

**BEST PRACTICES IN CLEANER PRODUCTION
PROMOTION AND IMPLEMENTATION
FOR SMALLER ENTERPRISES**

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PREPARED FOR

MULTILATERAL INVESTMENT FUND (MIF)
INTERAMERICAN DEVELOPMENT BANK (IADB)
WASHINGTON, DC

APRIL 2002

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The views and opinions expressed herein are those of the authors and do not necessarily reflect the official position of the Inter-American Development Bank or the other organizations mentioned in this report.

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Appendix

Case Summaries

- Multinational Umbrella Programs
- Country-Specific Programs

List of acronyms

ADB	Asian Development Bank
APRCP	Asia-Pacific Cleaner Production Roundtable for Cleaner Production
CEEC	Central and Eastern Europe Countries
CNP+L	Centro Nacional de Producción Más Limpia
CP	Cleaner Production
CPRA	Cleaner Production Roundtable of the Americas
EMS	Environmental Management Systems
IDB	Inter-American Development Bank
ILO	International Labor Organization
ISO	International Standards Organization
IWM	Industrial Waste Minimization
KfW	German Financial Cooperation
LAC	Latin American and Caribbean region
MBIs	Market-Based Instruments
MIF	Multilateral Investment Fund
NCPC	National Cleaner Production Center
NEFCO	Nordic Environmental Finance Corporation
NGOs	Non-Governmental Organizations
NIS	Newly Independent States (former Soviet Republics)
NPPR	National Pollution Prevention Roundtable (US-based)
OECD	Organization for Economic Cooperation and Development
OECD-EAP	OECD Environmental Action Plan
OEM	Original Equipment Manufacturer
P2	Pollution Prevention
SBDC	Small Business Development Center
SMEs	Small and Medium Enterprises
UNEP	United Nations Environment Program
UNEP-TIE	UNEP Division of Technology, Industry and Economics
UNIDO	United Nations Industrial Development Organization
USAEP	United States Asia Environmental Partnership
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
WB	World Bank
WBCSD	World Business Council for Sustainable Development
WCPS	World Cleaner Production Society
WEC	World Environment Center

List of acknowledgements

During the information gathering process for this paper, several institutions were contacted. Individuals at these institutions provided valuable information and feedback regarding their own experiences. The authors would like to acknowledge and thank the following people and institutions for their support:

J. Warren Evans, Helen Cruda and Yue-Lang Feng, Asian Development Bank
Burton Hamner and Richard Stevenson, Asian Development Bank Consultants
Carlos Enrique Arze, Centro de Promoción de Tecnologías Sostenibles (CPTS), Bolivia
Ana Oestreich, Centro Ecuatoriano de Producción Mas Limpia
José Angel Gutiérrez R., Centro Guatemalteco de Producción Más Limpia
Hugo Springer, Centro Nacional de Tecnologías Limpias, Brazil,
Carlos Arango, Centro Nacional de Producción Mas Limpia y Tecnologías Alternativas,
Colombia
Carol Colorado, Centro Nacional de Producción Más Limpia, El Salvador
Mily Cortés Posas, Centro Nacional de Producción Más Limpia, Honduras
Laura Beltrán and Guillermo Román, Centro Mexicano de Producción Mas Limpia
Cesar Barahona, Centro de Producción Mas Limpia of Nicaragua
Ana María Cruz, CÉSPEDES – México
Héctor Arangua, FUNTEC – México
Evans Kituyi, Industrial Ecology Institute, Kenya
Elisabet Paulig-Tönnies and Harro Pitkänen, Nordic Environment Finance Corporation
Pawel Kazmierczyk, United Nations Environment Program, El Salvador
Garrette Clark and Ari Huhtala, UNEP – DTIE
Edward Clarence and Petra Schwager, UNIDO
Kimm Peter, Nick Shufro and Judith Barry, USAEP
Gilbert Jackson, USAID
Karen Brown and Ed Weiler, USEPA
Lynn Helbrecht, Washington State Department of Ecology
Tim Lindsey, Waste Management and Research Center and NPPR
Samantha Chadwick, World Business Council for Sustainable Development
Brad Gentry, Reid Lifset, Monica Araya and Alan Brewster from Yale University
Gunter Pauli, Zero Emissions Research Institute

I. Goals and Structure

This report contains a review of a set of international programs that have been designed to promote Cleaner Production (CP). It is intended for use by the Multilateral Investment Fund (MIF), and similar donor agencies in their considerations of how best to structure their programs with small and medium enterprises (SMEs). The MIF is supporting several approaches for developing the private sector in Latin America and the Caribbean through the creation of a wide portfolio of projects organized in clusters. Each cluster is comprised of six to ten projects related by a common and innovative theme. Current efforts are aimed at promoting resource efficiency while improving the economic and environmental performance of SMEs in the region. This report will contribute to projects in the cluster: *Achieving Ecoefficiency in Small and Medium Enterprises Through Cleaner Production and Environment Management* (MIF/IDB, 2001a). The report provides an overview of practices that have been effective in the implementation of CP programs throughout the world.

To optimize the performance of current and future projects related to this topic, the MIF contracted the Yale School of Forestry and Environmental Studies to undertake a review of internationally recognized best practices in programs focused on promoting and implementing CP (and related environmental management tools¹) among small and medium enterprises. The main objectives of the team of researchers from Yale were to recognize lessons learned by donor and executing agencies in the field of CP, and to make recommendations to the MIF on ways it might incorporate these lessons into its efforts to promote CP among its SME clients (IDB, 2001a).

The discussions that led to the recommendations presented here are based on an extensive research of existing literature that evaluates cleaner production experiences worldwide, and by telephone/email gathering of primary and secondary data from individuals working in the field. Two general types of projects and experiences were analyzed – those administered across several regions by a single multilateral donor agency (hereafter called “umbrella” projects) and those within a single country (“country-specific” projects).

In discussing ways to disseminate CP concepts that reflect the experience in many different regions, we have found it useful to organize the information into six categories. These themes coincide with programmatic areas pursued by the MIF projects in this cluster (IDB, 2001b) and are:

¹ Cleaner Production, Pollution Prevention, Waste Minimization and Eco-efficiency are closely related preventive, proactive frameworks that attempt to replace end-of-pipe approaches. The programs analyzed in this report used one or more of these terms as the guiding principle.

- Raising Awareness about CP among SMEs
- Capacity Building for the Supply of CP expertise
- Strengthening regulatory frameworks for CP
- CP Institutional Structure
- Financing CP
- CP Implementation in SMEs

Most analyzed projects tackle a combination of these focus areas. Each section is further separated into key elements within each of the thematic areas, and highlights the lessons learned from the experience of both umbrella and country-specific projects. Finally, recommendations as to the possible structure of MIF projects are made. One appendix accompanies the document: a selection of case summaries from several of the analyzed experiences (Appendix 1).

A. Background: Cleaner Production and SMEs

The organizing principle of Cleaner Production is efficiency. The most common definition of CP used by programs across the world is that of the United Nations Environment Program (UNEP, 2001d). It calls for

"the continuous application of an integrated preventive environmental strategy applied to processes, products, and services to increase eco-efficiency and reduce risks to humans and the environment."

Among many objectives, CP seeks to minimize the use as well as optimize the reuse and recycling of hazardous and non-hazardous materials. CP attempts to use the materials of the manufacturing process in a more efficient way, reducing the amount of inputs needed and the amount of non-desired outputs. CP can also seek to minimize the risk to and improve human capital through worker hygiene and safety programs. Although CP usually requires capital investment, it often gives monetary returns by minimizing energy consumption and lowering material and handling costs (Graedel and Howard-Grenville, 2001). By doing this, the CP approach becomes both an environmental and a production strategy.

A related principle is that of an environmental management system (EMS). EMSs are formal structures of rules and resources that managers adopt to establish organizational routines that help achieve corporate environmental goals. They are a subset of management systems in general (Nash and Ehrenfeld, 2001). Cleaner Production may be used as a tool within an EMS to achieve specific production-oriented goals.

SMEs represent a large proportion of the industrial enterprises in developing economies such as the Caribbean and Latin America. The definition of SMEs varies among institutions, regions and countries. For example, the European Commission defines SMEs as independent enterprises with less than 250 employees and less than ECU 40 million in annual sales (EC, 1996). Usually the number of employees and a monetary value (yearly sales, capitalization) are used to determine whether an enterprise is micro, small, medium or large. The MIF defines SMEs as enterprises

with less than US\$3 million in annual sales and less than 100 employees. For the purposes of this report, however, no single definition of SME will be used since the analysis and recommendation applies to a broad range of enterprises.

While large factories produce greater volumes of pollution, many argue that small factories are more pollution intensive and, hence, impose greater environmental harm per unit output (World Bank, 2001). The overall impact that SMEs have on the environment is yet unknown, and data on their activities is neither easy to obtain nor calculate. The ADB notes that most of the pollution in Asian countries comes from SMEs, and is especially concentrated in its mega-cities (ADB, 2000). While it remains an under-researched sector, the majority of enterprises in Latin America correspond to SMEs. Mexico is a clear example of this, where SMEs represent 90% of the industries nationally (Sosa-Reyes, 2001). As such, addressing CP implementation among SMEs in Latin America and the Caribbean must be a current priority.

SME-specific barriers to implement cleaner production schemes include the lack of professional management skills, poor record keeping, resistance by decision-makers (exacerbated by the concentration of power in few persons), over-emphasis on production, non-involvement of workers, limited technical capabilities and access to technical information, limited skilled human capital, lack of in-house monitoring, deficiencies in maintenance, unstable finances and high cost and low availability of capital for CP (Cooray, 1999). These are general management issues that challenge SMEs throughout the world, not only in the area of adopting CP strategies (McVay and Miehlbradt, 2000). In the US, CP has had slow diffusion, despite availability of case studies of excellent, profitable CP solutions (Lindsey, 1999; NPPR, 2000). Some reasons for this are:

- A “prevention” approach is a hard sell, given traditional focus on regulatory compliance
- Government initiatives are regarded skeptically by private sector
- Emphasis has mostly been on creating awareness of CP concepts
- CP is usually optional for companies, and is not regarded as a high priority (NPPR, 2000).

It is noteworthy that the slowness observed has come in the face of well-documented benefits of cleaner production for SMEs. The following list itemizes some examples.

- Minimization of resources used and increase in productivity
- Decrease in contamination and human health risks
- Better environmental compliance
- Better public relations (with both regulators and neighbors)
- Increase in competitiveness
- Improved public image

Efforts to promote CP are laying the foundation for future developments, taking into account eco-efficiency principles. CP can yield both environmental and economic gains both in the short term as well as in the future.

II. Raising Awareness about CP among SMEs

It has become increasingly apparent that high levels of environmental awareness alone are inadequate to initiate action. It is the increased awareness of CP benefits, many of them related to production efficiency and competitiveness, which drives companies to implement CP programs. Economic, environmental and other benefits of CP are well-documented in many cases. In order for CP to be widely adopted among industries, owners and managers must recognize those benefits. For SMEs, much of the information has failed to reach and be absorbed by those who possess the ability to make the necessary changes in their enterprises.

This chapter will address several key elements that should be considered or implemented in order to raise awareness of CP effectively. Most CP programs were started over the last fifteen years using multi-national (regional) approaches with the objective of developing a basic national capacity for CP. Throughout that time, multilateral donor agencies focused their attention on introducing CP to countries in Asia and the emerging economies of Eastern Europe. The United Nations Industrial Development Organization and the United Nations Environment Program (UNIDO/UNEP) supported the creation of National Cleaner Production Centers (NCPCs) throughout the world. The United States Agency for International Development (USAID) and the United States Asia Environmental Partnership (US-AEP) also focused on country specific approaches. The Organization for Economic Cooperation and Development (OECD) and Asian Development Bank (ADB) assisted national CP efforts within broader regional contexts.

Today, programs at both national and international scales that provide assistance in CP reflect the need for improved management services within SMEs. Many SMEs prefer to turn to local small business service centers and industry/trade networks, rather than government or international organizations for this type of assistance (UNEP, 2001b). Business supply chains also provide a mechanism for information transfer and incentives for action in SMEs. The International Labour Organization (ILO) facilitates Business Development Services (BDS), which offer a wide range of non-financial services that assist SMEs in their operation and growth. A market development paradigm, in which a network of private suppliers operates competitively to provide BDS to SMEs, has emerged as a useful framework for the delivery of such services (McVay and Miehlsbradt, 2000). Cleaner Production is a form of business development that can be transferred to SMEs via similar mechanisms.

A. Regional, National or Local Approaches?

National level plans for diffusing the concept of Cleaner Production throughout society, combined with localized delivery of awareness programs, have proven useful in many nations. National level strategic plans for introducing and diffusing CP practices are necessary to set priorities, direct efforts and recognize successes at the country level (ADB, 2001b). From the evidence in various reports, a national approach is usually the first stage to promote CP in a given country.

The initial strategy often includes demonstration projects across a number of key sectors. This is a useful approach to present the opportunities available through CP, in a clear and directly obvious way, to the multiple industrial sectors interested in CP. Targeting firms on the basis of the industrial sector often occurs within the framework of the national plan.

After a few years of experience with national approaches based on operations through a single CP center or authority, it has been found advantageous or necessary to reach down to the local level to expand geographic coverage, especially in larger countries (Roman, 2000). In larger countries, dispersed locations for accessing information about CP are necessary. The NCPC experience in Mexico identified the need for a more local approach that will be able to increase the coverage of CP initiatives, rather than having it concentrated in the country's capital as is often the case (Roman, 2000).

**Box 1: Neighborhood Canvassing Efforts
In South Australia**

The South Australian experience in raising awareness involves targeting SMEs through neighborhood canvassing efforts. Local environmental authorities go door-to-door, use local press and letters to reach small businesses in particular districts, then invite them to introductory sessions on CP. These sessions highlight industrial impacts on the environment, as well as the economic and environmental benefits of CP. Participants then attend a series of workshops where they are taught how pollution prevention and CP methodologies can be applied to their businesses. Working on a neighborhood basis has increased participants' knowledge of each others' activities, as well as developed a network among the SMEs for collective and targeted actions (Carnegie et al, 1999).

Some experiences in Europe and Asia suggests that SMEs are more likely to respond to local and municipal rather than national pressures (Weiler, 1998; OECD, 2000; ADB, 2001b). The ADB is currently including areas outside the traditional industry-focus for CP. One non-traditional area involves developing CP action plans for local governments, where CP can become a tool for both improving operations within the government itself as well as for interactions with local industries (USAEP, 2000b; ADB, 2001b). The Cleaner Practices for Cities program, supported by the USAEP and ADB provided industries in Batangas Bay in the Philippines with access to financing institutions for Integrated Waste Management. Many companies also joined voluntary agreements with the local government to reduce waste generation as part of that city's CP strategy (USAEP, 2000b). The China Council for International Cooperation on Environmental and Development is similarly pursuing the creation of CP demonstration initiatives at the city level in order to engage both industry and local government in the promotion of CP (Brewster, 2001).

Effective awareness-raising programs can involve different groups in the wider society – from government representatives and business stakeholders to the public who are impacted by industrial pollution. Members of the public, especially those who may be directly impacted by the activities of SME manufacturers, can put pressure on those enterprises to effect change or otherwise provide compensation for their pollution (World Bank, 2000).

Region wide programs such as conferences are useful for both raising awareness among firms, as well as sharing information among agencies promoting CP and providers of CP expertise. The European Roundtable on Cleaner Production is in its eighth year, while the Asia-Pacific Roundtable on Cleaner Production (APRCP) is in its fifth year and the Cleaner Production Roundtable of the Americas (CPRA) in its fourth (Canadian Center for Pollution Prevention, 2002). The roundtables have successfully held regional conferences to highlight successes in CP programs, and to discuss and promote CP diffusion in those regions. The conferences can help to direct the course of CP implementation, as in the case in the Americas where it was recommended that CP be included as a guiding principle in current regulations and policies across the region (CPRA, 1998). While it is difficult to quantify the direct impact such conferences have on private enterprises, the spread of such conferences throughout the world suggest that they are important mechanisms for sharing experiences and raising awareness on CP.

B. The use of demonstration projects for awareness raising

Many national approaches have been based on the implementation of demonstration projects in the hope of generating chain reactions among those who are exposed to those projects. In many instances, demonstration projects remain as just that, not even being replicated in the very companies where they are demonstrated (Brewster, 2001). Also, NCPCs experience suggests that demonstration projects have limited results in promoting CP in enterprises different than the involved one (Clarence-Smith, 2002). Experiences from the ADB suggest that it is better to use a combination of strategies such as training, and case studies by industrial sector in addition to demonstration projects (ADB, 2001b).

As far as possible, demonstration projects should be spread across industry sectors and be of different types (chemical processing, mechanical engineering, manufacturing, etc.), in order to be relevant to a wide cross-section of industries. While demonstration projects, by themselves, are useful, they are not typically the single focus for spreading information on the benefits. In the World Cleaner Production Society (WCPS) model, demonstration projects are combined with training of trainers, in-company assessments and developing CP action plans to provide cost-effective nation-wide dissemination of CP. Where possible, case studies of projects from other locations with similar industrial processes can also be used to supplement the demonstration projects (Nedenes, 1999).

The success of demonstration projects hinges upon the capacity of firms to meet NCPCs host selection criteria (UNEP, 2002):

- Active management involvement, including financial managers
- Obvious CP potential within the company and industry
- Stable economic situation
- Interest in developing EMS
- Willingness to share their experience with companies that use similar technology
- Willingness to apply long-term CP strategies.

C. Communications

Developing an effective mechanism for communication between the directors of a CP program and industry is a key element for the success or failure of any program. A variety of media can be used to disseminate information about CP, including printed materials (guidance manuals, fact sheets, reports, brochures, case studies), videos, electronic systems including the Internet and databases. Communication with live persons through telephone, direct contact and training exercises can also be used. An important consideration however, is that these materials be presented in language that is familiar to and easy to understand by the target audience.

A study developed by UNEP-TIE concluded that, in order to establish an effective communication with SMEs, the following aspects may be considered:

- Clear messages about how CP works and its economic and environmental benefits
- Clear next steps that can be taken by the firms in order to receive more information or implement programs
- Personal contact between program staff/consultants and top company owners/managers
- Continuing on-going support while the programs are in action
- Use of interactive learning processes (UNEP, 2001b)

Enterprises will not make environmental improvements solely based on exposure to information. SMEs have traditionally had limited access to the information necessary to address environmental issues. However, the information and training approach used with larger corporations has not worked well in many cases for SMEs (OECD, 1998; Evans, 1999; ADB, 2001b). When SMEs receive CP information, it has often been in such large volume that not all of it can be processed or used. On the other hand, information transmitted without follow-up strategies, such as information sent via postal system, are among the least effective mechanisms (UNEP, 2001b). The level of information provided should match the needs and capabilities of enterprises to process and act upon it. As it is not possible to reach all SMEs immediately, it is important to carefully prioritize the targeted SMEs. Information that is of relevance to SMEs is:

- General overviews of industrial environmental impacts and related national environmental regulations
- General and sector -specific potential benefits of CP
- Sector-specific environmental problems and CP recommendations
- Sources of assistance, including technical assistance and available funding sources.

The following are potential actions to consider when planning a communications strategy:

- Develop mechanisms to help companies process, understand and act upon the received information
- Provide assistance for accessing the existing resources (e.g. help in finding CP consultants and in the preparation of proposals and grants)
- Provide assistance for writing policies and developing environmental management programs
- For, international organizations, utilize existing intermediaries of information sharing, ensuring that a local partner organization is in charge of delivering the information.
- For, national organizations, adapt and integrate international policies and strategies to national situation and network with other national organizations to provide assistance to local enterprises
- Use local organizations to facilitate networking amongst SMEs and industry associations for CP (UNEP, 2001b).

Currently, several programs are exploring ways to ensure that they will implement a more efficient way of communication with SMEs. UNEP's Division of Technology, Industry and Economics (UNEP-TIE) is exploring mechanisms to develop better systems for communicating environmental best practice in small business (UNEP, 2001b). Information dissemination includes general topics, as well as technical training and assistance via the use of electronic means (databases and the Internet), one-on-one contact and printed materials (UNEP, 2001b). UNEP-TIE aims to reach SMEs by identifying what types of information are needed within those organizations and then devising a best means of delivery. The USEPA provides a resource guide in both print and electronic formats as one form of presenting guidance on CP to SMEs. This is complemented by telephone hotlines, information clearinghouses, newsletters, websites and virtual communication centers. Information is provided at multiple levels, from the federal-level Small Business Ombudsman to regional/state-level Small Business Liaisons (USEPA, 2001).

D. Internet and Electronic Communications

Information technology is a prevalent means in more developed countries of disseminating information about CP. However, it is not apparent whether electronic information reaches SMEs in an effective manner. The UNEP-TIE study indicates that though mechanisms like the Internet have a high potential to disseminate information, they are not currently used extensively by SMEs² (UNEP, 2001b).

The importance of using information technology in the promotion of CP in the Americas was highlighted at the Pollution Prevention Roundtable of the Americas (CPRA, 1998). This message was repeated in October 1999 at the second regional conference where the idea of creating a

² It is important to note that the relevance of IT in society and its role in reaching industry can change rapidly due to the reduction of hardware and telecommunication costs.

website for the region-wide roundtable was agreed. Currently, there are many websites that present case studies and useful links for industry and enterprises. These include general and sector-specific information on CP and sources of funding. One example is the UNIDO National Cleaner Production Centre's Network (<http://www.unido.org/doc/331390.htmls>). From this site it is possible to get general information on CP and establish contact with any of the NCPCs worldwide. A 1999 study highlighted major websites promoting CP via the Internet, recommending the promotion of Internet among trade and professional associations in Latin America. The study also recommended making CP case studies available on the Internet (Lifset & Fernandez, 1999).

E. A trustworthy channel for communication: the role of industry associations

Both the route and the information transmitted must be considered by SMEs as reliable. As such, some of the most effective mechanisms for the transmission of information for SMEs are:

- Local industry associations, chambers and other local level information sources. Such sources of information are more widely used than the international and national governmental levels.
- Information delivered by other industry representatives.

SMEs are more likely to trust and approach local industry chambers and associations for general information and support. Trade associations and industry chambers are valuable partners for establishing effective communications mechanisms with the target industry sectors.

Industry associations have played a key role in the establishment of CP Roundtables and NCPCs, such as the Centro Ecuatoriano de Producción Más Limpia / Ecuadorian Cleaner Production Center – CEPL (Recalde, 2001). In a somewhat related approach, the US National Pollution Prevention Roundtable (NPPR) suggests that industry leaders be targeted for implementing CP strategies through case studies, technical papers and presentations. They suggest that leaders in an industry are able to influence the attitudes and behavior of the peers, who then mimic them to keep competitive (Lindsey, 1998). As thought leaders, they can influence SMEs to adopt CP strategies themselves, especially through forums such as trade associations and supply chains (NPPR, 2000). The ADB, however, has found this strategy of relying on “opinion leaders” as less effective (Stevenson, 2001a). It is important to foster cooperation among different actors, such as governments, industry associations and universities (USAEP, 2000a).

F. CP and Environmental Management Systems

Environmental Management as defined by the OECD combines UNEP's definitions of energy efficiency, waste minimization and cleaner production with the World Business Council for Sustainable Development's concept of ecoefficiency (OECD, 1998). The experiences analyzed suggest benefits of integrating Environmental Management Systems (EMS) with CP activities and approaches. Concurrently, and mainly because of perceived benefits, many organizations continue to jointly deliver these services. UN case studies show the importance of adherence to

standardized procedures to achieve the goals of a cleaner industry. They also emphasize the strong links among environmental management systems (EMS and ISO standards), waste minimization, company profitability and competitiveness (UNEP-TIE, 2000a). The incorporation of EMS and CP is anticipated to prevent the adoption of end-of-pipe solutions (UNIDO, 2001).

CP's diffusion among SMEs can be improved through 'greening the supply chain', a practice derived from EMS. While SMEs play a less significant role in industry organizations, they are often influenced by their peers in those associations. SMEs also comprise a major part of supply chains. Industry association and supply chain links create opportunities through which the behavior of SMEs can be influenced. Local governments, financing institutions and insurers can extend environmental requirements for suppliers, by greening supply chains. Many multinational corporations play an important role in "greening the supply chain" by assisting their local suppliers (many of whom are SMEs) to adopt CP practices (ADB, 2001b). In practice, 'greening the supply chain' can work in conjunction with industry organizations as a means of diffusing practices.

There have been many instances of NCPCs providing assistance in the preparation of international EMSs such as the International Standards Organization (ISO) 14000 series (NEFCO, 2001; WEC, 2001). Voluntary programs such as ISO, Responsible Care and Life-Cycle Design have been a successful part of Taiwan's Industrial Waste Minimization (IWM) program since 1995 (Chiu et al, 1999). Even though the experiences analyzed suggest benefits resulting from the integration of EMS and CP, there has been no systematic evaluation on the effectiveness of these programs. Further research is needed to clearly define the benefits of joining CP and EMS, and point out key elements that will make this association more effective.

Box 2: Greening the Supply Chain in Taiwan

Taiwan's Corporate Synergy Systems (CSS) is a form of greening the supply chain, fully supported by the national government. Large firms are awarded assistance from the Industrial Development Bureau of the Ministry of Economic Affairs. They usually work with approximately ten SMEs and lead the efforts in initiating, organizing and maintaining the system of cooperation around CP. The large, central firm usually serves as a model of CP behavior for the satellite firms, in addition its employees are selected and trained to assist the satellite firms in implementing their aspects of the plan (Tang et al, 1999).

G. Award Programs

An innovative approach for awareness raising about CP at company, industry and national levels is through award competitions. Large companies often successfully implement programs, such as CP, through competitions among different divisions within their organizations. The recognition that is received for winning such in-company competitions is a strong driver for encouraging adoption of the particular program or practice.

In the United States, the Malcolm Baldrige Award program, based on principles of quality management, has been successful at encouraging business, of all sizes to adopt improved quality management practices. In fact, one of the five annual awards is dedicated to small businesses. The program is credited with being a major driver in disseminating information about best practices and making quality improvement a national priority among private enterprises. The program has been so successful, that 43 states now have awards programs modeled after the Baldrige Awards. This mimicry has also extended internationally, where nearly 60 similar programs have been established in the past few years (NIST, 2002).

Both Indonesia and Taiwan have developed national-level award competitions for firms based on successful implementation of CP strategies (Bratasida & Helbrecht, 1999; Chiu et al, 1999). These award programs were created to provide additional market-based incentives for companies to adopt CP.

Voluntary programs are yet another means to raise awareness of CP. They have some similarity to award programs in that participation is not required, and participants generally join on the basis of perceived benefits around public image improvement. The Mexican Office of the Federal Attorney for Environmental Protection (PROFEPA) initiated a voluntary program in 1992 for auditing enterprises and applying action plans to comply with regulations and institute CP practices. More than 820 firms have been certified with PROFEPA's "Industria Limpia." PROFEPA has enjoyed such success nationally with the program that they are moving towards making this certification internationally-recognized (MIF/IDB, 2001b).

Funding for the Indonesian Cleaner Production Award Program was initially provided by the Indonesian Environmental Impact Management Agency (BAPEDAL) and GTZ, a German development aid agency. A key factor in the creation of the award program model was the inclusion of multiple stakeholders in the program's development. Persons from several industries, academia, NGOs, research institutes and various government departments were all included throughout the development process from conceptualization through marketing the program to prospective applicants (Bratasida & Helbrecht, 1999). This program only operated as a pilot project with two years of funding. While building local capacity to sustain the program was an objective of the external donors and consultants, the small staff and budget of the local agency were prohibitive factors. The process of developing the program was a valuable model in that it demonstrated how to execute a successful award program by including multiple stakeholders throughout and matching the program to local culture (Helbrecht, 2002).

Box 3: Indonesian Incentives for CP

In the Indonesian Cleaner Production Award program model companies were given incentives based on an increase in marketing advantage through improved public perception of the firm and government recognition of the firm's environmental performance. Firms were compared with others in their industry by criteria of Cleaner Production, Pollutant Source Reduction, Management Commitment and Environmental Leadership. Companies applied and competed for the awards, which were presented in formal ceremonies with full media coverage. The textile industry was the first sector targeted for the program. Companies responded in unexpectedly large numbers as the program keyed in on the importance of appearance in the local culture. The award ceremony was attended by many small firms that did not compete for the award, but were interested in learning how they too could win such an award (Bratasida & Helbrecht, 1999; Helbrecht, 2002).

III. Capacity Building for the Supply of CP expertise

This section focuses on building mechanisms to increase the local supply and demand of CP professional expertise. In the regions to which this report is directed, the basic skills needed to implement CP are generally lacking in SMEs (OECD, 1998). Training and capacity-building are, thus, major elements in any program aimed at the realization of CP in practice.

A. The Creation of a “CP Market”

In order to achieve a basic capacity level, there is a need to create a “CP market”. This approach gives importance to both the training of consultants and personnel with the ability to provide CP services—the supply side— (OECD, 1998; WEC, 2001), as well as to the need and interest—demand side—for CP. Strong attention must be placed on the creation of a demand for CP, in order to ensure that a market for these services exists. NCPCs experience shows that there much of the effort expended on the training of consultants has had little pay-off due to the lack of demand for their services on the part of the companies (Clarence-Smith, 2001).

Another major obstacle for SMEs that might engage in CP training programs is a lack of personnel available and competent to engage in the learning activities. Additionally, most SMEs’ lack funds to implement any of the knowledge about CP acquired by the trainees. This problem is especially important when dealing with micro-enterprises. Regional differences should be taken into account as well. Latin American companies have had a tendency to hire external consultants to get involved in CP learning activities, whereas companies in Eastern Europe tend to get the staff involved in the activities (Kazmierczyk, 2001b). Experience suggests the involvement of the company’s staff in CP learning activities is a more efficient way to transfer knowledge to SMEs. However, given the scarcity of resources at SMEs, most companies are not likely to train their own staff in CP.

Training is paramount to create CP capacity in a given region or nation. Training activities should be targeted to the following groups:

- High level executives or owners of the enterprises
- Technicians and professional students at technological institutes and universities
- Consultants
- Management and production workers
- Policy makers and regulators

The type of information and level of detail needed by each of these groups is different. While introductory sessions on the importance of CP can be conducted with all of the above groups, more detailed sessions on the specifics of CP methodology should be provided for each group separately.

A “CP market” will be composed by more than just the supply and demand sides. Several other stakeholders serve as liaisons and facilitators, as in the case of the financial and governmental sectors. To overcome the bottlenecks linked with CP financing, training should be targeted also to the following sectors:

- Personnel involved in activities regarding industry and commerce
- Banks and financial institutions
- Public sector institutions
- The media.

The need to introduce the financial sector in CP training activities has been identified by both umbrella and country-specific programs. The Mexican Centro Nacional de Producción Más Limpia has included two non-traditional groups in CP professional capacity building exercises. These are (1) representatives from the financial sector including private banks and other sources of credit to SMEs, and (2) national ministers and government personnel from several departments including environment, trade, industry, finance, agriculture and tourism. These groups can significantly impact the adoption of CP practices by industries through policy-setting and loan-provisions, which are both seen as necessary to enable SMEs to implement CP (Roman, 2001). The UN has identified the following needs for training in CP financing:

- CP concepts and practice
- Capital budgeting and funding of capital projects
- Profiting from CP
- Funding CP projects (UNEP, 2001c).

The Latin American Center for Competitiveness and Sustainable Development - CLACDS of the INCAE, along with the CDG, has developed the "Ecobanking Project," an initiative that links the banking sector with the environment. Through this project, training is provided to Environmental Managers in the Latin American Banking Sector. The objective of the training is to expose the banking industry to cutting edge concepts of industrial ecology and ecoefficiency. Training is provided in the following topics (adapted from <http://www.ecobanking.com/EN/cdg/>):

- Environmental risk analysis for loan and investment projects.
- Eco-efficiency in banking business internal operations.
- Socially responsible investment funds.
- Green financial products.
- Implementation of environmental management systems in financial institutions.
- Communication about environmental practices in financial institutions.

B. Training Format and mechanisms

Training programs have been held mostly in the form of seminars and workshops. To broaden the possibilities of success, they are frequently combined with environmental reviews, case studies or assessments of companies' processes, equipment and mechanisms for identifying potentially sustainable projects. Case studies are a successful and highly interactive method for training.

It is important to establish a certification system for trainers: trained consultants can be certified to provide assistance to local enterprises (USEPA, 1999b; OECD, 2000). This is considered one of the main lessons learned by the UNIDO/UNEP experience in NCPs. UNIDO/UNEP are currently exploring an experts certification system in Tunisia (UNIDO, 2001). In Norway, CP experts must prepare plans for three levels of CP actions (zero-cost, short-term return and large investment/long-term return) in order to become certified (OECD, 1999).

Although no formal standards for CP practices exist and are unlikely to be established in the near future, there already exists a body of recognized technical and organizational approaches. The same is true for both technical and financial methods of analyzing an enterprise's processes and identifying opportunities for CP. Trainers of consultants and practitioners and consultants alike should be cognizant of this basic ground of practical knowledge. One means to assure that all of these parties do have some established minimal level of competence is through certification. Certification could follow the pattern of the ISO 14000 environmental management system standard, although there are as noted significant differences between CP and the ISO programme. The major donor agencies and other interested institutions could set up some joint mechanism to determine what constitute the qualifications to become certified and designate an agent to carry out the actual procedures. It may be interesting to investigate the possibility of using the agents that have been approved to certify ISO EMS standards for a CP program. Certification would have the additional benefits of moving toward a common global understanding of CP and support the efforts of Original Equipment Manufacturers (OEMs), such as automobile manufacturers, who have begun to use so-called greening the supply chain to force their vendors to upgrade their environmental practices (see the section on Policy Instruments, below).

Box 4: Training of trainers

Training-of-trainers can be an efficient way to transmit knowledge, providing that the trainers have the resources to replicate the activity. Training-of-trainers methodologies are being used by the IADB in partnership with UNIDO and the Inter-American Association on Sanitary and Environmental Engineering (AIDIS). Technicians from 16 countries have attended CP training, and will replicate the training experience in their countries of origin. (IDB, 2002).

C. Links with academia

Involvement of academia can be very important to the development of CP over the long run through its traditional role in shaping professional norms. Professional norms and standards is one of the cornerstones of the institutional theory of firm behavior (Scott, 1995). The expectation is that if universities and other training institutes begin to include cleaner production in their curricula, their graduates will begin to exert pressure from within to employ CP strategies at higher levels of priority.

Financial institutions, business schools and academia need to strengthen their capacity to understand the benefits of CP. This topic has to be integrated among formal education programs. In the long term this training is aimed at, among other things, incorporating environmental needs into standard business counseling. CP can be introduced in both university curricula (OECD, 1998) among engineers, environmental managers, policy makers, economists and through professional workshops that include a mix of participants from consultants, industry, government, finance (In-na, 1999). As previously mentioned, some workshops and curriculums can address specific groups in order to deliver a more substantive and in-depth set of information that is relevant to them (Scott and Heart, 1999).

The link between CP and formal educational institutions can be one of the most powerful tools for CP awareness. The education system and media have been used to promote society-wide understanding of human health impacts of industrial pollution and the benefits of CP (Evans, 1999; ADB, 2001b).

The Australian experience has involved flexible learning programs to provide comprehensive post-graduate training in CP by combining at-home, on-site and in-classroom learning. This professional training can be divided into three sections – introductory, industry-specific and assessment trainings. As part of this training participants learn to set worthwhile and attainable goals, as well as build in-company teams from all departments including management, production, engineering, marketing, environment and research and development (Scott and Heart, 1999).

However, NCPCs have identified a lack of CP education among professional curriculums. The Mexican NCPC points out that most current technical education is oriented towards end-of-pipe solutions rather than pollution prevention. Internal education given to employees at enterprises is oriented towards meeting specific requirements, without continuous training on preventive approaches (Mexican Pollution Prevention Roundtable,(2001). This emphasizes the need to formalize CP in tertiary and professional education programs.

An approach that strengthens the relationship between CP and academia, while combining the training future CP professionals with delivery of CP assessment and implementation, is the use of university-level student interns. It can also serve the needs of firms that probably could not afford consultancy fees, such as SMEs. Support for this approach is echoed by the US NPPR, which suggests that students can work on demonstration projects at client sites. Internships provide a low-cost means of diffusing information about the benefits of CP across industries (NPPR, 2000).

Thailand introduced a Cleaner Production Internship Program (CPIP) in 1996. Students, along with their mentors from both government and academia, attend five-day intensive workshops where they learn about CP concepts and methodologies. Students are then placed in groups of two at factories in different industries for eight weeks under the supervision of factory coordinators and mentors. Students perform a CP assessment and propose options for resolving the issues to the companies (Yuvaniyama et al, 1999).

Box 5: Mechanisms for Improvement in the Thailand CP Internship Program.

- Accommodate companies and students from more remote parts of the country
- Present more in-depth CP assessment methodology in the native language
- Provide students with more background training before the program start
- Provide incentives for more active participation by mentors
- Raise awareness of CP principles among factory coordinators,
- Target personnel with decision-making power as supervisors for students. (Yuvaniyama et al, 1999).

D. Research and Development

Research and development (R&D) are necessary for countries to develop their own clean technology that would better meet the needs of local industry as well as liberate them from reliance on foreign technologies. Many CP programs, such as the NCPCs, are based on the transfer of know how more than in the transfer of technology, encouraging the development of new technologies in each one of the countries. Some studies cite that there is a clear relationship among CP, environmental regulations, competitiveness and R&D. Sound environmental regulations foster technological improvements that will pay for the economic investment in compliance (Porter and Van Der Linde, 1999). This technological and environmental improvement will generate additional benefits by enhancing competitiveness (regulations and CP will be treated in-depth in the following chapter). Governments should facilitate research and development on cleaner production technologies and tools. R&D is stressed as a form of capacity building in Taiwan, where priority areas include:

- Establishing a national framework for Cleaner Production R&D
- Improving data and support for decision-making
- Increasing availability of technology and encouraging innovation
- Increasing training and awareness (Huang, 2001).

However, in several cases, SMEs do not have the capacity for large and sustained investments in R&D. Creating strong and permanent links between SMEs and NCPCs can bridge this gap by brokering SMEs with access to innovative technologies.

IV. Strengthening Regulatory Framework for CP

This section examines how multilateral agencies have assisted national governments in developing policies and regulatory frameworks that encourage CP activities. Government involvement is a key factor in developing successful Cleaner Production programs. Effective national policies can create a climate that raises awareness about issues surrounding industrial pollution and Cleaner Production, as well as stimulate the actions of firms towards CP solutions. As mentioned previously, the benefits of sound environmental regulations are greater than just the protection of the environment, including increased competitiveness by fostering technological innovations (Porter and Van Der Linde, 1999).

A. Why regulatory frameworks might promote CP

CP is less likely to be economically attractive within legal frameworks that do not place a strong emphasis on environmental regulations, or in economic systems that have under-priced or “free” natural resources (UNEP-TIE, 2000). Regulations that promote CP have been identified by the ADB as an important element for the diffusion of those practices in any given country or region (ADB, 2001b). However, even when regulations have been established, lack of enforcement minimizes the regulatory intention. Regulations and enforcement are of prime importance to the way industry regards the environmental procedures that they must follow. As such, appropriate policy and legal frameworks are helpful to move from the ‘end-of-pipe’ to the CP model. Regulations, customer demands and insurance requirements are recognized as motives for modifying environmental behavior of firms.

Regulations, if enforced, have an institutional influence on the cultural drivers that shape the routine behavior of firms in any given society. The third pillar of the institutional school of theory is the tendency of firms to copy the practices of (i.e., follow) the leaders in their sector. For example, progress in total quality management has been driven strongly by this last factor through benchmarking exercises and public recognition to leaders such as in the US Malcolm Baldrige award. Combinations of all three institutional factors [normative, coercive (or regulative) and mimetic (copying)] can be powerful determinants in moving firms towards adopting new CP behavioral patterns into their routine practices (Scott, 1995).

However, when establishing sound regulations that will promote CP adoption, basic principles have to be followed (Porter and Van Der Linde, 1999):

- The type of innovation resulting from the regulation should be decided by the industry, and not by the regulator.
- The regulation should not specify any particular technology, fostering continuous improvement.

Regulations that foster permanent technology innovation are usually linked with market-based incentives. The ADB recommends that governments institute market-based incentives and public rewards for good performance to encourage CP adoption. As such, their CP technical assistance programs target institutional capacity building to develop and implement these instruments (Evans & Hamner, 2001; Stevenson, 2001a, b, c).

**Box 6: The Product Choice Principle in Sweden
(UNEP-TIE, 2000a)**

The Product Choice Principle (also known as substitution principle) requires the replacement of a substance that might be harmful for the environment or human health if a less harmful alternative exists. The principle applies when the substitution is not unreasonably costly and overall presents benefits. In Sweden this principle was applied for the substitution of Cadmium and its compounds in applications as coloring agents, stabilizers and substances for surface treatment. More than 10 years passed before the measure was fully applied, as exemptions were allowed. These exemptions were needed due to technical problems that the industry faced during the conversion to alternatives and the existence of more cadmium-based products than expected. Although the industry experienced several difficulties on the first phase of the ban, including increased expenses, in the long run there was no significant negative impact on the economy. The initial difficulties were associated with increased costs in raw materials, technological development and increased waste in processes, among others.

Some of the lessons learned from this experience include exemptions may be a good way to address initial stages for regulations that require significant changes in product manufacturing. This gives the industry a clear message that the substance will be phased out. It also provides pressure, incentives and a basic margin of time to find alternatives. Additional incentives are related to the fact that the Swedish industry acquired a competitive advantage over other countries during later periods when the cadmium ban was adopted by several other governments.

In some aspects, SMEs all over the world have a similar approach to regulatory frameworks. While studies in Asia show that SMEs are concerned about their environmental performance and are willing to do something to reflect their concern, evidence suggests that they have little exposure to environmental management practices and are often unaware of the legislation in this area. SMEs rarely use the services of environmental support organizations, as they perceive the efforts for improving environmental performance as costly and are skeptical of the reported benefits related to this field (Kazmierczyk, 2001b). Although there is not enough data, a similar situation might be present in Latin America and the Caribbean. Two key similarities between Eastern Europe and Latin America and the Caribbean with regards to obstacles in implementing CP are associated with the role of regulations (Kazmierczyk, 2001a):

- Environmental regulations, which promote end-of-pipe solutions.
- Low levels of compliance with existing environmental regulations.

Some of the key elements to consider while establishing regulatory frameworks that foster CP are:

- Cooperation among the public and private sector in the development of environmental policy and regulations.
- Understanding the linkages between industry, commerce and international regulations, as a fundamental aspect of a clean revolution.
- Creating incentives for the private sector to implement CP.
- Providing easier access to information about government regulations and programs.
- Understanding that language can be a barrier. Current regulations that apply to SMEs have language that is based on a combination of technical and legal terms and hence difficult to understand. The structure of regulations makes it difficult to understand their objectives and follow up the results.
- Focus on implementing CP (Source Reduction) and at the same time in compliance with regulations.
- Support a more effective monitoring and enforcement of standards and regulations (Evans & Hamner, 2001; Stevenson, 2001a,b,c).

B. National Policy Plan Development

It has been widely accepted that a change from an end-of-pipe approach to a CP approach not only requires training and capacity building at the industry level, but also a favorable policy framework at national and local levels (in both regulatory and financial aspects). This change can be achieved by gaining access to the highest political levels of decision making (Clarence-Smith, 2001). CP programs may engage in activities related to advising governmental officials in policy building, as a way to increase national and local capacity for CP.

Several countries have adopted a national policy for cleaner production, including Colombia, Chile and the Czech Republic. Colombia adopted a “National Policy for Cleaner Production” in 1995. Since then, agreements for cleaner production have been carried out between environmental authorities and the private sector. Agreements include quantified targets, deadline dates, firms commitments, and mechanisms for monitoring and verification of results (UNEP-TIE, 2000a). These agreements have lowered the levels of emissions beyond the goals set by standards and regulations. At the same time, the notion of cleaner production has been adopted by several other policy frameworks directed towards the increase of productivity in the country. The Cleaner Production National Policy interacts with specific sector-based policy frameworks (República de Colombia, 1998).

Some of the lessons learned through this experience are (República de Colombia, 1998):

- There is a strong need to address environmental problems from an integral perspective, and not in an isolated manner. Environmental concerns should be introduced in broadly applicable economic and other policies, not only in environmental policy.
- There is a lack of technical and analytical tools to define sector-based and regional goals and objectives.
- Industrial sectors that have participated in policy formulation and development have, on some occasions, adopted their own voluntary standards, policies, and procedures. This result demonstrates the increased levels of awareness and commitment that participatory regulatory processes can produce.
- The implementation of a national policy requires strong environmental institutions and a high degree of cooperation among different environmental and non-environmental authorities.

Chile has implemented a national cleaner production policy since 1997. This policy is also based on the notion of negotiated environmental agreements. Since 1997, seven agreements involving more than 300 enterprises from different sectors have been signed (República de Chile, 2001).

**Box 7: Basic conditions for the effectiveness of
Negotiated environmental agreements
(UNEP-TIE, 2000a)**

- Legal and policy framework recognizing the agreements
- Equal and sufficient professional capacities within industry and government
- Suitable baseline data
- Credible representatives in negotiations

The cases from Colombia and Chile show that the success of national policies for cleaner production is closely related with the capacity of the governments to engage in common activities and agreements with the private sector. In 2001, Chile established the National Council for Cleaner Production (Consejo Nacional de Producción Limpia), as the entity in charge of the promotion of the national cleaner production policy –(Política de Fomento a la Producción Más Limpia). It is worth noting that the council is composed of both leaders from the private sector and representatives from the environmental agencies and, governmental agencies that support the increase of the national productivity.

A national policy, strategic and action plan should to be in place to guide and coordinate efforts around promoting and adopting CP. In order to create a plan that addresses the needs of multiple stakeholders and is appropriate to the national culture, the planning process should include the following stages (Stevenson, 2001b,c):

- Identify sectoral representatives and stakeholders who will contribute to promoting CP and/or benefit from CP practices; convene a small planning group with key stakeholders including individuals from the ministry of finance, industry and environment as well as important players in the national economy (industry and other business), academia and local government.
- Define clear, specific, measurable objectives for the policy; define clear and measurable targets so that progress can be quantified.
- Examine national policies that either complement or hinder the promotion and adoption of CP; identify specific policies in each sector of economic activity and government in order to determine how they impact CP adoption and how they can be altered to improve its adoption.
- Define general and specific sector-based policy, as well as the action items that are necessary to implement the national strategy.
- Compare action items across sectors to build collaborative relationships among stakeholders.
- Identify or establish an organization, through consensus among stakeholders, to implement the plan, monitor its impact and continuously bring together stakeholders to review and revise the policy and strategies.

C. Policy Instruments

UNEP suggests that governments can use three types of policy instruments: Regulatory instruments, market-based instruments, information-based instruments (UNEP-TIE, 2000a). This subsection provides basic insight on the benefits of implementing policy instruments not based on the compliance of strict regulations, but on market behavior and information flow. These three combined types of instruments may be used to foster different types of interaction between government and industry:

- Specified compliance: government imposes precise and specific obligatory demands or standards
- Negotiated compliance: regulators and regulated interact to set the standards
- Co-regulation: interaction in setting standards that are not mandatory
- Self-regulation: industry sets standards that are not legally enforceable.

Information regarding the most effective type of interaction in establishing a given regulatory framework was not readily available in the resources available to this project. However, most of the reviewed experiences suggest that specified compliance has led to end-of-pipe measures. Negotiated compliance provides a more open exchange of information and a more cooperative mechanism, on occasion leaving the particular means to achieve the agreed standards in the hands of the industry. This may lead to a more flexible, innovative and preventive mechanism. Negotiated compliance has to be supported by adequate procedures, in order to avoid excessive “regulatory capture” by industry (UNEP-TIE, 2000a). A particular benefit of the negotiated compliance is that it ensures the participation of all key stakeholders.

Market-based instruments (MBIs), especially those that bring the external costs of pollution within the private cost of firms, are more efficient in reducing pollution. MBIs have greater flexibility than standard instruments and act as incentives in the development of more effective mechanisms and technologies for pollution prevention (Evans & Hamner, 2001). However, their introduction often faces many political constraints. Before the introduction of market-based instruments, governments should identify and evaluate other type of economic incentives that might be already in operation, including subsidies (ADB, 2001b). Subsidies might artificially lower the prices of certain resources, stimulating pollution, overuse and shortages (UNEP-TIE, 2000a). Market-based instruments can include taxes (and tax exemptions/reductions), fees, liability rules and subsidies (such as preferential tax treatment). Mexico recently introduced tax breaks for the import of contamination control equipment, highlighting its importance. This measure oriented exclusively for CP can result in CP awareness raising, increased implementation by highlighting the advantages of CP over end-of-pipe measures (UNEP 2000e). While in Malaysia, tax incentives, consisting of depreciation allowances, import duties and sales taxes appeared to be ineffective at encouraging SMEs to adopt environmental protection or CP (Hamner, 2001). There has been little information from other studies on the use and effectiveness of using tax incentives.

There are two types of information-based strategies. The first is predicated on the provision of technical and financial information in an accessible and understandable form, which may include the establishment of databases on CP techniques. This form of information-based strategy reduces the often high transaction costs to obtain the information. The second type of information-based strategy addresses the way companies communicate with consumers and governments. Examples of this type of strategy include measures that address environmental consumption, such as eco-labeling, and the public disclosure of a firm's environmental performance. For measures of this type success depends greatly on the level of credibility and accuracy in the information supplied by companies, the enforcement capabilities of environmental authorities, and the acceptance by consumers (UNEP-TIE, 2000a). This type of strategy depends on pressure by informed stakeholders to change behavior, such as the adoption of CP.

For SMEs, the direct provision of technical information is likely to be more valuable than eco-labeling because stakeholder pressures are weak in their case. Large companies usually rely more in reputation and have enough resources to locate the information they need. SMEs lack the resources to do extensive searching on their own and transaction costs will be relatively more significant. However, techniques such as eco-labeling and the public disclosure of a firm's environmental performance can substantially modify the environmental performance of SMEs by mechanisms such as greening the supply chain. As SMEs form part of the supply chain, information must be provided to the larger firms to whom they sell their goods. The buyer firm in these cases can supply pressure to adopt CP and other environmental practices such as implementation of an EMS, analogous to consumer pressure in the case of eco-labels.

V. CP Institutional Structure

CP implementation represents a series of actions that go beyond technological changes to policy frameworks, societal attitudes, education systems and business perspectives (Kazmierczyk, 2000). This section looks at the structure of programs for introducing and diffusing CP practices. For Latin America, “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” (CPRA, 1998). Effective delivery of CP content has been orchestrated through regional cooperation strategies, articulation of CP with EMS, and national level centers, the most prominent of which are the National Cleaner Production Centers (NCPCs).

A. Cleaner Production Roundtables

Roundtables have emerged as an effective means of communication among CP professionals in different locations – both at national and regional levels. The US-based NPPR uses an electronic distribution list as the primary means of communication among professionals in the CP community. This provides a forum for company personnel, consultants and government administrators to exchange ideas about existing regulations, available technology, new opportunities and innovative approaches in implementing CP. In addition, the NPPR hosts technical workgroups that consider specific problems in the field.

The Asia-Pacific Roundtable for Cleaner Production Roundtable (APRCP) provides a similar forum for networking among professionals in the CP community in that region. Regular conferences and workshops, often sponsored by multilateral donor agencies such as the ADB and USAEP, present highlights of current progress and needs for future endeavors. It is an effective stage for the exchange of information across nations so that the experiences of one may potentially be applied to many others in the network. The APRCP fosters collaboration among professionals across the region, as well as coordination of their efforts for region-wide benefit. Similar-type roundtables exist in Europe, the Americas and at national levels throughout the world.

B. National Cleaner Production Centers

NCPCs and other centralized organizations for the promotion of CP have had an important role in CP implementation all over the world. These centers provide the most effective start-point for implementing strategies in small and medium enterprises. They operate as the natural first stop that companies approach for obtaining information about CP. NCPCs provide both public and commercial services (OECD, 1999). They have played a major role in different fields, from CP

awareness to policy advising, consultancy services and training new generations of CP consultants. However, playing multiple roles has also been a challenge for NCPCs.

USAID has supported different types of organizations for the national and local promotion of CP. The Industrial Extensions for the Environment (IEE) are service delivery organizations developed through USAEP that provide assistance to industry in developing technologies, ecoefficiency and CP. IEEs can be found within governmental agencies, business/industry associations, consulting groups, academic and educational institutions, non-governmental organizations, and research and development groups (USAEP, 2001a). Similarly, the World Environment Center (WEC) Pollution Prevention Centers (PPC) promote outreach, training, technical assistance and policy reform through industry linkages (WEC, 2001). PPCs provide onsite assistance, training and CP consulting services oriented towards waste minimization and implementation of EMS. The 11 PPCs that operate in nine countries in Eastern Europe (three in Poland) are found within universities, business assistance organizations and governmental institutions.

The OECD distinguishes between two types of services that can be provided by CP centers – public services that focus on information dissemination, policy building and awareness raising, and commercial services that focus on consultancy services for which payment can be received from clients (OECD, 1999). According to the OECD, CP Centers must have clear ideas about whether their functions will be commercial, public or some combination of the two. The OECD found that independent, non-government CP centers have been most effective at implementing CP programs. The general management, institutional capacity and financial resources of these centers can be supported through external cooperation. Centers should regularly monitor their performance, revise policies and programs to better meet the overall goals of CP implementation (OECD, 1999). CP centers must be established concurrently with industry technical assistance programs. Special attention should be placed on organizational development. Another point to consider is that centers providing commercial services may actually compete with private sector CP consultants. Because of this inherent competitive potential, the types of services provided should be carefully structured to achieve a balance in the development of the supply side of the market (McVay and Miehlbradt, 2000).

OECD recommendations to CP centers in CEEC/NIS include:

- Take more active role in lobbying, informing and helping government to develop policies to better implement CP
- Involve various government ministries in the steering committees for the centers
- Form links with NGOs and universities
- Develop integrated CP/EMS methodologies

- Form regional collaboration with other CP centers to share information, increase visibility, coordinate communications
- Create more effective marketing strategies, especially streamlining training and communication programs – promoting new technologies and city-wide Cleaner Production campaigns
- Become intermediaries between donors and enterprises
- Set achievable time-lines for environmental performance targets by industry (OECD, 2000).

**Box 8: The Mexican NCPC
and the issue of national coverage**

The Mexican NCPC (CMPL) concludes that even though there has been an effort to promote CP in the country, most of the achievements have only been made at a demonstration scale. There is a need for CP diffusion on a wider scale—in particular to SMEs. The following are some recommendations from the Director of the CMPL to increase coverage of CP in the nation (Roman, 2001):

1. Adopt CP as a national policy, especially incorporating it into current environmental, monetary, industrial and commercial laws.
2. Adopt CP as a business strategy related to the increase in productivity.
3. Generate awareness among the financial sector on the short-term economic benefits and credit-worthiness of CP projects.
4. Increase the quantity of consultants capable of providing CP assessment.

The US NPPR recommends that CP centers be technically equipped to demonstrate a wide variety of CP projects. Chemical, mechanical and general materials-processing, and manufacturing demonstration projects may all be accommodated. This variety of projects can broaden the range of clients who can view hands-on demonstrations of how CP can directly impact them because the projects reflect their own business processes (NPPR, 2000).

C. Sustainability of CP Centers

In the long-term centers should aim to become financially self-sustaining. If the history of CP programs follows other similar economic development or environmental programs, support from donor agencies or local government will always be finite and uncertain. Self-sufficiency will avoid long-term reliance on uncertain budgets and priorities.

Charging for commercially viable services, as well as entering into partnerships with international organizations or private firms (e.g. environmental consultants), for specific

objectives can help provide means for centers to support themselves (OECD, 1999). In the formation of a CP center, consultation with multiple, local stakeholders can determine what is the most appropriate role of the center. This is dependent on the existing relationships between the public and private sectors, as well as the state of CP awareness, social and economic factors in the society. CP centers often offer a mix of public and private services. Balance must be attained between stimulating the supply and demand side for CP services and generating income from services offered. In order to achieve financial sustainability, the OECD recommended that CP centers in the NIS prioritize offering the following services in order to achieve sustainability:

- Training for enterprises paid for by the firm
- Implementing cleaner technologies in enterprises
- Providing financial services
- Setting up (and providing access to) databases with new CP solutions
- Auditing enterprises after CP implementation (OECD, 2000).

In achieving self-sufficiency, NCPCs face the risk of becoming just like a consulting firm. If so, they face the risk of competing against those consultants previously trained by them. To ensure that this does not happen, the NCPC experience suggests the need for centers to stay at the cutting edge of CP to legitimize and differentiate their programs as being innovation-leading. Also, providing EMS services in addition to CP (and in an integrated manner) may be another to promote CP while maintaining competitiveness within the CP market (Clarence-Smith, 2001).

The Thai Cleaner Technology Information Center (CTIC) was designed to be self-sustaining, and has adopted several innovative strategies to do so. A working group from other national CP organizations assisted in developing the CTIC's core competencies to avoid duplication of activities, including networking with other regional organizations to share information. Its small staff compiles and sells "digested" research according to customer requests, rather than providing public access to information. A proactive approach is taken to anticipate what those requests might be in the future. Market research with representatives of industry and other stakeholders was used to build plans for the types of activities that were desired by clients. CTIC includes this sale of information as part of its greater group of CP advisory services on topics such as training, technology transfer and establishing centers like itself (Parasnis, 1999).

The actual mix of services provided by a CP center will change with time as the local setting matures with respect to CP diffusion. Centers must regularly evaluate the needs of the market, measure their performance and adjust their strategies accordingly.

D. Combining CP and Business Management Principles

Cleaner Production can be combined with other business management activities that can enhance the overall performance of SMEs. In general, SMEs have an array of problems, most importantly a lack of skilled and experienced resources at the management level. CP can either be used as a tool for introducing general business management concepts, or be introduced along with them (Cooray, 1999).

In the United States, the Environmental Protection Agency (EPA) and the Small Business Association worked together to initiate six state-level pilot projects through existing Small Business Development Centers (SBDCs). These centers provide a complex set of business services to SMEs, which were expanded to include CP information dissemination and assessments. Environmental assistance professionals joined the traditional team by taking part in standard business counseling practice. The SBDCs leveraged their existing links with industry to encourage discussion in sectors where pollution prevention opportunities were becoming apparent (USEPA, 2001a).

Some of the pilot projects are growing in their states while others are no longer active, but the model has not been replicated outside of the pilot project sites. The main reason cited for the failure of the spread of the concept is the resistance of environmental technical assistance providers who fought against losing their business to the SBDCs (Weiler, 2002). However, the SBDCs in Vermont and Pennsylvania were able to circumvent these problems and increase the size of their programs. The most successful strategies included:

- Integrating environmental assistance into regular business development
- Targeting and following-up with SMEs
- Comprehensive planning to evaluate capabilities and roles of the SBDC and other environmental assistance providers
- Targeting businesses in their start-up phase or who were concerned about compliance issues (USEPA, 2001a).

Nevada, which was not one of the pilot projects, provides an alternative SBDC model. The environmental and business assistance programs were originally placed together, so environmental assistance was viewed as a natural function of that SBDC (Weiler, 2002).

Mexican experiences suggest that the link between SMEs and chambers of commerce could be utilized to deliver CP information and encourage its adoption (Sosa-Reyes, 2000). Their experience also suggests that labeling CP as a business strategy aimed to increase productivity would help in its wider adoption (Roman, 2001).

E. CP at the Company Level

While large factories produce greater volumes of pollution, many argue that small factories are more pollution intensive and, hence, impose greater environmental harm per unit output (World Bank, 2001). The overall impact that SMEs have on the environment is yet unknown, and data on their activities is neither easy to obtain nor calculate. The ADB notes that most of the pollution in Asian countries comes from SMEs, and is especially concentrated in its mega-cities (ADB, 2000). While it remains an under-researched sector, the majority of enterprises in Latin America correspond to SMEs. Mexico is a clear example of this, where SMEs represent 90% of the industries nationally (Sosa-Reyes, 2001). As such, addressing CP implementation among SMEs in Latin America and the Caribbean must be a current priority.

Sector-based targeting of firms is a useful tool to provide efficient CP training to SMEs. However, implementing CP projects has shown that industrial sectors behave differently. Projects tend to be more successful in sectors that have more intense intra-sectoral competition and financial stability (UNEP, 2002). The “CP Challenge” program in the Washington Department of Ecology targets selected sectors within particular regions to implement CP training and projects within a relatively small number of firms, many of which are small businesses. Engineers from the department work with firms to technically assess CP opportunities, conduct full financial analyses and assist in project implementation (Helbrecht, 2002).

Experience from the NCPC suggests that successful projects within companies have had extensive involvement and cooperation from both the company staff and managers (UNEP, 2002). Training in the Taiwanese CP promotion campaigns targets both technical staff and enterprise managers simultaneously. In this way, both the persons able to make decisions about changes in production processes are exposed to the same information about CP program benefits as the persons who will actually implement those changes at their companies (Chiu et al, 1999; Chiu, 2001).

The Sri Lankan model also emphasizes mixing personnel who are trained in CP within a company. Personnel from supervisory and production levels are trained and eventually serve on the CP project implementation teams. Management at these firms commit to being pro-active and accommodating the recommendations of the CP team. In so doing they open themselves up to decisions that can improve productivity, increase worker involvement and devolve the concentration of decision-making power that is often present in SMEs (Cooray, 1999).

VI. Financing CP

Several of the initiatives identified CP financing as one of the major constraints for CP adoption. These constraints are based on the lack of credit dedicated to CP projects and the inability of firms to present creditworthy proposals (UNEP-TIE, 2001b). Studies done by UNEP in Guatemala, Lithuania and Mexico, among other countries, highlight the difficulties that the industrial sector and SMEs in particular face while accessing to an adequate amount of funds to invest in CP. Banks do not have a particular preference for environmentally-oriented projects, and pay more attention to the financial aspects of a loan than to the technical ones. Companies have mentioned that, if adequate financial conditions exist, they would maintain or increase the investments on CP. The main challenge is to promote CP investment opportunities and benefits among the financial sector (UNEP, 2000e). Table 1 summarizes studies by CP financing programs that highlight several difficulties faced by companies (UNEP, 2001c; NEFCO, 2001).

To overcome the difficulties associated with CP financing, some organizations have established specific programs. One of the most innovative aspects of these initiatives programs is that they target not just the industrial sector, but also banks and other financial institutions. They aim to help financial institutions understand CP as well as help firms develop creditworthy CP investment proposals.

Table 1: Problems, Causes and Possible Solutions for CP Financing
(UNEP, 2001c; NEFCO, 2001)

Problem	Causes	Possible solutions
Difficulties related to technical and financial assessment of CP investment proposals.	<ul style="list-style-type: none"> • Lack of understanding in the financial sector of the CP possibilities • Credit providers are unable to assess CP investment proposals • Inadequate financing: shortage of capital, limited experience in risk analysis, legislative and asset related constraints in arranging collateral, limited use of credit financing as a resource. 	<ul style="list-style-type: none"> • Increase the capacity of technical assistance providers and CP assessors in the preparation of proposals. • Use independent local and foreign “third-party” experts to provide assistance in assessment.
CP investment proposals lack creditworthiness	<ul style="list-style-type: none"> • Lack of financial savvy and loan writing capacity in companies 	<ul style="list-style-type: none"> • Training firms in the creation of creditworthy proposals

Problem	Causes	Possible solutions
Lack of credit lines or schemes for CP	<ul style="list-style-type: none"> • Bank system focused on traditional collateral value (land and buildings). Provision of working capital only. • High interest rate due to economic and financial instability 	<ul style="list-style-type: none"> • Develop financial and economic tools and instruments to correct the bias and permit the evaluation of the economic benefits of CP. • Promotion of credit schemes for CP investments. • Adoption of CP investments in bank portfolios.
High costs for implementing CP	<ul style="list-style-type: none"> • Lack or limited CP technology and capacity • Perceptions of technology risks 	<ul style="list-style-type: none"> • Promotion of credit schemes for CP investments.
Lack of an adequate environment for CP	<ul style="list-style-type: none"> • Lack of an adequate CP policy framework • Lack of demand for CP from industrial community. • Unfamiliarity with the concept of profitable environmental investments (NEFCO). 	<ul style="list-style-type: none"> • Promote CP as a means to improve and manage a company's image. • Transfer intellectual property rights to stimulate local production and commercialization of CP. • Introduce policies and instruments that will promote the adoption of CP such as: <ul style="list-style-type: none"> • Import tax reductions • Special funds and credit lines • Pricing of water and energy. • Elimination of escalating tariffs

A. Key elements

Problems related to financing in the UN CP program contain the following issues (UNEP, 2001c):

- Language: CP language has not been appropriated by the financial sector. They are more aware of the concepts related to 'environmental management' of traditional, end-of-pipe environment 'costs' (not efficiency).
- Time Scales: The initial process of CP assessment generally takes only short periods of time. However, in many cases the implementation of recommendations depend on the capital budgeting process, expanding significantly the period of time for the adoption of the new approach. There is usually a lengthy period between loan agreement and disbursement, which delay also acts as a significant barrier to the implementation of CP within a firm.
- Incremental nature of CP investments: The CP investment is often seen as an additional component of a major strategy, rather than a mainstream strategy in itself or an integral part of a project. Following this pattern, the environmental investment is seen as incremental or hybrid. According to UN experience, "best results can be achieved, if the process changes incorporating CP investment is valued as a whole" (UNEP, 2001c).

Some of the general recommendations coming out of the UN's CP Financing program are (UNEP, 2001c):

- Financial institutions, business schools and academia need to strengthen their capacity to understand the benefits of CP in order to create a cadre of financial professionals who are more receptive to financing CP projects. This topic has to be integrated among the formal education programs.
- Revolving funds for CP should be encouraged to provide funding for SMEs to adopt CP projects.
- Enterprises should establish practices to measure and reflect the cost of waste management and external environmental costs.
- There is a strong need to measure the economic benefits of CP—what can be the costs and benefits of doing things in a different way.

Other experiences show similar results. Hamner (2001) presented lessons learned from financing projects around the world in an effort to improve this focus area in the ADB's project work. Problems and successful strategies include:

- Availability of financing is not enough to motivate investment.
- Financial institutions are uninterested because they can't understand technical and financial merits of CP investment proposals.
- Credit schemes are not suited for CP investments.
- Proposals are usually written poorly and/or not credit-worthy.
- Local financial environments are not supportive of CP.
- In Europe, successful results have stemmed from partnerships between donor agencies and local financial institutions that understand CP as it relates to local SMEs.
- Loan guarantees are a successful approach in Europe and offer appropriate roles for international donors.
- Equity financing through Socially-Responsible Investors/Venture Capital by using screening mechanisms should be explored as means of financing CP.
- CP solutions should be defined as productivity improvements to encourage support by credit providers.
- Small loans should be grouped together to reduce transaction costs to institutions
- Promote lending, especially to SMEs, by domestic entities, rather than remaining reliant on foreign aid. This involves teaching financiers CP concepts and how it can improve the performance of their clients.
- Technical assistance and facilitation for SMEs must include proposal preparation and local financing.

B. Loan Facilities

Revolving loan facilities is a strategy that is being currently implemented by the Nordic Environmental Finance Corporation (NEFCO). Over two dozen Cleaner Production projects companies in Lithuania and northwestern Russia have been funded via local intermediaries. The

revolving loan facility provides up to 90% of the investment required for high-priority cleaner production projects valued less than US\$200,000 (NEFCO, 1998). Firms are offered fixed low interest rates with maturity dates beyond the expected time for returns on the investments to materialize. Borrowers' assets are used as collateral. The efforts are aimed at funding model projects, which could demonstrate the win-win potential of CP to domestic financiers and other enterprises. NEFCO (2001) has established a set of recommendations based on their experience with the Revolving Loan Facility. These include:

- Delivery of specific training and project preparation on financial benefits of CP projects at the enterprise level.
- Expansion of advisory services/consultancies to assist the enterprises in preparing project proposals and loan applications.
- Training and advising for financiers to secure solid baselines, supervise project implementation and monitor project results

In Latin American countries, these experiences are still in their beginning stages. USAID is planning to finance the Andean Region Revolving Loan Fund for Cleaner Production – Andean Region Environmental Committee (COMARA). Mexico's FIPREV (Pollution Prevention Fund) awards financial credits to SMEs for environmental assessments that identify and implement CP opportunities. It is a revolving fund in operation since 1998 and has provided loans to approximately 40 SMEs. These companies have reduced the environmental impact of their operations and have improved their environmental performance (Sosa-Reyes, 2000). FIPREV provide low interest loans in Mexican pesos or, if the firm is exporting goods or services, US dollars. These loans come in the form of technical assistance for changes in industrial processes. FIPREV estimates that its loan system is accountable for more than \$650,000 per year in savings (Gallagher, 2001).

Loan Guarantee facilities are being promoted as a means of financing CP projects in SMEs. In the US and Canada guarantee programs are recommended to fund loans to 80% of the total value. Smaller firms have been found to be less likely to default on paying off their loans, and so should be targeted for loan guarantees (Hamner, 2001). The KfW (German Financial Cooperation) offers loans to commercial banks and SMEs for CP. They use a wide range of options for CP financing, including credit lines and grants along with long term loans. In this mechanism links between the companies receiving loans and the NCPC are encouraged. In Chile, with the support of the KfW, the NCPC is establishing a loan line with low interest rates for CP financing. Based on this experience, the KfW suggests the need to involve NGOs in the CP financing process, as agents between demand and supply of CP financing and as instruments that will support or audit the investment (ERCP, 2001). Similarly, the ADB recommends the use of a local, independent organization to act as facilitator for lending to SMEs with a multinational loan guarantee facility (Stevenson, 2000).

C. Prioritizing CP Investments

Sector-based approaches are often key to the success of a national CP strategy. They provide a mechanism for targeting firms within the broader national approach. They demand a

prioritization of efforts as some industrial sectors may be more responsive or require more immediate attention because of the level of impact. The results of sector prioritization studies at the national level in Central America are summarized in the table below. The data and methodology remain relevant to Latin America and can serve as a guide to the MIF in their present and future work throughout the region.

In Central America, the NCPCs have established prioritization areas aiming to provide information to decision makers about where to invest in cleaner production (CGP+L 2001). The effort was based on the following criteria:

- Competitiveness of each sector
- Contributions to GDP
- Growth index
- Environmental performance and impacts

Due to differences in the type of information available, each country used a different set of specific criteria for the prioritization. The results are varied, but all show the need to target those sectors that may result in a more efficient investment with the ability to show specific results. The prioritization can be applied not only to investments, but also to the adoption and support for sector-based policies, regulations and public-private agreements.

Table 2: Prioritized sectors to invest in CP in Central America (CGP+L 2001)					
<i>Guatemala</i>	<i>El Salvador</i>	<i>Honduras</i>	<i>Nicaragua</i>	<i>Costa Rica</i>	<i>Panama</i>
Sugar production, Tanning processes (leather), chemical industry, Paper, Coffee	Textiles and leather, food and tobacco, chemical industry, metal production sector, hotel and restaurants	Textiles, food production, tourism, forestry industry, mining	Coffee, sugar, dairy products, fisheries, slaughterhouses	Tanning processes (leather), natural oil production, coffee, sugar, fisheries	Coffee, sugar, pork and poultry industry, mining

VII. Recommendations

The MIF Project Cluster on *Achieving Ecoefficiency through Cleaner Production and Environmental Management* places special emphasis on strategies for reaching SMEs in the region. SMEs are a dynamic aspect of industry organization in countries throughout Latin America and the Caribbean. They account for large percentages of national production and employment, as well as high levels of pollution. The MIF has previously identified four areas that projects in this cluster should address: awareness raising, professional capacity building, facilitating implementation and regulatory advising (MIF/IDB, 2001a). This section draws from the lessons learned described above, to recommend strategies applicable to those four areas and two additional areas – institutional structure and financing CP in SMEs. These recommendations are based on best practices identified from efforts around the world to promote CP among SMEs. They are offered for consideration as the MIF considers how best to improve the implementation of Cleaner Production programs.

A. Awareness Raising

- **A national strategic plan for awareness raising should be developed with input from and implementation by multiple local stakeholders.**

The first area to be addressed in promoting CP is raising awareness within the national community (where feasible), including members of industry, government and the general public. These plans should identify specific objectives and target areas as well as set practical deadlines and utilize the experience of the IDB from other countries.

- **Firms can be targeted by prioritized sectors, within the national framework.**

Sectors that present the greatest potential for improvement through Cleaner Production could be targeted. These sectors include those that are the most polluting, have the greatest visibility or are facing stricter regulations.

- **Individual firms should be targeted through local efforts.**

Initially, national awareness programs could be focused in the capital city or main industrial center. However, in larger countries, localized initiatives in other regions are necessary to disseminate information to other parts of the country. Local outreach emphasizes personal contact, a strategy that has proven very effective in communicating with SMEs.

- **Public involvement can create pressure on SMEs at the local level to adopt cleaner practices.**

The general public as well as industries should be supplied with information about the health impacts of industrial pollution and the benefits of CP. This approach creates more widespread awareness and serves as a means of citizen empowerment to place pressure on industries, especially SMEs, which are more likely to respond to this level of direct pressure.

- **Demonstration projects should be spread across sectors and combined with other strategies such as case studies and in-company assessments.**

In countries that are being introduced to CP, demonstration projects play a vital role in exhibiting both technical and economic aspects to the industrial community. Projects should be spread across all sectors to reach a wide cross-section of industries. Alternatively they could be focused on the targeted industrial sectors. Specific examples, from basic improved housekeeping to full technical CP solutions, can be used to demonstrate that companies can undertake CP projects supported by a wide range of investment levels. Resources should not be dedicated to replicating demonstration projects, rather they should be used in combination with other strategies.

- **Cleaner Production should be marketed as providing economic benefits in addition to environmental ones.**

CP presents both economic benefits through resource efficiency and productivity improvements, and environmental benefits through reduced impacts. SMEs are unlikely to adopt CP practices unless they are clearly shown how those practices can affect their bottom line.

- **Messages can be communicated using a variety of media; emphasis should be placed on making the messages clear and easy to understand.**

A broad array of media can be used in awareness raising including video, electronic (computer, Internet), print (fact sheets, manuals, case studies). The most important aspects of communication materials are that the materials should be written in language and disseminated through information channels that are familiar to and easy to understand by SMEs, and they should provide clear messages and directions for follow-up activities (i.e. next steps).

- **SMEs are more likely to respond to information that comes to them personally from trusted sources.**

Direct contact is desirable to reach SMEs. SMEs must trust the sources of information. Industry organizations such as trade associations, local chambers of commerce and small business development centers represent trusted sources of information for SMEs and should be approached to disseminate information to them.

- **SMEs do not use web resources extensively, so CP information on the Internet is not likely to be accessed by them.**

While the Internet has been touted as an effective means for spreading information about CP, it is not as readily accessed by SMEs who may lack access to Internet resources and knowledge about its use. This obstacle is expected to change as computer and Internet resources become more widely used in the region. At present, however, emphasis should not be placed on developing web resources that are not likely to be used by SMEs.

- **Award and voluntary programs should be designed to provide perceptible and tangible benefits that would encourage company participation.**

Award programs present an innovative means of raising awareness of CP throughout a country by recognizing high-level achievements by companies. The biggest selling point of such programs is that award-winning companies receive marketing advantage because of media and institutional recognition associated with the program.

- **Combining CP with environmental management systems (EMS) is a good way to promote solutions that proactively tackle environmental issues in firms.**

CP and EMS are related concepts that reinforce each other. Linking CP with well-recognized EMSs is thought to encourage adoption. A powerful strategy linked to EMS is the use of larger companies who can influence SMEs to change their production methods by “greening the supply chain”.

B. Capacity Building

- **A “CP market” should be developed, composed by both the supply and the demand side.**

While addressing the issue of capacity building, both supply and demand sides should be developed. This approach will not only focus on the training of CP consultants, the support of CP expertise within companies, but also the awareness that will foster a need and interest to acquire CP services. Note that while the demand side places a strong emphasis in the training of consultants, a valuable asset for a CP market, the involvement of each company’s staff in CP learning activities is a more efficient way to transfer knowledge to SMEs.

- **A cadre of professionals capable of providing CP consultancy services should be developed to spur and to meet industry demands as they grow over time.**

In order to meet the demand generated for CP services, through awareness-raising activities, a network of institutions and professionals must be established. Timing of supply-side activities should be coordinated with growing awareness and demand on the part of institutions such as CP Centers that can serve as intermediaries between clients and CP professionals.

- **CP professionals should be trained throughout university curricula.**

CP education should be introduced in cross-disciplinary university curricula. Training programs at this broad scope will facilitate the institutionalizing of a CP “culture” among professionals over time.

- **Internship programs can combine professional training for students with low cost CP service delivery to SME clients.**

Internship programs combine professional training for students with low cost CP service delivery to SME clients. The programs should be structured to give students ample background to engage in worthwhile projects. Firms must be willing to accept and adopt the recommendations of student interns.

- **CP training should reach a broad group of professionals, extending beyond the technical.**

Training activities should be targeted to the following groups: professional consultants, SME owners/managers/technicians, technical institute and university students, government administrators, local financiers. Personnel from various government ministries including offices related to environment, trade, industry, finance, agriculture and tourism should be targeted as well. General CP training should be targeted to reach all groups at the same time, so that they can become more familiar with issues that are pertinent to the other groups. Beyond the general training activities, others should be offered that focus on sectors and on the specific needs of different professionals.

- **Certification for CP technical assistance providers should be explored.**

A certification system should be established for the professional trainers who will administer CP information programs to the national community. Certification establishes a set of professional standards and gives providers greater credibility among their clients.

- **Research and Development can stimulate local innovation with respect to appropriate technology.**

There should be some focus on R&D to encourage national self-reliance in terms of creating their own technology rather than relying on imports. This promotes sustainability and competitiveness in environmental technology at the national level. Creating strong and permanent links between SMEs and NCPCs can bridge this gap by brokering SMEs with access to innovative technologies.

C. Regulatory Framework

- **Regulations should be multi-sectoral**

Regulations play an important part in creating pressure for industries to adopt new, desirable strategic behavior. Regulations should be multi-sectoral, that is, have stipulations in economic, industrial, and agricultural as well as environmental policies. In general, policies that promote CP should:

- ❑ Focus on production and management changes rather than end-of-pipe solutions.
- ❑ Improve the enforcement of regulations in order to achieve better compliance.
- ❑ Ensure that the type of regulation implemented will not promote end-of-pipe solutions.

- ❑ Provide public disclosure of environmental performance and promotion of measures that address an environmental consumption (eco-labeling).
 - ❑ Review and correct pre-existing subsidies or other economic incentives that might artificially lower the prices of certain resources and stimulate pollution and unsustainable use.
 - ❑ Facilitate research and development on cleaner production technologies and tools in order to improve information-based support for decision-making processes, increase availability of technology, and encourage innovation.
 - ❑ Support the definition of general and specific sector-based policy, as well as the action items that are necessary to implement a national strategy.
 - ❑ Devise a basic system to ensure that there will be high levels of compliance, since lack of enforcement minimizes the regulatory intention.
- **A National Policy for Cleaner Production should be developed in those countries that still lack one.**

The broad implementation of CP in a country depends largely in a favorable policy framework at national and local levels (in both regulatory and financial aspects). This framework should address environmental problems from an integral perspective, and not in an isolated manner. Its application will require a high degree of cooperation among different environmental and non-environmental authorities. In general, the instrument should foster collaborative relationships among stakeholders and different sectors.

- **Support the adoption of market-based policies and incentives to promote CP**

MBIs have greater flexibility than standard instruments and act as incentives in the development of more effective mechanisms and technologies for pollution prevention. Tax breaks for the import of CP technology should also be promoted.

- **Foster mechanisms for negotiated compliance**

Negotiated compliance is a form of interaction among governments and industry, within a regulatory framework, that takes into account all major stakeholders and promotes cooperation. There is a need to foster schemes for negotiated levels of compliance for pollution reduction, where regulators and industry interact to set the standards should be promoted. The decision regarding the type of technological innovation used to meet a certain goal should be in the hands of the industrial sectors, therefore promoting technological improvements.

D. Institutional Structure

- **CP centers work best as institutions that are independent of government, but have input from all major stakeholders in the country.**

A national level center should be responsible for implementing the national CP plans. CP centers work best as institutions that are independent of government, but have input from all major

stakeholders in the country. They can be linked with trade associations or academic institutions or can operate as independent bodies. Centers should be the first stop for SMEs to find CP information and professional resources. While they should start as single national entities, they should have regional satellite offices to deliver more personalized information to companies.

- **Centers should aim for self-sustainability by providing commercially viable services in addition to public services.**

CP centers often provide a mixture of public and commercial services such as training, consulting and providing useful information (including linking SMEs with CP consultants). Centers must carefully assess the most appropriate role for them given local needs, and balance their own sustainability with the supply of CP professionals in a competitive marketplace. They should work with governments to develop national-level, multi-sectoral and industry-specific policies. They can also serve as intermediaries among stakeholders including foreign donors, academia, business and government.

- **Roundtables offer national and regional-level forums for information exchange about CP.**

Roundtables at national and regional levels have succeeded in creating a forum for the exchange of ideas among private enterprises, CP professionals, CP centers, government officials and donor agencies. These forums can help to raise awareness and share strategies for improving CP promotion and implementation.

- **Sectors should be prioritized in the first stages of CP program implementation.**

Particular sectors, which have good potential for improvement, either because of willingness to cooperate, high visibility or high levels of pollution should be targeted in the first stages of a national plan implementation.

- **CP promotion can be more effective if it is linked to basic business management principles.**

Most SMEs lack numerous basic business management skills. CP can be more effective if it is linked to general business management principles. This combination provides a more complete system approach for SMEs to improve their overall productivity. CP can be incorporated into more commonly accepted business practices through inclusion among the services provided by small business development centers.

E. Financing

- **Financial institutions, business schools and academia need to strengthen their capacity to understand the benefits of CP.**

Financing remains a major obstacle for many SMEs to implementing Cleaner Production projects. Three issues need to be addressed – the ability of SMEs to create credit-worthy proposals, the willingness of financial institutions to finance CP investments, and the availability of funds for CP investments. Financing CP should be a topic that is addressed both in formal education programs and CP awareness workshops. As such, financiers need to be included in CP awareness-raising campaigns.

- **CP training programs and consultancy services should include instruction on the formulation of creditworthy CP investment proposals.**

SMEs loan proposals for CP projects are often rejected because they are not credit-worthy. CP training programs and consultancy services should include instruction on the formulation of creditworthy CP investment proposals. This is an aspect that should be included in the skill set administered to CP professionals during capacity building exercises.

- **Funds should have flexible, innovative repayment schedules as well as be administered by local financial institutions.**

Revolving funds and credit lines should be instituted for CP investments. Funds should have flexible, innovative repayment schedules as well as be administered by local financial institutions even if the actual funds come from external sources. Governments may need to establish mechanisms that measure and reflect the cost of waste management and external environmental costs as well as the economic benefits and costs of CP implementation.

F. Facilitating Implementation

- **Local experts can provide sector-specific, on-site technical, financial and implementation assistance.**

Assistance within SMEs should be provided by local technical experts who are familiar with issues relevant to the nature of the industrial sector. These experts should provide assistance in both the assessment/planning and the implementation stages. The nature of the assistance should also cover technical and financial aspects of the project.

- **CP implementation teams within companies should use staff members from production, supervisory and management levels.**

In-company project teams that combine staff from various levels have been shown to be effective at implementing CP projects as they draw on the different types of expertise of personnel and create buy-in among the groups. However, management commitment is of the utmost importance in actually implementing the solutions proposed by the in-company team.

VIII. Conclusion: Implementing CP in Latin American SMEs

This report was designed to assist the implementation of MIF projects in the cluster: *Achieving Ecoefficiency Through Cleaner Production and Environment Management* (MIF/IDB, 2001a). The analysis and findings are applicable to other similar donor programs as well. It has drawn upon lessons learned in Cleaner Production awareness-raising and implementation programs from around the world. Readers of this report need to keep clear that the work has been based primarily on secondary documentation, that is, reports prepared by others than the research team. One of the most serious limitations in the authors' being able to make strong recommendations about the most effective choices from among the many described above is the virtual lack of data on the specific outcomes at the enterprise level of the programs discussed in those documents. The obvious conclusion here is that such research is critical to refocus the broader analysis and conclusions so that one can draw on data from the enterprise level. Pointing out such need does not, however, diminish the usefulness of what has been written here.

In particular, there are a few areas where further higher-level research is warranted, as information was not currently available or was not available in sufficient detail:

- Legal issues – as relates to technology transfer
- Incorporating CP in the licensing process for industries
- Certification systems for CP professionals
- Specific cases of CP implementation among SMEs

SMEs play a significant role in national economies throughout Latin America and the Caribbean. As global markets become more open to trade, smaller enterprises will be put under greater pressure to increase their competitiveness. The competitiveness of SMEs in Latin America is an issue of particular relevance at this time, given the expected growth of sub-regional free trade agreements, and the desire to access international markets. Latin America may have a limited capacity to access European and North American markets if nations do not shift their competitive strategies from a model of dependence on cheap natural and human resources and high levels of environmental damage, to one based on an increase in productivity, environmental performance, and the incorporation of environmentally positive characteristics in its products (Pratt and Rojas, 2001).

CP has been often marketed as an environmentally beneficial measure, which is usually thought to incur additional costs. Rather, CP can have greater appeal when it is shown to be an instrument that increases competitiveness and provides opportunities to access global markets. SMEs are less able to dedicate their limited human and capital resources to non-essential business functions than larger enterprises. Hence, the financial and productivity benefits should be included with environmental ones when SMEs are informed about CP.

Latin America and the Caribbean present several challenges for the implementation of CP in SMEs. Weak environmental laws and poor enforcement coupled with a paucity of information on existing environmental impacts and performance prevents accurate measurement of future CP achievements. These problems are aggravated by a poor tradition of sharing and recording information in the region and the lack of public access to information. Nations throughout the

region lack the required diagnostics that can assess priority areas for the implementation of CP. Stronger environmental regulations and a definition of baseline conditions should precede or run parallel to the establishment of CP policies and programs. National-level CP planning can serve to bring stakeholders together to share information, determine areas for prioritization and establish systems for measuring the progress of CP campaigns.

Incorporating multiple stakeholders into CP plans presents both an opportunity and a challenge. It is a formidable task given the numerous agencies and institutions with interests in commerce and the environment within each country. Within governmental alone, a successful CP program should include discussions among ministers of industry, commerce, finance, health education and environment, as well as local government officials, among others. Major achievements have already been made through voluntary agreements between governments and industry, which have been a trademark in the implementation of CP schemes in parts of Latin America (such as Chile, Colombia, Mexico). Industrial sectors appear willing to take advantage of this model for implementing new policies, though the financial sector should also be included in these discussions. Multiple stakeholder participation in the planning process can lead to more effective policies since they incorporate the concerns and expectations of different groups.

One of the most significant challenges facing SMEs is related to the size and structure of many smaller, often family-owned enterprises. The adoption of CP can be hindered by a lack of personnel available for training and implementation, a lack of technical capabilities and an inflexible decision-making structure. The development of tools that will enable smaller enterprises to adopt CP is a challenge that can be addressed through the training of a cadre of CP professionals who can then work with companies too small to train their own staff.

Latin American nations are at varying stages of CP implementation. Some have well-established national CP centers with several years of experience (such as Brazil and Mexico), and policies that have already passed the initial tests of implementation (such as Chile and Colombia). Many of the existing initiatives have benefited tremendously from international cooperation, where current CP capacity has been built through partnerships among local organizations, governments and international organizations such as the UNIDO, UNEP and USAID. Other nations are just developing the first steps to implement CP (such as Ecuador and Honduras), while several, including most of the Caribbean, have not yet taken steps to incorporate CP. For those countries in the formative stages of CP implementation, there is an opportunity to incorporate lessons learned from others in the region as well as through international perspectives and assistance. The momentum is also in place for further CP capacity building using a regional perspective through roundtables and other collaborations.

CP implementation takes place on many different levels simultaneously – regional, national, local and in-company. It is important to coordinate these efforts to deliver clear, consistent messages and provide SMEs with the incentives and resources to incorporate CP practices in their operations. The experiences and recommendations presented in this report are intended to demonstrate how CP programs can be designed to address the challenges faced by SMEs in Latin American and the Caribbean and to specifically assist MIF with its efforts in this area.

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