening Jamaica’s tourism/hospitality sector through the implementation of Environmental Management Systems (EMS) and Green Globe (GG) certification of its hotels. The project is being sponsored by the Jamaica Hotel and Tourist Association via funding provided by USAID.

The Certification programme (launched January 1998) is aimed at developing a greater awareness among Jamaica’s tourism community about the benefits of EMS and of “going green”. To this end, GG has developed an EMS system specifically tailored to the tourism sector. The project encompasses environmental audits and also the formation of a skilled auditing team.

This is going to enable a number of tourism related establishments to carry out this kind of audit, thus emphasizing to the whole sector, the economic advantages of GG certification and “green” operations and fostering environmentally sustained tourism in Jamaica. To date, audits have begun at approximately fifteen hotels, ranging from fifteen to two hundred rooms. Five properties are currently being audited for GG certification.

The audits are conceptually simple and recommended by EAST reports are also very simple and generally inexpensive. The results obtained are quite encouraging and the audits have demonstrated, for instance, that a “green” hotel may save up to half the electricity that would be normally used, not to mention its enhanced attraction to the “green tourist” segment. Achieving Certification is going to be a driving force for Jamaican hotels.

Barriers

Major barriers to CP promotion are a lack of financial resources, as well as local industrialists generally not knowing about CP concepts or not willing to invest in research and development.

MEXICO

Government Policies and Regulatory Framework

The Environment, Natural Resource and Fishing Secretariat,( Secretaría de Medio Ambiente, Recursos Naturales y Pesca - SEMARNAP ) is the federal agency responsible for the preparation of environmental policies, laws and regulations, as well as monitoring and enforcement actions encompassing most environmental problems.

The Federal Environmental Protection Agency,
(Procuraduría Federal de Protección Ambiental PROFEPA) is an independent institution tasked with enforcing environmental compliance, through the use of two main instruments: environmental inspections and audits.

Mexico hosts a UNIDO/UNEP NCPC, the “Centro Mexicano para la Producción más Limpia”, which has been jointly created and supported by the Mexican Government and UNIDO/UNEP.

Government Sector Efforts

Although Mexico has not established an indigenous CP programme, the National Programme on Industrial Audits has taken the option of using the agency’s environmental audits as a voluntary instrument for pollution prevention and control. This has been done by making use of measures such as raw material substitution, technological improvements and energy efficiency, as tools to minimize the companies’ environmental risks and liabilities.

As a settlement instrument, companies can establish an “Action Plan” embodying a series of goals. Those that attain all of them within a set time frame receive a “Clean Industry” certificate. Between 1992 and 1997, more than 712 environmental audits and 400 Action Plans were made, resulting in an investment of more than US$ 1 million in source reduction measures.

Mexico City’s Environmental Secretariat (Secretaría del Ambiente) has developed several programmes directed at addressing the city’s well-known and difficult air pollution problems. These programmes mainly focus on reduction in the levels of dangerous pollutants in the local air, suggesting a series of goals, each one addressing a specific aspect of the problem. From a CP standpoint, two of the most relevant, are “Industria Limpia” (Clean Industry) and “Vehículos Limpios” (Clean Vehicles).

The Industria Limpia program uses several instruments, or tools, as an incentive for industries to reduce their emissions. These include voluntary recognition programmes of the “beyond compliance” type, economic incentives (in the form of tax deductions) for investments in environmental technologies, and, changes to less polluting energy sources such as natural gas.

The “Vehículos Limpios” programme goal is to stimulate high standards of renovation and maintenance of Mexico City’s large automotive fleet, in order to minimize air emissions. The main instruments used have been rotation traffic restriction programmes such as the “Hoy no Circula” (Car Free Day), as well as those of the mandatory inspection/maintenance (I/M) kind. Incentive measures are also used to allow vehicles with outstanding I/M grades relative freedom from the rotation programmes. Agreements were also sought with Mexico’s Petroleum Agency (PEMEX) in order to improve the quality of the locally used fuels.

Volatile Organic Compounds (VOCs) emissions are also being targeted by specific measures such as the implementation of airtight fueling systems in local gas stations and use of equipment and strategies to prevent leakage in the natural gas distribution network.

The Role of Other Organizations

Mexican UNIDO/UNEP CP Centre (Centro Mexicano para la Producción más Limpia) CMPL
CMPL has been involved in CP activities since its inception in 1996 and is currently based at the Instituto Politécnico Nacional (National Polytechnic Institute, IPN).

An overview of the activities carried out throughout this period shows more than thirty CP assessments in key industrial sectors such as metal plating, foundries and chemical plants, as well as in the services sector, such as hospitals. Most of the Centre’s efforts are directed toward SME’s.
Dividends in terms of savings and production increases were estimated to be around US$ 10 million. At present, two chemical plants are in the process of obtaining financing for implementing CP process changes stemming from the Centre’s efforts. Furthermore, over one hundred persons have been trained in CP practices through the Centre’s courses. It is also involved in studies aimed at the establishment of future CP policies in Mexico.

Future work will involve follow up of the above mentioned sectors, plus some other branches of the service sector, as well as the industrial sectors of mining and sugar cane processing. The establishment of a formally certified CP course is also envisaged. Policies and schemes for financing CP introduction are also being developed.

Centre for Cleaner Technologies and Sustainable Development – (CITELDES)

CITELDES, was created in 1997 and is currently based in the City of Xalapa (State of Veracruz). It receives the support of the World Association of Industrial and Technological Research Organizations (WAITRO). Its mission is the:

- Dissemination of information related to cleaner production;
- Creation of an electronic network of groups interested in clean technologies;
- Organization of international symposia, training courses and conferences, in order to foster the exchange of ideas among the various sectors (public, private and academic) involved;
- Establishment of demonstration projects; and,
- Know-how and technology transfer from research groups to end users through conventional and non-conventional means.

CITELDES has been actively promoting clean technologies among coffee processors in the Huatusco Region (state of Veracruz), besides also having helped organize the Third International Symposium on “Cleaner Bioprocesses and Sustainable Development”, held in June 1998, in the city of Veracruz.

Last year the Centre carried out a project supported by the Organization of American States (OAS) aimed at evaluating the socio-economic and environmental impacts of the coffee processing industry and developing strategies for mitigating them. CITELDES – along with the Institute of Ecology – is currently planning to publish a book on Cleaner Bioprocesses. CITELDES is planning the following activities for the next two-year period:

- Establishment of a “who’s who” database on what is being offered or needed in the market in terms of environmental technologies;
- Promotion of cleaner processes at key agro - industries or industries with negative environmental impact;
- Preparation of a training course aimed at building up CP capacities in developing countries, to be developed in conjunction with the “Universidad Tecnológica Vicente Perez Rosales”, Santiago, Chile;
- Organization of the IV International Symposium on Cleaner Bioprocesses and Sustainable Development.
- Initiatives to bring together SME’s and international financial institutions.

The Environmental Quality Centre (Centro de Calidad Ambiental)

The “Centro de Calidad Ambiental” is located in the Technological Institute of Monterrey (ITESM). It carries out programmes focused on preventing pollution through the use of cleaner technologies. ITESM has already included cleaner production as part of its environmental quality courses.

Barriers

Although UNEP has already published some materials in Spanish, most of the available CP information is only available
in English, which constitutes a language problem. Despite CP efforts, the concept has not yet been widely disseminated in Mexico. This must be done in order to involve the Mexican society in getting better results. Most Mexican NGO’s involved in CP activities have only recently been established and generally can only count on limited budgets to carry out their workplans.

Although SME managers are interested in cleaner technologies, they have problems with scarce funding due to the financial crisis in Mexico.

NICARAGUA

Government Policies and Regulatory Framework

Nicaraguan national policies generally do not put special emphasis on the encouragement of CP practices.

Government Sector Efforts

The Ministry of Natural Resources and Environment (MARENA) runs a pollution prevention project as part of a comprehensive environmental programme financed by the Finnish government. The project has carried out studies on the situation of different industrial sectors focusing on prevention and waste water treatment in the dairy and leather sectors.

In spite of the existence of the National Environmental Commission (CONAMA) and the National Commission for Sustainable Development (CONADES), valuable environmental projects and programmes have mainly been promoted and implemented by national NGO’s, bilateral cooperation and through the support of international organizations.

The Role of Other Organizations

The Nicaraguan (UNIDO/UNEP) Cleaner Production Center Project is a UNIDO and National University of Technology Initiative. It has been functioning since 1998, within the framework of the NCPC programme in Central America and is funded by the Austrian government. At present the main emphasis is on CP capacity building.

Active networking with other national partners involved in the field is of major importance in establishing a national infrastructure. Subject-oriented and sector specific cooperation with governmental and non-governmental stakeholders is needed in order to integrate Cleaner Production into existing programmes and projects.

The NCPC is presently carrying out the following activities:

- Translation, adaptation and elaboration of CP training material in accordance with the local needs;
- Integration of ten CP Pilot projects and training sessions in medium- sized enterprises, partly in cooperation with the Austrian company STENUM. A CP project involving various Nicaraguan hospitals is projected;
- CP in SMEs; sector-specific solutions for ceramic and furniture manufacturing companies;
- A one year technical training programme on food technology, with specific courses for different branches of the food processing industry to introduce the concepts of eco-efficiency and CP;
- Establishment of an ecological design concept in cooperation with the Central American Initiative for Ecological Design and the Delft University of Technology;
- Setting up an energy efficiency expert team within the NCPC, in order to provide more specific attention to client needs;
- Continuous CP training provided to staff members on a national, regional and international level;
- Continuous campaign of information dissemination within national and international events related to CP and pollution prevention;
- Compiling information on options for reuse, recycling
and remanufacturing of waste materials in order to publish a guide on the topic;
- Strengthening links with relevant government institutions such as the Ministry for Economy, Ministry of Environment, Ministry of Health, Labor Ministry, as well as with local and international NGOs;
- Cooperation with UNEP in the project “Strategies and Mechanisms for Promoting Cleaner Production Investments in Developing Countries”;
- Providing more and more opportunities for international subject specific cooperation.

The mix of pilot projects, training and services offered to client companies by the Nicaraguan Cleaner Production Centre could serve as a reference point for such activities in a different country with similar conditions and environment due to overall positive and promising work experience and results that have been obtained so far, within the scope of activities mentioned above.

Since 1998, when the Nicaraguan Cleaner Production Centre Project was taken as an initiative by UNIDO and the National University of Technology, CP has been introduced to all disciplines related to the topic (industrial engineering, mechanics, material sciences, chemistry and postgraduate environmental sciences, among others). The subject is taught to pre-graduate students but has not yet been formally included in their syllabus. Central American University (UCA), through its environmental department is beginning to focus on SEM. The law department focuses on issues related to environmental legislation.

Case studies and demonstration projects are being developed in food & drink processing, plastics, printing, services, car repair shops, hospitals, furniture and ceramics. CP material is available in the local language.

Together with INPYME, the National Institute for Small- and Medium- Sized Enterprises, UNIDO runs a project oriented toward the creation of clusters among small enterprises. The INPYME Environmental Department cooperates in providing assistance mainly to the small and very small enterprises.

Cadin, the Nicaraguan Chamber of Industry runs a department that offers training to industry in environmental-related issues.

Barriers

The Nicaraguan industries, particularly small- and medium-size, are characterized by inefficient use of resources, lack of appropriate technologies, lack of access to information, difficulties in finding out about alternative materials, production processes and products; deficiencies in management, administration, marketing practices, financial resources, technical capacity and equipment. These have an adverse impact on competitiveness.

The main barriers encountered in order to promote and implement CP are:

- Limited environmental consciousness. The CP concept is still not well known among industry, the banking and legislative sectors, professionals and consultants;
- Bureaucratic resistance to change;
- Existing legal framework, very little existing control mechanisms;
- No specific cleaner production policy or incentives available, in order to encourage technical developments in this area;
- Lack of reasonably priced financial sources for CP financing. Capacity for the promotion of cleaner production investments is still to be developed. The cost of capital is extraordinarily high in Nicaragua and thereby hampers investments in industry modernization (including Cleaner Production), even if these
investments would create substantial improvements in the overall productivity and profitability;
• Lack of professionals with sufficient CP know-how;
• Pricing of natural resources (for example water) is underdeveloped;
• Deficiencies in waste management system;
• Inept handling of toxic substances, which often enter the country unlabeled;
• Incentives for reuse and recycling through poverty only, no market driven efforts;
• Lack of information at the government, industry and consumer levels.

PERU

Government Policies and Regulatory Framework

In Peru, the government recognizes CP’s importance. The Ministry of Industry encourages companies to adopt monitoring programmes, in accordance with national standards. The same occurs in the fishing and mining sectors.

The Role of Other Organizations

The Pan-American Centre for Sanitary Engineering and Environmental Sciences (CEPIS) is the environmental technology centre of the Pan-American Health Organization (OPS). OPS itself is the regional office for the Americas of the World Health Organization (WHO). Established in 1968 with headquarters in Lima, (CEPIS) has the task of cooperating with American countries in order to assess and control environmental risk factors that may - directly or indirectly - affect their populations’ health. It currently concentrates its efforts in the fields of waste management and control of chemical contaminants in the environment.

CEPIS’ cooperation work is basically carried out through technical assistance, specialists training and information dissemination activities.

It has been developing CP activities since 1992, editing publications and providing information exchange.

As a part of its information dissemination activities, CEPIS also translates relevant documents and books into Spanish. At present, information on CP is available in Spanish, Portuguese and English.

The Paracas Bay Industrial Pollution Prevention Project is managed by a consortium of Peru’s National Environmental Council (Consejo Nacional del Ambiente, CONAM), USAID and the National Fishing Society (Sociedad Nacional de Pesquería, SNP). The consortium is tasked with assessing efficiency losses, preventing environmental problems and improving the profitability margin of the local fish flour production sector. The sector had been showing estimated yearly losses of US$ 36 million and the project served to demonstrate the importance of raw material quality preservation and process water recycling.

Universities, Technical Schools and Research Institutions

During the last three years, at least ten public and private Peruvian universities, notably the National Engineering (UNI), National Agriculture (UNALM), Plura National (UNP), Mayor de San Marcos National (UNMSM), Peru Catholic (PUCP), Lima (UL) Ricardo Palma Private (UPRP) and Federico Villarreal National (UNFV) Universities have included CP issues in their curricula.

In many other Latin American and Caribbean countries, the “MSC. on Environmental Management” Programme has been instituted. In 1997-98, CEPIS trained fourteen professors from Brazil, Colombia, Costa Rica, Cuba, Ecuador, Mexico and Peru.

Barriers

In general terms, the main barriers to CP in Peru are:
• Lack of solid and adequate legislation;
• Little political compromises;
• Little interest from industrialists;
• Poor financial capability;
• Lack of a clear understanding about the benefits obtained from CP;
• Poor research of appropriate technologies.

**TRINIDAD - TOBAGO**

**Government Policies and Regulatory Framework**

In Trinidad - Tobago, CP has been institutionalized through the Environmental Management Agency’s Policy Statement. The draft for the “National Environmental Policy” also states the priority of CP in relation to pollution control technologies.

At this moment, there is limited CP activity in the country, mostly supported by UNEP and the International Labor Organization (ILO). CP is particularly interesting for the hotel segment of the services sector.

**The Role of Other Organizations**

The Caribbean Industrial Research Institute (CARIRI) has been mandated by the Government of Trinidad - Tobago to develop a capability in environmental sciences. The Institute is establishing a consulting service based both on accredited testing services and its past experience in engineering design and materials evaluation. Targeting areas such as chemicals, agro-processing, construction and minerals, CARIRI has been undertaking demonstration projects in the hotel and food processing sectors, providing technical information to industry through printed information and consulting services.

Universities, Technical Schools and Research Institutions

The University of West Indies, Faculty of Engineering, provides a module addressing CP.

**URUGUAY**

**Government Policies and Regulatory Framework**

In Uruguay the Ministry of Housing, Land Planning and Environment (Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente, MVOTMA) created in 1990, is charged with the formulation, execution and evaluation of the National Environmental Plan and the development of the National Environmental Policy.

Although CP has not been formally instituted in Uruguay as a national programme, the government considers CP as an efficient means of achieving the country’s sustainable development.

The development of CP activities is still incipient, mainly directed at waste minimisation practices rather than implementing clean technology processes.

It would be necessary to introduce modifications to the Uruguayan legal framework in order to promote regulations for the effective application of sustainable technologies. One of the main future challenges for MVOTMA is going to be the establishment of funding mechanisms to help industries implement CP measures and modify the current pollution control strategies that are still focused on end-of-pipe approaches.

**Government Sector Efforts**

In pursuance to the Montreal Protocol and with support of the United Nations, MVOTMA has been carrying out a programme for the substitution of Chlorofluorocarbon through industrial modification projects.

In the period 1997-1998 MVOTMA – with the aid of the Canadian government – has conducted a diagnostic study of the dairy sector and sponsored a workshop on CP technologies.

In accordance with the priorities set by MVOTMA, many seminars and training activities involving both industry and local communities have been held, aimed at a wider dissemination of the concepts of responsible care for the environment and environmental awareness raising. It has been noted that considerable interest on the part of the Chamber of Industry
has resulted from these events.

In the last few years some voluntary initiatives of environmental protection have been taken by the manufacturing industries. The most important affect the chemical sector, which has been enrolled in the Responsible Care® Programme since 1998. Some industries have also obtained ISO 14001 certification.

MVOTMA has also been taking part in the National ISO 14001 Committee established at the National Institute for Technical Standards – UNIT.

The Role of Other Organizations

The University of the Republic of Uruguay – through its Faculty of Engineering – has a number of research projects focused on CP. In 1999 MVOTMA awarded its National Environmental Prize to one of these research projects concerned with enzymatic leather unhairing.

Uruguay’s Technological Laboratory, (Laboratorio Tecnológico del Uruguay, LATU), was created in 1965 as a joint initiative of the country’s public and private sectors. It is tasked with:

- Technology development, adaptation and transfer;
- Management of regulating mechanisms for industrial and commercial activities

- Consulting services in the fields of laboratory analyses and quality certification.

Interest in CP started in the early 1990’s and gathered momentum in 1994, when LATU hosted the Uruguayan Seminar on Sustainable Development, or (La Industria en el Uruguay en el Marco del Desarrollo Sustentable), with representatives from UNEP and IE/PAC. This was the starting point for LATU’s work on CP.

From then on, LATU’s several different technological branches have been conducting studies on CP opportunities in strategic industrial sectors such as tanneries, milk derivatives, meat processing, cereal processing and textiles.

LATU has been working with MVOTMA in order to carry out the substitution of Chlorofluorocarbons through industrial modification projects and the environmental labeling project “Ozono Amigo”, besides also developing ISO9000 and ISO14000 training and certification activities in conjunction with the Austrian Association for Quality Management Systems (ÖQS).

In 1997, UNIDO presented a proposal to LATU for a SME Waste Minimization Project that would serve to set the basis for a future National Cleaner Production Centre in Uruguay. However, there were some objections, and up to the present time, this initiative has not borne fruit.

Barriers

The main barriers to CP development in Uruguay are:

- Lack of an appropriate and effective legal framework of environmental regulations involving CP;
- Lack of financing for industrial CP projects;
- Lack of knowledge about CP’s benefits to corporations.

Additionally, public information availability in Uruguay is considered to be less than satisfactory, because it is not readily available under the “CP” heading. Besides, there are no substantial CP training/educational programmes in place. The few information dissemination activities to date have been limited to relatively scattered presentations to industry representatives in workshops or seminars.
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### CP AND RELATED ISSUES IN BRAZILIAN UNIVERSITIES

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</tbody>
</table>

Note: The acronyms in parentheses denote the Brazilian State each campus is located: BA- Bahia; ES- Espirito Santo; MG- Minas Gerais; MS- Mato Grosso do Sul; PE- Pernambuco; PR- Paraíba; RS- Rio Grande do Sul; RN- Rio Grande do Norte; RO- Rondônia; SC- Santa Catarina; SP- São Paulo.
## CP AND RELATED ISSUES IN BRAZILIAN UNIVERSITIES

<table>
<thead>
<tr>
<th>UNIVERSITY</th>
<th>Note: The acronyms in parentheses denote the Brazilian State each campus is located: BA- Bahia; ES- Espírito Santo; MG- Minas Gerais; MS- Mato Grosso do Sul; PE- Pernambuco; PR- Paraná; RS- Rio Grande do Sul; RN- Rio Grande do Norte; RO- Rondônia; SC- Santa Catarina; SP- São Paulo.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Itajubá Engineering School (MG)</td>
<td><a href="mailto:barbosa@iem.ufjei.br">barbosa@iem.ufjei.br</a></td>
</tr>
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<td>The Science &amp; Technology Foundation (RS)</td>
<td>+55 51 226 0207</td>
</tr>
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<td><a href="mailto:makui@f5.usp.br">makui@f5.usp.br</a></td>
</tr>
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<td>The University of São Paulo Polytechnic School – Chemical Engineering Department (SP)</td>
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</tr>
<tr>
<td>Unesp/ Paulista State University - Guaratinguetá Campus - Engineering College (SP)</td>
<td>+55 12 5252466</td>
</tr>
<tr>
<td>Unesp – Guaratinguetá Campus - Engineering College (SP)</td>
<td><a href="mailto:wayo@feg.unesp.br">wayo@feg.unesp.br</a></td>
</tr>
<tr>
<td>Unesp – Guaratinguetá Campus (SP)</td>
<td><a href="mailto:sta@feg.unesp.br">sta@feg.unesp.br</a></td>
</tr>
<tr>
<td>Unesp – Bauru Campus – Engineering College (SP)</td>
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</tr>
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<td>Unesp – Bauru Campus- Science College (SP)</td>
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</tr>
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</tr>
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</tbody>
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8.2 ANNEX II - CP CONTACTS IN LATIN AMERICA AND THE CARIBBEAN

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8.3 ANNEX III - INTERNET RESOURCES FOR CP IN LATIN AMERICA AND THE CARIBBEAN

Comprehensive Programmes and Funding
CAF – Corporación Andina de Fomento (The Andean Development Corporation)  
The Inter-American Programme for Environment Technology Cooperation in Key Industry Sectors


Country-Specific Information

Argentina

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Secretaria de Recursos Naturales Y Desarrollo Sustentable

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Brazil

Bank of the State of São Paulo (BANESPA) 
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Catholic University of Rio Grande do Sul 
Brazilian Business Council for the Sustainable Development (CEBDS) 
The São Paulo State Environment Agency (CETESB) 
Credibanco 
The Brazilian Ministry of Science and Technology Research and Projects Financing (FINEP) 
I The Brazilian Institute for the Environment (IBAMA) 
São Paulo Institute of Technology Research (IPT) 
Mauá Institute of Technology 
Brazilian Ministry of the Environment (MMA) 
Programme for Energy Conservation (PROCEL) 
Responsible Care® 
SENAI Technology Centres 
University of Bahia 
University of Campinas

http://www.bnedes.gov.br/english
http://www.pucrs.br/pos
http://www.cebds.com.br
http://www.cetesb.sp.gov.br
http://www.credibanco.com.br/indexe.htm
http://www.finep.gov.br/Scripts/sitecf.exe/Home
http://www.ibama.gov.br
http://www.irt.br
http://www.maua.br
http://www.mma.gov.br
http://www.eletrobras.gov.br/procel/ingl.htm
http://www.abiquim.org.br/atua.htm
http://www.ciet.senai.br
http://www.teclim.ufba.br
http://www.unicamp.br
Brazil

University of Ouro Preto  http://www.ufop.br/cursos/posgrad/intro.htm
University of Rio Grande do Sul  http://www.ufrgs.br
University of Santa Catarina  http://www.ufop.br/cursos/posgrad/intro.htm
University of São Paulo Ecobuilding and Cleaner Production  http://www.lsi.usp.br/~prodlimp
University of Vale dos Sinos  http://www.unisinos.br

Chile

Banco de Crédito e Inversiones  http://www.bci.cl
National Comission for the Environment (CONAMA)  http://www.conama.cl
REUNA – Red Universitaria Nacional (National University Network)  http://www.reuna.cl
The Executive CP Secretariat  http://www.corfo.cl
Universidad Católica  http://www.ing.puc.cl

Colombia

Unidad de Asistencia Tecnica para la Pequeña y Mediana Empresa (ACERCAR)  http://www.acercar.org.co
Asociación Colombiana de Ingeniería Sanitaria y Ambiental (ACODAL)  http://www.colnodo.org.co
Universidad Industrial de Santander/ Nodo Regional de Producción Más Limpia  http://www.cdmdb.gov.co/nodo
Centre Nacional de Produccion Mas Limpia y Tecnologias Ambientales  http://www.eis-online.com

Costa Rica

CEGESTI  http://www.cegesti.org/ingles/cegesti.html
NCPC - Centro Nacional de Producción más Limpia (CNPML)  http://www.cnpmil.or.cr

El Salvador

NCPC - Centro Nacional de Producción más Limpia (CNPML)  http://www.cnpmil.org.sv
Jamaica
National Resources Conservation Authority (NRCA)  http://www.nrca.org

Mexico
Centro Mexicano para la Producción más Limpia  http://www.cmpl.ipn.mx

Peru
Centro Panamericano de Ingeniería Sanitaria y Ciencias del Ambiente (CEPIS)  http://www.cepis.org.pe

Trinidad - Tobago
Caribbean Industrial Research Institute (CARIRI)  http://www.cariri.com
Environment Management Agency (EMA)  http://www.ema.co.tt

Uruguay
Uruguay (RTC)  http://www.chasque.apc.org/despel
ANNEX IV - REFERENCES


SECRETARIA EJECUTIVA DE PRODUCCION LIMPIA/ MINISTERIO DE ECONOMIA, Chile. El Fomento a la Producción Limpia en Chile. (Santiago), Ministerio de Economía, nov. 1998.


In addition to the above mentioned references, this report largely draws from numerous internet information resources, various project reports, brochures and publications, and contributions by a number of CP professionals in the region through personal communication.
There is a variety of information and advice available from the United Nations Environment Programme at:

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ABOUT THE UNEP DIVISION OF TECHNOLOGY, INDUSTRY AND ECONOMICS

The mission of the UNEP Division of Technology, Industry and Economics is to help the decision-makers in government, local authorities and industry develop and adopt policies and practices that:

- Are cleaner and safer;
- Make efficient use of natural resources;
- Ensure adequate management of chemicals;
- Incorporate environmental costs;
- Reduce pollution and risks for humans and the environment.

The UNEP Division of Technology, Industry and Economics (UNEP DTIE) located in Paris, is composed of one centre and four units:

- The International Environmental Technology Centre (Osaka), which promotes the adoption and use of environmentally sound technologies with a focus on the environmental management of cities and freshwater basins in developing countries and countries in transition
- Production and Consumption (Paris), which fosters the development of cleaner and safer production and consumption patterns that lead to increased efficiency in the use of natural resources and reduction in pollution
- Chemicals (Geneva), which promotes sustainable development by catalyzing global actions and building national capacities for sound management of chemicals and the improvement of chemical safety world-wide, with priority on Persistent Organic Pollutants (POPs) and Prior Informed Consent (PIC), jointly with FAO
- Energy and Ozone Action (Paris), which supports the phase-out of ozone depleting substances in developing countries with economies in transition, and promotes good management practices and use of energy, with a focus on atmospheric impacts. The UNEP/Collaborating Centre on Energy and Environment supports the work of the unit.
- Economics and Trade (Geneva), which promotes the use and application of assessment and incentive tools for environmental policy and helps improve the understanding of linkages between trade and environment and the role of financial institutions in promoting sustainable development

UNEP DTIE activities focus on raising awareness, improving the transfer of information, building capacity, fostering technology cooperation, partnerships and transfer, improving understanding of environmental impacts of trade issues, promoting integration of environmental considerations into economic policies, and catalyzing global chemical safety.

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