

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

**Appendix I - Case Summaries**

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## Asian Development Bank

### 1. General Description

The Asian Development Bank (ADB) has a comprehensive environmental program aimed to improve environmental conditions in its Developing Member Countries (DMCs). One of their focus areas is the promotion of Cleaner Production on national levels (ADB, 2001a). Cleaner Production projects have been funded since the late 1980s. A wide range of projects have included firm level CP strategies, establishing information systems, building core groups of CP professionals and strengthening research and development capacity. Some projects have specifically focused on SMEs through the inclusion of credit financing as a source of funding. Governments have also benefited from financial and technical assistance in developing Cleaner Production programs. As of the end of 1999, US\$3.2 billion was loaned to six countries – China, India, Indonesia, Malaysia, Philippines and Thailand for Cleaner Production projects (ADB, 2000).

Type of program	Description
Umbrella program to promote Cleaner Production among developing member countries.	Promotion of CP through a combination of efforts, including training, capacity building, direct financial assistance and support for policy making.

The ADB uses a regional technical assistance (RETA) approach – with geographic focus on (1) China and (2) the other five countries listed above, aimed to:

- Assist in policy and institutional framework for integrating CP in national environmental and industrial development strategies
- Recommend financing mechanisms for implementing CP strategies
- Encourage cooperation among governments, private sector, academic institutions, NGOs, other aid agencies in developing national action plans and technical needs.

In 2001, the ADB in reviewing the accomplishments and shortcomings of its past projects, developed guidelines for promoting CP by government policy-makers. The guidelines emphasize strategic and action planning, the inclusion of multiple stakeholders, expansion into ‘emerging’ areas outside industry and the use of a variety of policy instruments (ADB, 2001b). The ADB’s new strategy aims to address policy from the perspectives of enterprise decision makers such that:

- The combination of strategies, including awareness, pressures, and incentives, must show how Cleaner Production is in the best interest of the firm.
- Adoption of practices must be voluntary, as regulations are not sufficient to ensure that best practices are adopted. Positive drivers/incentives should be emphasized: recognition and rewards, public and business-to-business B2B/supply chain demand, increase in sales (due to competitive advantage in the market)
- Strategic goal setting and policy formation must include the concerns/resources of all stakeholders (government, businesses, NGOs) in order to realize nationwide behavioral change. It is more important to use sector/location approaches as well as build demand and capacity rather than replicating demonstration projects.

## **2. Key Elements**

### **2a. Financing Cleaner Production**

Burton Hammer, one of the ADB's Cleaner Production consultants presented lessons learnt from financing projects around the world in an effort to improve this focus area in the ADB's project work. Problems and successful strategies are:

- 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 present good role 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 (Hammer, 2001)

### **3. Lessons Learnt**

In 1995, the ADB reviewed their CP programs and found five factors that need to be in place for countries to move forward with clean technology:

- Policy & Regulations - presence of appropriate policy and legal frameworks
- Information networks for existing technology, trends in technology, product markets and technology suppliers
- Assessment skills for information on technology, markets and suppliers and determine the kind of technology appropriate for the economy's special circumstances
- Diffusion potential - assimilate and diffuse technology efficiently throughout the economy
- R&D capacity - adopt, improve and develop technology to the local setting (ADB, 2001b)

Previous approaches have relied on providing information, skills and financing, as well as using industry leaders for demonstration Cleaner Production projects with the expectation that others in the industry would follow. Governments have not regarded Cleaner Production as a priority area in policy formation, seeing it merely as a technical issue. The ADB recommends that donors should have put more pressure on policy planning and development, as thus far their actions have been inadequate. The information and training approach used with larger corporations has not worked well for SMEs because some of their specific problems include limited human and capital resources (Evans, 1999; ADB, 2001b). Other problems of note are:

- Limited general awareness and lack of clear goals at decision-making levels (upper management in both private and public sector) about CP and its differences/advantages over end-of-pipe controls
- Limited public awareness on the public health effects of industrial pollution
- Insufficient human resources to promote (evaluate, assimilate and diffuse) CP
- Absence of networks that can provide up-to-date and unbiased information on finding Cleaner Production/Technology practices, trends and suppliers
- Low costs of basic natural resources (water, wood, etc), often regarded as “free”
- Poor enforcement of environmental regulations and compliance monitoring
- Existing environmental standards are often media-specific and promote end-of-pipe control technology rather than Cleaner Production
- Few positive incentives are used especially market based ones, like tradable permits and tariff waivers which are widely viewed as too complicated
- Lack of transparency among businesses in developing countries – information on a firm’s operations, especially environmental performance is often kept secret.
- Poor access to financing for SMEs – due to poor proposals, unwillingness of bankers to finance SMEs especially where CP is not well understood
- Financing is critical, but not necessarily the limiting factor. Business development is a major consideration, especially as part of pressure through industry supply chains.
- Pressure from global competitors on firms, especially SMEs, implies that investments would be more short-term, and that alternative strategies for becoming more competitive may take precedence over CP strategies.
- Reactionary behavior on the part of policy and enterprise decision makers limit support of long-term planning approaches.

Overcoming these barriers involves:

- Strategic planning that will integrate CP across sectors, change behavior at all levels of enterprise and government and involve multiple stakeholders
- Setting standards and regulations that promote pollution prevention not control
- More effective monitoring and enforcement of standards and regulations
- Focus on future industry investments, not just changing existing industries
- Consider urban and industrial pollution problems and solutions together, e.g. Incorporating CP into transportation and municipal services
- Focus on SMEs should include
  - access to financing (teaching financiers)
  - preparation of loan proposals
  - bringing SMEs into economic mainstream – registration
- Using market-based instruments such as loan guarantee programs that can be implemented to assist SMEs access loans when they lack collateral and borrowing histories. Foreign aid agencies can form partnerships with local banks to implement such loans
- Use greening the supply chain as means of diffusing practices, not just through industry organizations. SMEs are less likely to be a part of industry organizations, but will have supply chain links through which their behavior can be influenced.

- Greening supply chains should extend to requirements for suppliers by local governments, financing institutions and insurers. Many multinational corporations play an important role in “greening the supply chain” – by assisting their local suppliers (many of whom are SMEs) to adopt Cleaner Production practices.
- Improving transparency in industries such as reporting environmental performance using standard metrics to government (who should develop reporting systems) and the public, e.g. Global Reporting Initiative.
- Altering consumer preferences to create demand for goods and services that have been produced with cleaner technology and practices.
- Redefining markets to provide services rather than products, which would encourage manufacturers to use resources more sustainably.
- Use globalization of markets as a tool to encourage SMEs to adopt Cleaner Production
- Use telecommunication resources, Internet, networking, conferencing, etc. to facilitate access to information.
- Raise public awareness about industrial pollution and its potential solution through CP via the media and public health avenues, also assist in empowering them to put pressure on firms to adopt CP.

### ***National Policies***

While there will be variations among the actual implementation plans for each country, all national strategies should include (Evans & Hammer, 2001; Stevenson, 2001a,b,c):

- Neutral forums among all stakeholders (industry, other businesses, academia, various government departments, NGOs) to identify national goals, policy objectives and action plans
- Formulation of public policy, integrating it across sectors – focus on environmental policy within industrial, energy and investment developments, encourage collaboration across different government departments/ministries
- Combination of policy tool – regulations, voluntary programs, market-based instruments, transparency/disclosure, information/education, that are most appropriate to promote CP and behavioral change towards it
- Policies that address economic needs for productivity improvements, as well as integration of strategies across sectors and within each sector
- National action plan based on common goals and strategies, incorporating concerns and resources of stakeholders. CP centers should focus on coordinating interactions among stakeholders and serving as a catalyst for their behavior.
- Action plans should go beyond “industry” to sectors such as tourism, transportation, health services and agriculture, so these sectors should be included from initial planning stages.
- Independent monitoring body (include public and private agents) to continually assess and improve the action plan. Performance measurements should be at firm, sector and national levels to have a more comprehensive view of progress. Metrics will have to evolve to measure efficient resource use rather than pollutant discharges.

- Use of the education system and media to promote society-wide understanding of human health impacts of industrial pollution and the benefits of Cleaner Production. Studies show that SMEs are likely to respond to localized rather than municipal/national pressures.
- Market based incentives and public rewards for good performance. Foreign assistance programs should target institutional capacity building to develop these instruments and administer their implementation
- International donors to assist in planning as well as coordinate efforts of different agencies
- Promotion of lending by domestic entities, rather than remaining reliant on foreign aid, especially to SMEs. This involves teaching financiers CP concepts and how it can improve the performance of their clients.
- Paying attention to forces prohibiting wide-spread adoption of CP in the country.
- CP requires behavioral change, not just technical fixes – use concepts like management improvement, risk reduction, social responsibility and competitive advantage to get target groups thinking beyond immediate project
- Technical assistance and facilitation for SMEs including proposal preparation and local financing
- Networks for the exchange of information – technical and operational

The national policy, strategic plan and action plan should proceed along the following stages (Stevenson, 2001b,c):

- Convene small planning group with key stakeholders including ministry of finance, industry and environment as well as important players in the national economy (industry and other business), academia and local government.
- Define broad national policy to achieve Cleaner Production and clear, understandable, national goals to get there.
- Define clear, specific, measurable objectives for the policy.
- Identify sectors and stakeholders who can contribute to promoting CP and/or benefit from CP practices.
- Examine national policies that either complement or hinder the promotion and adoption of Cleaner Production.
- 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.
- Identify conflicts among existing policies within and among sectors in order to build an integrated policy framework
- Identify conditions and incentives, both nationally and specifically within each sector, that would encourage enterprise decision-makers to achieve the policy objectives.
- Define a broad strategy to achieve those conditions – this will set the directions for action, specifics to the strategy can be added later on.
- All stakeholders should be brought together to devise specific policies and action plans for each sector.
- 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.

As part of the ADB's Cleaner Production strategy in China, assistance aims to create policy and pressure drivers that will motivate Town and Village Enterprises (TVEs) to adopt CP practices on their own. It was felt that enterprise-level assistance would not be cost-effective. Another example from the CP promotion program in India emphasizes local input and capacity building to research and develop technologies, policy instruments and enforcement. A strategic objective is to influence the future design of technologies and practices in Asia, as that region is still in a stage of massive industrial growth (ADB, 2001b).

### ***Recommendations to International Donors***

International donors should also develop a network to coordinate their actions in the region to not unnecessarily duplicate actions (Stevenson, 2001d). They should also:

- Focus on assisting governments in integrated policy and action planning
- Evaluate past experiences, from itself and other agencies, when designing future promotion strategies, which should be aligned with national CP strategic plans
- Support networks for technical, financing and policy information exchange
- Perform benchmarking and regular assessments to evaluate performance and success of their contributions.
- Work with local institution to facilitate multinational loan guarantees between local banks and enterprises, including assisting enterprises in loan preparation.
- Partake in international investment funds that encourage cleaner technology manufacture and adoption. ADB proposes to follow the MIF's environmental strategy for grants including improving policy and support frameworks, improving firm management, the creation of CP investment funds and use of financial intermediaries.
- Support the privatization of state-owned industries
- Incorporate Cleaner Production into their own activities, as well as coordinate their activities in the ways that their strategies to nations recommend.

ADB proposes the following general guidelines that all international donor agencies should bear in mind when promoting Cleaner Production (ADB, 2001a; Stevenson, 2001d):

- Learn lessons from past experience, but introduce innovations into programs to keep dynamic
- Each setting is different, so blanket policies/programs must adapt to local needs/culture
- Influence the nature of future investments
- Cleaner Production implies reducing resource use



- Resource use and pollution generation per unit of production must decrease to become sustainable
- Think like enterprise decision-makers in devising strategies that they are most likely to embrace to change their behavior

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## Nordic Environmental Finance Corporation (NEFCO)

### 1. General Description

The Nordic Environmental Finance Corporation was initiated in 1990 to finance environmental investments in Central and Eastern Europe Countries and the Newly Independent States. In addition, a wide array of training programs were conducted through the region. A major objective of the project is to stimulate domestic financing of Cleaner Production projects, so that external financing would be relegated to a complementary nature.

The program focuses on financing mechanisms for the adoption of cleaner production practices among businesses in these countries. Since 1997, they have instituted a program to provide loans specifically for cleaner production investments, matching them to the cash flow generated by the investment. They do not have special programs for SMEs.

Type of program	Description
Program to promote CP in transition economies.	Promotion of CP through various means but with major focus on financing mechanisms.

### 2. Key Elements

The Revolving Facility for Cleaner Production Investments was started in Lithuania and Northwestern Russia (because of relevance to pollution affecting Nordic countries). NEFCO offered financing of up to 90% of the investment (the range of loans was US\$50,000-\$200,000 required for high priority cleaner production projects (NEFCO, 1998). They offered firms fixed low interest rates with maturity dates based on the expected time for returns on the investments to materialize. This payback time frame could be extended to 20% longer than the ROI period, up to a maximum of 3 years. The assets of the borrowers were used as collateral. The efforts are aimed at funding model projects, which could demonstrate the win-win potential of Cleaner Production to domestic financiers and other enterprises. These projects are

“designed to capture commercially valuable emissions and wastes from existing production facilities or the reduced use of inputs and does not include the financing of installation of additional production equipment, or direct expansion of existing production facilities” (NEFCO, 2001).

NEFCO defines three types of Cleaner Production projects:

- A. Housekeeping actions, with nil or minor investments and payback of investments in less than one year.
- B. Short-term (< one year) investments to be financed over operating budget or small loans.
- C. Long-term (> one year) investments, requiring external loans.

Eligible borrowers are state enterprises, local and foreign private firms and joint ventures. Contractors and suppliers for the projects are primarily sought locally, then from the Nordic countries and finally internationally (NEFCO, 1998). However, most clean technology is actually imported from Western Europe (Paulig-Tønnes, 2002). Training programs in the form of seminars and workshops are combined with environmental reviews of companies' processes and equipment and mechanisms for identifying potentially sustainable projects. These programs have typically been funded by the bilateral grants from the Norwegian government (Paulig-Tønnes, 2002).

National Cleaner Production Centers are expected to play a vital role in the identification, preparation, supervision and monitoring of projects (each of these aspects are included in loan applications). They can also assist firms in developing environmental management systems such as ISO. They act as intermediaries between industrial enterprises and NEFCO. NEFCO is typically invited by the CP centers to present seminars on CP concepts as well as the revolving loan facility.

So far 39 projects have been approved for financing under the program 10 of which are currently active, 16 loans have been disbursed and the repayment phase has begun for the first projects. Approximately ten new project applications are received annually. The fund has grown from a size of €2 million to €6.7 million (NEFCO, 2001, Paulig-Tønnes, 2002).

### **3. Lessons Learnt**

Some of the major obstacles that prevent the adoption of CP by enterprises in these countries include:

- 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
- Unfamiliarity with the concept of profitable environmental investments.

Recommendations that NEFCO (2001) is currently employing based on their experience with the Revolving Loan Facility include:

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

### **4. Next Steps**

A workshop, financed by the governments of Denmark, Finland and Norway, is planned for Spring 2002 for CP centers in Lithuania and Russia. This workshop is expected to deal with issues of increasing competence in developing and evaluating CP projects (Paulig-Tønnes, 2002).

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## **Organization for Economic Cooperation and Development (OECD)**

### **1. General Summary**

The Organization for Economic Cooperation and Development (OECD) has implemented Cleaner Production programs in Central and Eastern Europe Countries and the Newly Independent States (CEEC/NIS) over the last ten years. The Environmental Action Plan (EAP) Task Force was charged with promoting the implementation of Cleaner Production in 1995 at a meeting of European Environment Ministers. The general policies coming out of that conference recommended that the OECD, led by the EAP Task Force would:

- Facilitate and support the adoption of environmental management systems by enterprises in CEE/NIS
- Seek participation of various stakeholders from public and private sectors in developing and implementing programs
- Invite participation of other international organizations to provide practical support for programs

Environmental management as defined by the OECD incorporates UNEP's definitions of energy-efficiency, waste minimization and cleaner production as well as the World Business Council for Sustainable Development's concept of eco-efficiency. The EAP Task Force set a goal to achieve a Basic Capacity Level (BCL) for CP adoption in the designated countries by 1998. BCL involves the creation of a core of CP advisors and trainers, demonstration projects, CP centers, training materials and inclusion of CP concepts in university curricula. These targets were not entirely met, despite the demonstrated benefits of CP strategies. As such, the OECD has reviewed its strategies for promoting CP in CEEC/NIS (OECD, 1998).

In traditional approaches consultants/CP centers worked with companies on an individual basis to promote Cleaner Production and assess its applicability in those situations. This presents a higher cost approach than using mass-training in classrooms, which has little need for in-company assessments. A best practices guide was prepared for the OECD by the Norway-based World Cleaner Production Society (WCPS) and was based on the model program developed by the WCPS in cooperation with CP centers in Poland, Czech Republic, Slovak Republic, Russia and China. This model combined trainer training, in-company assessments, demonstration projects and national CP action plan development (Nedenes, 1999).

### **2. Key Elements**

#### ***Financing***

The OECD has used 2-4 BCL building program cycles in each country to develop necessary support programs and functions, often at a 100% donor funding level (not including company participation costs). In these programs, early negotiations between donors and government are necessary to shift emphasis from donor to local funding. Decisions on financing for full dissemination should be finalized by end of the BCL. Revolving funds with simple applications, short paybacks and low interest rates are the most highly recommended financing mechanisms for companies to implement CP projects (OECD, 1998).

The OECD's policy on financing Cleaner Production involves:

- Setting a priority to fund low-cost, small investments that bring immediate economic and environmental returns (using both domestic and external financing)
- Using savings from prior investments to fund larger investments where possible
- Encouraging enterprises to use their own resources (capital and credit) as far as is possible. Government must establish the necessary framework and conditions for environmental investments
- Training enterprise managers in the preparation of loan proposals, as well as financiers (and in some cases government officials) in the merits of CP investments
- Building credit lines to commercial banks and revolving funds for enterprises to finance CP investments
- Developing project appraisal methodology
- Assisting governments in creating environmental funds

### ***Policy Framework***

The OECD recognizes the need for governments to institute policy frameworks that promote CP, including legislation, economic instruments and awareness raising programs. General recommendations are that:

- A combination of policy tools should be put together to best meet the needs of the domestic business environment and all stakeholders.
- Local and regional government bodies should be included in the creation and implementation of CP policies.
- Policies should have clear and measurable targets so that progress can be quantified.

### ***Training***

The OECD provides direct support to governments in overcoming barriers to the dissemination of CP. Information about success stories can be spread and government personnel must be increasingly sensitized to the role of CP in national development. Governments should facilitate information exchange among various stakeholders to whom CP may be important, as well as formalize CP in tertiary education programs (OECD, 2000).

## **3. Lessons Learnt**

Failures in environmental policies, geared more towards end-of-pipe solutions, and the market, where inadequate information leads to high risks and the unpredictable behavior of agents, are major factors in the poor dissemination of Cleaner Production (OECD, 2000).

Experience in OECD projects have demonstrated that CP services can be of two types:

- Commercially viable – performing environmental audits, developing management systems and delivering training programs
- Public – raising public awareness, performing and spreading information about demonstration projects and case studies, and developing measurement guides

As such CP Centers should be designed with clear ideas about what their functions will be, commercial or public services or some combination of the two. 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, but centers must aim to become self-sustaining. Charging for commercially viable services as well as partnerships with international organizations or private firms, e.g. environmental consultants, for specific objectives can provide means for centers to support themselves. Centers must regularly monitor their performance, revise policies and programs to better meet the overall goals of CP implementation (OECD, 1999).

Factors cited for implementing successful, cost-effective CP programs by foreign aid agencies, based on the WCPS model (Nedenes, 1999), include:

- Quick turn-around from initial assistance to self-help by national entities.
- Short (1-2 days) in-company advising sessions
- Action oriented learning (doing)
- Tailored group interactions to reflect local culture
- Participation in CP programs by all levels of enterprise (SMEs to Multinational corporations)
- Link industries and local municipalities in CP programs

Later adaptations to the programs included:

- Reaching levels of participation at 25-30 companies per program
- Assisting government decision makers in designing policy instruments
- Do-it-yourself programs to help companies find funding sources and prepare loan applications

Other recommendations:

- Companies should also have environmental management systems in place to provide enough monitoring and reporting of results
- Companies sign letters of intent/commitment with government when enforcement is weak

Results from the WCPS model indicate that basic capacity level (BCL) for Cleaner Production using this program structure can be attained in 1-3 years. The conditions necessary for local organizations to disseminate CP to all relevant enterprises can be reached in 5-10 years after BCL. Costs are on the order of US\$500-1500 per production enterprise (funded either by the enterprises themselves or governments) with US\$3000-7000 provided by external funding. Within 1-5 years after BCL, 200-1000 demonstration companies that have CP action and business plans can reflect profitable long-term investments. A minimum of 45% emissions reductions are possible 2-3 years after assessments (Nedenes, 1999).

Government initiatives that create an environment where CP can diffuse through relevant sectors include:

- Development of integrated environmental policies, long-term goals and clear, quantifiable targets that are developed in concert with the business community, other ministries
- National plans based on the most cost-effective and fastest CP capacity building and dissemination methods available

- Joint declarations and commitments by Ministers of Industry and Environment
- Contracts between donor and recipient government
- Legal requirements for CP audits and periodic reporting
- Free/subsidized CP mass training and advising or other cost-effective approaches
- Penalties for pollution to stimulate CP, shift away from end-of-pipe controls
- Set-up revolving fund or other non-bureaucratic mechanisms for grants and low interest loans
- Join CP programs with industry and municipalities – “Cleaner Production Cities”
- Certification system for trainers and award system for companies demonstrating high-level achievement
- CP center to administer capacity building and dissemination programs, as well as help companies with loan applications
- EMS/CP assessments mandatory for loans/grants of any purpose
- Establishment of public sector information programs (OECD, 2000).

At the 2000 EAP Task Force meeting recommendations were made to governments, donor agencies and CP centers to improve the dissemination of CP activities (OECD, 2000). Governments are urged to:

- Make CP a national priority, focus on certain sectors and develop a national strategy for EME
- Improve enforcement of existing environmental laws and regulations
- Expand use of economic instruments in environmental policies
- Promote local financing of CP investments
- Use revenue from environmental taxes to fund CP/EME programs
- Boost information campaigns aimed at enterprises
- Establish CP centers by involving representatives from all relevant ministries
- Fund demonstration projects at government enterprises

Donor agencies should focus on:

- Building more active dialogue with government agencies for long-term planning
- Raising public, worker and management awareness about environmental issues and CP
- Establishing financing mechanisms like NEFCO’s revolving fund, soft credits, venture capital
- Coordinating actions with other donors through information exchanges
- Focus CP programs in particular sectors
- Setting-up real-time exchanges to provide up-to-date technology information to CP centers
- Enhance capacity-building efforts in firms, CP centers and government departments

Recommendations to CP centers in CEEC/NIS include:

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

- Form regional conglomeration 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 intermediary between donors and enterprises
- Set achievable time-lines for environmental performance targets by industry

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**United Nations Environmental Program (UNEP) &  
United Nations Industrial Development Organization (UNIDO)**

**1. General Description**

UNIDO and UNEP have worked together since 1994 on the establishment of National Cleaner Production Centers (NCPCs) in both developing countries and countries in transition.

**1a. General Description of the National Cleaner Production Centers**

Twenty NCPCs have been established in the following countries: Brazil, China, Costa Rica, Czech Republic, El Salvador, Ethiopia, Guatemala, Hungary, India, Kenya, Mexico, Mozambique, Morocco, Nicaragua, Slovakia, Tunisia, Tanzania, Vietnam, Zambia and Zimbabwe.

Type of program	Description
Umbrella program to support the establishment of centers for the promotion of CP	General promotion of CP through different combined efforts, including training, direct assistance and support for policy making, among others.

The UNIDO CP centers are typically non-governmental and non-profit independent foundations. They have a tendency to have small staffs of about 10 persons (data based on the Eastern Europe experience) and be located within a University or industrial association. They are usually funded by external donor agencies including UNEP/UNIDO. The objective of the NCPCs is to "increase the application and raise awareness of cleaner production in industry and to encourage the inclusion of cleaner production measures in national environmental policy and legislation in developing countries and economies in transition". The centers are funded for three to five years by UNEP/UNIDO.

**1b. General Description of Financing CP Program:**

In 1999 UNEP launched an initiative to promote CP related investments in developing countries. This initiative was a response to the repeated difficulties noted by industry in acquiring the necessary resources to undertake CP strategies. Previous years of experience at the NCPCs led to the identification of financial aspects as a major constraint for the adoption of CP. This is particularly true for SMEs. One of the most innovative approaches of this initiative is that it targets not just the industrial sector, but also the banks and financial institutions. It aims to help financial institution understand clean production and help the industry to develop creditworthy CP investment proposals.

Type of program	Description
Programs for the promotion of CP through the identification of specific bottlenecks and the development of strategies to solve them.	CP financing has been identified as one of the mayor bottlenecks for CP adoption. This type of program supports research on the topic and develop strategies to overcome the difficulties related.

The initiative recognizes the role that the financial sector has on industrial development, especially in the process of granting loans and evaluating investment proposals. Since in this evaluation process environmental risks are often undervalued, “projects that might really be good investments and yield an environmental benefit, fail to go forward because of a misconception of the risks involved and financial assessment biased towards end-of-pipe solutions” (UNEP-TIE, 2001b). Studies developed through this initiative show that financial institutions do not consider CP strategies as favorable criteria for approving funds or loans. However, the program has raised the question of “whether providing financing for an end-of-pipe option constitutes an expenditure or an investment.” The program will promote investment decisions and cost-saving criteria that includes several environmental costs and risks.

It is expected that efforts relating the financial sector with a CP approach will increase in the coming years. Currently, five pilot countries have been selected: Guatemala, Nicaragua, Tanzania, Zimbabwe and Vietnam. All of them have NCPCs. Financing CP is focused on SMEs, and currently is putting a strong emphasis on training.

## **2. Key elements in the general strategy**

### **2a. Key elements in the NCPC**

The NCPCs strategy is based in the following procedures:

- In-plant demonstrations
- Training and education in CP
- Dissemination of information and promotion of CP
- Policy making assessment
- Assistance in obtaining funds for CP

Strong emphasis is placed on the similarity of the concepts of Clean Production (as pollution prevention) and Eco-efficiency (as waste minimization). Key concepts include: innovation and prevention; transfer of know how rather than the transfer of technology.

#### ***Sample of Tools used:***

In the assessment of Cleaner Production NCPCs examine the potential of a given industry for cleaner production, evaluate the performance of firms, and quantify costs and benefits.

### **2b. Key elements in the Financing CP Program**

- Training in CP investment proposals.
- Promotion of credit schemes for CP investments among financial institutions.
- Introduction of credit lines, trust funds and favorable policy changes for CP financing.
- Training in the creation and elaboration of creditworthy proposals.

### 3. Lessons Learned:

#### *The implementation of CP Centers:*

Since inception, the CP centers have been through several dilemmas. A double role has been constant: they are business driven but are also expected to deliver a public good. The following are also some of the dilemmas faced: difficulties to stimulate interest of industry; lack of efficient financing schemes; difficulties to ensure financial self-sustainability; inability to influence policy making. Besides these dilemmas, the following is a list of the main obstacles to CP implementation (Kazmierczyk, 2001b).

- Mindset - focus on end-of-pipe measures, and culture of non-compliance
- Separation of environmental management from economics and production
- Focus on short-term cash flow problems
- Problems in assessing costs and benefits of CP programs
- Changing regulatory framework
- Regulations promoting end-of-pipe solutions
- Poor enforcement (especially among SMEs)
- Lack of functioning incentives in policies
- Limited integration of CP into sectoral policies
- Difficult access to finance - hard lending conditions, and low proposal preparation capacity
- Limited national support services

The general context on which the SMEs perform pose a few additional obstacles:

- Low environmental awareness: lack of interest in CP, resistance to change, low environmental standards
- Knowledge-based obstacles: lack of knowledge and information on CP, and language barriers to understanding CP materials
- Economic obstacles: difficulties for financing, failures in determining costs of a CP investment
- Subsidies for the use of resources such as energy and water
- Overall poor economic conditions

In general, the mayor constrains for SMEs to engage in CP programs are related to the lack of personnel to engage in CP learning activities and the lack of funds to implement knowledge about CP. This is especially important when dealing with micro-enterprises. While Latin American companies have had a tendency to hire external consultants to get involved in CP learning activities, companies in Eastern Europe tend to get the staff involved in the activities. The involvement of each company's staff in CP learning activities is a more efficient way to transfer knowledge to SMEs. More important than high environmental awareness, the need to increase efficiency is what drives these companies to implement CP programs.

**Box: Barriers Identified Based On The  
South African Experience (UNEP, 2000a)**

- Lack of management commitment and political will
- Lack of appropriate regulatory pressure
- Lack of public pressure
- Lack of awareness and understanding of the benefits and methodology of CP
- CP and waste management are not perceived as an opportunity but as a cost factor
- Lack of incentives
- Lack of information on CP (available technology and case studies)

***Recommendations to the implementation of CP initiatives (Kazmierczyk 2001a):***

- Better local CP implementation capacity
- CP promoted in policy and regulatory framework
- Improved compliance with the laws
- Realistic resource pricing
- Improved availability of financing
- Capacity to prepare bankable proposals
- Evaluation mechanisms

***Lessons learned during the years of the NCPC (UNIDO 2001):***

- Long-term time horizon (periods of five years) should be used.
- Trained consultants should be certified to provide assistance to local enterprises.
- Environmental Management Systems (EMS) and CP should be integrated to ensure that EMS adopted by enterprises will not lead to end-of-pipe solutions.
- The CP concept should be combined with sub-sector specific expertise to respond to the specific technical needs of companies.
- Integrated packages should respond to company's current needs. The possibility to establish strategies that combine CP and end-of-pipe solutions should be explored to make sure that the program will be able to respond to the current needs of companies. Many of these needs come from a command-and-control regulation, and CP in not all cases is helping these companies in meeting the standards set by that type of regulation.

### ***Difficulties and possible solutions for constraints on CP financing:***

Lack of information and adequate training have been identified as one of the major constraints for CP. Major efforts are in training for the following sectors: Industry and commerce, banks and financial institutions and state bodies and media. Currently, the following training programs are running: a) Introduction to CP concepts and practice, b) Introduction to Capital Budgeting and Funding of Capital Projects, c) Profiting from CP, d) Funding CP projects. These training programs are the result of the training needs assessment to the five pilot countries where the CP financing program is being implemented.

The main conclusions of the current experience of the CP financing program are related to 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'.
- Time Scales: There is usually a lengthy period between loan agreement and disbursement, which acts as a significant barrier.
- Size of 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 an additional one, and is therefore given less attention and importance. In most cases it remains a small investment. The fact that government policies focus on enforcement places an additional burden to this constraint.

Some of the general recommendations based on current the experience of the CP Financing program are (UNEP, 2001c):

- Financial institutions, business schools and academia need to strengthen their capacity to understand the benefits of CP. This topic has to be integrated among the formal education programs.
- Revolving funds for CP should be encouraged.
- 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.

Studies done by the CP financing program show the following difficulties for CP financing (UNEP, 200c).

<b>Problem</b>	<b>Causes</b>	<b>Possible solutions</b>
Difficulties related with the technical and financial assessment of CP investment proposals.	<ul style="list-style-type: none"> <li>• Lack of understanding from the financial sector of the CP possibilities</li> <li>• Credit providers are unable to assess the CP investment proposals</li> </ul>	<ul style="list-style-type: none"> <li>• Increase the capacity of technical assistance providers and CP assessors in the preparation of proposals.</li> </ul>
CP investment proposals lack of creditworthiness	<ul style="list-style-type: none"> <li>• Lack of financial savvy and loan writing capacity in companies</li> </ul>	<ul style="list-style-type: none"> <li>• Training firms in the creation of creditworthy proposals</li> </ul>
Lack of credit lines or schemes for CP	<ul style="list-style-type: none"> <li>• Bank system focused on traditional collateral value (land and buildings). Provision of working capital only.</li> <li>• High interest rate due to economic and financial instability</li> </ul>	<ul style="list-style-type: none"> <li>• Develop financial and economic tools and instruments to correct the bias and permit the evaluation of the economic benefits of CP.</li> <li>• Promotion of credit schemes for CP investments.</li> <li>• Adoption of CP investments in banks portfolio.</li> </ul>
High costs for implementing CP	<ul style="list-style-type: none"> <li>• Lack or limited CP technology and capacity</li> <li>• Perceptions of technology risks</li> </ul>	<ul style="list-style-type: none"> <li>• Promotion of credit schemes for CP investments.</li> </ul>
Lack of an adequate environment for CP	<ul style="list-style-type: none"> <li>• Lack of an adequate CP policy framework</li> <li>• Lack of demand for CP from industrial community.</li> </ul>	<ul style="list-style-type: none"> <li>• Promote CP as a means to improve and manage a company's image.</li> <li>• Transfer intellectual property rights to stimulate local production and commercialization of CP.</li> <li>• Introduce policies and instruments that will promote the adoption of CP such as: <ul style="list-style-type: none"> <li>• Import tax reductions</li> <li>• Special funds and credit lines</li> <li>• Pricing of water and energy.</li> <li>• Elimination of escalating tariffs</li> </ul> </li> </ul>

### ***SMEs CP Best Practices Information flow:***

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). The activities of information dissemination include awareness raising and technical training and assistance via the use of electronic means (databases and the internet), one-on-one exposure and spread of information via hardcopy (UNEP, 2001b). The basic questions used by UNEP-TIE to determine recommendations on how to best communicate with

SMEs and how to create an effective dissemination of environmental information program are the following:

- What information do enterprises need?
- What information is available?
- What additional information should be provided?
- How is information delivered?

How to establish an effective communication with SMEs?  
The following describes the main aspects to take into consideration:

“Communicate the right message with clear next steps, personally, to top company managers and provide on-going support while they are in action”

The study developed by UNEP-TIE showed that enterprises will not make environmental improvements solely based on exposure to information. While in general companies receive so much information that not all of it is used or processed. It is important for an enterprise to have the capability to process the information and act based on it. However, SMEs have limited access to the necessary information to address environmental issues. The study concluded that the best way to communicate with SMEs is through personal contact; also, interactive learning process should be favored, since these are more effective. As it is not possible to reach all SMEs, it is important to carefully prioritize the targeted SMEs.

The type of information that SMEs need are:

- Sector specific
- Sources of assistance, including available funding sources
- Specific environmental issues
- General and sector oriented potential benefits
- General overview of environmental impacts and environmental regulation

The means of getting this information to them are:

- Checklists
- Case studies
- Technical guides
- Information centers
- Phone-in hot lines
- Government funded training and technical assistance
- Demonstration projects

The routes:

It is not clear if electronic information was reaching the companies in an effective manner. Through mechanisms like the Internet have a high potential to disseminate information, they are not currently used extensively by SMEs<sup>1</sup>. General means of transmitting information with no follow-up strategies, like information send via mail, are among the least effective mechanisms.

- SMEs prefer to go to local chambers of commerce and other local level information sources, rather than the international governmental level.
- Videos have also been effective.
- Industry in general rely more on the information delivered by other industry representative than by governmental agencies. SMEs rely more on the information coming from local business associations, other companies or partners involved in the productive operations (suppliers, consultants), rather than in the information coming from governments, universities, banks and insurance companies. However, there is still a lack of environmental information sharing among SMEs.
- The route or “agent of change”, and the information transmitted, should be considered by the SMEs as reliable.

Important aspects to consider when thinking about the information flow:

- SMEs will look for the information only when they have decided that they need it.
- Target company owners.
- Develop mechanisms to help companies to process, understand and act upon the received information
- Provide assistance to access the existing resources (e.g. Preparing proposals and grants)
- Provide assistance for writing policies and developing environmental management programs.
- The study recommends that the international organizations focus on existing intermediaries of information, or, to create new ones.
- The study recommends that the national organizations adapt international policies and strategies to national situation and support the integration of international policies in national environmental policies; network with other national organizations to provide assistance to local initiatives.
- The study recommends that the local organizations facilitate networking amongst SMEs and industry associations.

#### **4. Next Steps:**

UNIDO is currently working on the development of a set of indicators for success in CP implementation. This topic has been proved to be of high relevance to companies involved,

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<sup>1</sup> It is important to take into account the rapid change of the relevance of IT in society and its role in reaching industry. This can change significantly in the following years due to reduction of costs, raising environmental awareness and advances in electronic communication.



national centers in charge of the promotion and assistance and multilateral organizations dedicated to the promotion of CP adoption.

The CP financing project is taking steps to understand the way in which the financial sector and the banks approach environmental issues. It has been identified that this sector will play an important role in the achievement of sustainable development. Banks attitudes towards environmental performance and policy range from defensive to a sustainable perspective, passing preventive and offensive stages (UNEP 2001a). CP financing activities are a first step to involve the financial sector into CP practices.

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## United States – Asia Environmental Partnership (USAEP)

### 1. General Description

The United States – Asia Environmental Partnership (USAEP) is a cooperative program between the United States and 11 countries in the Asian region: Bangladesh, India, Sri Lanka, Thailand, Malaysia, Singapore, Indonesia, Vietnam, the Philippines, Hong Kong, Taiwan, Korea. USAEP is a regional program, under the leadership of USAID, which works in close relation with USAID missions in each of those countries. Some of the other US organizations involved in the program are the US Environmental Protection Agency and the US Department of Commerce. The objective of the program is to "pursue sustainable change in the way Asia proceeds with the industrial and urban growth necessary to address poverty" (USAEP, 2000). The program has been running since 1992.

Type of program	Description
Public-Private Partnership	Creates linkages and fosters cooperation between 2 countries or regions, involving industrial sectors, business, governments, multilateral and non-governmental organizations. More than using the traditional project-oriented approach, this model wishes to attain large-scale objectives by including private sector involvement and resources.

The USAEP is a broad environmental program that addresses many environmental sectors including cleaner production and pollution control, cooperation for the development of environmental policy and regulations. It aims to develop new activities directed at technology innovation, diffusion and cooperation, fostering a clean revolution and an environmentally improved urban habitat. Based on the premise that Asia still has to implement 80% of its total industrial capacity for 2010, the USAEP program seeks to help the region in the development of a clean industrial system from the bottom up.

### 2. Key elements

The following are key elements on the US-AEP strategy:

- Sharing of ideas and technology between institutions and individuals in Asia and the US
- Generate long-term partnerships that will contribute to the development of both the US industries and Asian countries
- Understand the linkages between industry, commerce and international regulations, as a fundamental aspect of a clean revolution
- Foster technical and other types of cooperation between industrial sectors of the US and Asia, including government, business, multilateral, and nongovernmental organizations
- Expanding the number of institutions involved in the environmental dialogue, including ministers of commerce, economy and development, financial sector and industries

- Incorporating leadership and enrollment as important elements
- Technology and environmental expertise transfer and international commerce
- Foster the implementation of international standard setting programs
- Defining the United States as the referent for environmental quality
- Technological transformation as a key element for an improved environmental performance

### *Emphasis*

For rapid growing economies, focus will be on clean industrial design, technology choice, plant and equipment selection, clean technology and clean production systems. For economies with smaller rates of growth, focus will be on pollution control, waste minimization and pollution prevention. To achieve this objective, the region is going to be supported on the experience of the industrialized countries (Bando, no date).

Country specific approach: Each country has a specific approach, resulting from, among others, specific country assessments. There is a yearly work plan for each country, composed of several environmental projects and addressing the specific national contexts. These national work plans have specific strategies. The projects involved cover several urban and industrial environmental issues, CP/P2 is one of them. Work plans emphasize the projected yearly annual savings for SME projects vs. the actual investment costs.

### *Approach to SMEs*

- Support Industrial Extensions for the Environment, as a type of organization capable of providing assistance to industry in developing technologies, eco-efficiency and cleaner production. An Industrial Extension for the Environment can be found within governmental agencies, government agencies, business or industry associations, consulting groups, academic and educational institutions, non-governmental organizations, and research and development groups. Examples of these organizations are Pollution Prevention Roundtables and National Chambers of Industry.
- Support US companies to transfer environmentally responsible technology to Asian countries, by establishing a technology fund that provides grants of up to \$20,000
- Support self-help environmental management projects including clean technology and cleaner production. Working closely with National Pollution Prevention Roundtables
- Develop Eco-productivity teams that support SMEs
- Linkage between industrial growth and technological transformation
- Priority given to industrial environmental performance
- Corporate disclosure and environmental accountability
- Foster pro-environmental pressures emerging in the marketplace
- Emphasis on technology cooperation and transfer
- Focus on economic and industrial growth and on the relationship between industrial growth and environmental infrastructure.

### 3. Lessons Learned

#### *Private partnerships*

The program have provided the foundations of long term partnerships between institutions in the US and Asia, bringing direct benefits to American business.

#### *Creation of Pollution Prevention Roundtables*

Through the USAEP program, a partnership between the US National Pollution Prevention Roundtable and several countries was created to support the creation of regional and national P2 roundtables in Asia<sup>2</sup>. This project resulted in the creation of 8 national pollution prevention roundtables and one regional (the Asia Pacific Roundtable on Cleaner Production – APRCP). USAEP has been maintaining the linkages with the Asian P2/CP roundtable, to continue pursuing its objective of fostering partnerships for clean development in the region. Some of the challenges in this field identified by the roundtables are: weak public pressure, regulations and incentives for the private sector to implement CP (magnitude of incentives varies greatly across groups – SMEs vs. multinationals); companies still think of CP as a cost – no widespread awareness about potential efficiency gains.

#### *CP Implementation in Urban Context*

The ADB Regional Technical Assistance (RETA) and USAEP work for the promotion of CP policies and practices in India, Indonesia, Philippines, Thailand and Vietnam – looking at translating industrial CP practices to urban context. Some of the key strategies are:

1. Change attitudes and minimize conflict through development of a common understanding of goals and strategies
2. Focus on easy opportunities (low hanging fruit) as pilot projects to build credibility and support on a wider scale
3. Develop partnerships among multiple stakeholders for short and long term efforts to build consensus on issues, policies and projects
4. Develop marketing approach designed to demonstrate comparative advantages and long-term economics of CP activities.

Seven critical elements to enable successful CP implementation in urban areas:

1. Support at **highest** levels
2. Involvement of all relevant stakeholders
3. Development of a policy framework
4. Linking economic to environmental performance
5. Establishment of measurable goals
6. Sufficient financial support
7. Implementation of a focused action plan

#### *General lessons*

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<sup>2</sup> Agreement AEP-0015-A-00-6033, October 1996.

Factors needed for USAEP's "clean revolution" in Asia: national goals are properly articulated, environmental indicators properly configured, public and private incentives properly directed, institutions and institutional systems properly aligned, and technology cooperation and transfer between the modernizing and industrializing countries assured. USAEP programs have a strong engagement with issues related to technology demand, adaptation, innovation, development, and diffusion. It suggests that policies must be designed to create adaptive capabilities rather than simply to encourage its passive acceptance after international transplantation. On the field of technology cooperation, it is important not to focus on one-time hardware transfer, but on on-going relationships to help build capacity for innovating own technical solutions. Build long-term, mutually dependent professional and institutional relationships that assume a larger importance to the more casual or brittle connections between technology providers and users.

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## United States Agency for International Development (USAID)

### 1. General description

USAID has been promoting CP through different programs in several countries. Part of their CP experience is related to the USAEP program. However, this summary will make a brief overview of some of the other experiences of CP funded by USAID. Some emphasis will be placed on USAID projects in Latin America.

#### **USAID/LAC/RSD's:**

The USAID/LAC/RSD's program supports USAID LAC missions on topics related to the adoption of clean technologies. The program has been running since the early 1990s. They support various activities from establishing Clean Production Centers to pilot plan case studies. Specific emphasis has been placed in the Andean region: Bolivia, Ecuador and Peru. Work has also been done in Chile, Mexico, Panama and Jamaica. Some of the projects that have been supported are:

- Center for the Promotion of Sustainable Technologies (*Centro de Promoción de Tecnologías Sostenibles*, or CPTS) – Bolivia
- Andean Region Revolving Loan Fund for Cleaner Production – Andean Region Environmental Committee (COMARA).

#### ***WEC Projects:***

Since early 1990s, with the support of USAID, the World Environment Center has run projects that link the industry with a better environmental performance in several countries in Central and Eastern Europe and the Central Asian Republics: the Industrial Waste Minimization Program. This effort has been done with partner organizations such as the Harvard Institute for International Development, and the financial support of the World Bank, United Nations and Organization for Economic Cooperation and Development, among others. 144 companies participated in the project, with savings of U.S. \$27.1 million per year. It prevented 126,000 tons of hazardous pollutants and 3.8 million cubic meters of contaminated wastewater per year (WEC, 2001).

Three key activities were the main elements of the WEC strategy:

1. Outreach and training
2. Technical assistance
3. Policy reforms

Besides the two above-mentioned programs, several other projects are being developed under Climate Technology Cooperation. These are designed mostly to promote the use of cleaner sources of energy, energy efficiency and the reduction of greenhouse gasses, and they relate in an indirect manner to CP.

## 2. Lessons learned

The USAID experience in the Andean region have shown that CP works, by reducing the costs of production, giving a rapid return on the investments, improving efficiency and competitiveness, reducing operating costs and strengthening the public image of the companies. However, the following barriers have been identified (Arze, 1999):

- Financial constraints: CP financing
- Technical limitations: lack of qualified human resources for auditing and/or implementing projects
- Regulatory framework: current laws encourage end-of-pipe solutions

To overcome these barriers, it has been suggested by the Andean Region Environmental Committee (COMARA) that there is a need for the creation of revolving funds, increased support to Cleaner Production Centers and support legal and regulatory changes. USAID has been supporting the adoption of legal frameworks that support CP in several regions of Latin America.

Currently, a joint effort between USAID and the National Authority of the Environment of Panama is exploring mechanisms to implement international standards and regulations that encourage CP. Although the effort is related to the general regulatory framework, it is sector specific. It is based on specialized assessments to companies looking for CP opportunities. With it, Panama's environmental regulations and industrial sectors are making an attempt to change from an end-of-pipe perspective to a CP perspective (Gagnet, 2000). The result is a series of technical recommendations that can be applied not only to specific sectors, but that can also be part of the regulations and legal frameworks. Many of the recommendations are based on the adoption of *Limites Maximos Permisibles* - LMPs (Maximum Emission Limits), and the strengthening of enforcement capability of these LMPs. The existence of LMPs will force companies to measure all their inputs and outputs, advancing the measurement of environmental costs. The whole experience shows the opportunities for joint work between environmental governmental organizations, industrial sectors and agencies for international cooperation.

### ***Lessons from the WEC Experience (WEC, 2001):***

Regarding Outreach and training:

- Develop a better understanding of the long-term strategic goals by the executing and financing agencies; avoid addressing environmental and business as separate topics
- Emphasize the strong links among environmental management systems (EMS and ISO standards), waste minimization and company profitability and competitiveness
- Develop a more formal coordination mechanism with other donors and organizations that fund and support CP
- Develop a national waste minimization development strategy linked to environmental management systems (EMS). This strategy should integrate the strengths of various donors.
- Case studies are successful and highly interactive methods for training.

- Direct more attention to training for small and medium sized enterprises - SMEs. Even though at the beginning of the program most of the attention was directed towards large companies, with the adoption of ISO 14001 standards SMEs obtained a new relevance due to their significant roles as suppliers.
- A viable environmental consulting sector is critical to adoption of waste minimization practices. The training should not be limited to the company's personnel. It should also foster private consultant activities.

Regarding technical assistance to industry:

- Management commitment and involvement, in all phases of the program, was the most significant factor for successful program implementation. Programs that lacked one of the following three elements failed or suffered: management commitment, worker participation and a systematic approach.
- Successful programs require clear motivations: stressing profitability to management and responsibility and rewards to workers. Profitability was the bottom line motivator, while altruistic motivations to improve environmental performance were not significant.
- US industry experts and technology are well respected; a multinational industrial experience allows the establishment of credibility and trust, fostering good working relationships.
- Pollution Prevention Centers should be established concurrently with industry technical assistance programs. Special attention should be placed on the organizational development, since this is a more complex assignment than the developing of technical skills of personnel.
- Integrate pollution prevention and environmental management systems (ISO 14001).
- Project identification and financing source links are needed.

Regarding policy analysis and development:

- Long-term, multi-level ministry relationships are critical to policy development. It takes between two to four years to establish good working relationships with ministries at decision-making and program implementation levels. This should include not only the ministers of the environment, but also the ministers of trade and economics, among others. Ministers of the environment have little or no influence compared with the others mentioned.

### **.3. Next Steps**

#### ***The US-LAC Environmental Partnership***

USAID is implementing a scheme based on the USAEP experience of Public-Private Partnerships in Latin America and the Caribbean. It will provide a regional approach that will combine the work of the USAID missions of each country with several other governmental agencies in the US.



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# World Bank

## 1. General Description

The World Bank does not have specific programs aimed at implementing Cleaner Production. The following is a brief overview of the types of activities that are in place in their environment projects in general. Their experience has centered on helping governments promote and develop Cleaner Production in industry (World Bank, 1998). Two critical factors are cited in developing effective CP programs:

- External incentives that encourage CP adoption by firms must be in place through government policy and regulation.
- Firms may need assistance in responding to incentives and actually adopting CP practices.

Governments must establish a framework to facilitate the promotion:

- Macro-economic policies that price resources properly, encourage investment in new technology and boost export markets.
- Predictable and flexible regulations that encourage firms to put in most cost-effective pollution management solutions.
- Credible enforcement system.
- Targeted programs to assist firms in CP adoption.

The WB distinguishes between two types of firms – dynamic and static. The former are very responsive to incentives, adopt new technology and management practices that improve productivity and competitiveness. Static firms, typically Small and Medium Enterprises (SMEs) and State-Owned Enterprises (SOEs), are slow to respond to changes and incentives (World Bank, 1998). Some of the reasons behind their reluctance include:

- Environment is a low-priority concern for management
- Other, non-CP projects, may have more immediate returns
- There is a lack of skilled and motivated personnel
- Sourcing financing is usually difficult

Governments should intervene in a focused manner to address specific pollution problems.

- Select sector that is economically important with serious pollution problems to warrant public concern and desire for change.
- Involve all stakeholders (public and private) in developing CP goals and plans.
- Set clear, achievable, measurable objectives that can establish credibility of the program.
- Create appropriate incentives to encourage firms.
- Design specific set of interventions for the sector:
  - Provide alternative technical solutions
  - Provide technical assistance for the implementation
  - Train management, production workers and regulators together
  - Improve access to financing through proposal writing assistance, start-up funds
- Monitor and report progress of the programs

Financing is not usually the critical factor in the adoption on CP. Firms should prepare a comprehensive business plans for the implementation of CP measures. These plans should tackle easy, housekeeping actions first, and where possible use the cost savings to pay for larger investments. Where internal financing can not cover the cost of CP investments, firms should seek financing from normal domestic channels (banks, financiers). External environmental funds must be carefully designed to meet the needs of local businesses as well as consider the institutional, cultural and governmental framework (World Bank, 1998).

Citizen and community participation in identifying pollution that directly affects and demanding change from the offending industrial polluters is viewed as an effective means of accelerating change in industry. Regulatory agencies can also play a role in this by providing a forum for citizen complaints and targeting companies for clean-up activities based on those results (World Bank, 2000).

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## **United States Environmental Protection Small Agency Businesses & Cleaner Production**

### **1. General Description**

The Federal US Environmental Protection Agency (EPA) has worked with the national Small Business Association (SBA) to devise strategies aimed at providing environmental assistance to small businesses. The assistance is in the form of both pollution prevention and regulatory compliance. Since 1996, the Small Business Regulatory Enforcement Fairness Act (SBREFA) has been in effect to create a more responsive environment to small businesses with respect to compliance issues. Even so, small businesses were not being reached and considerable uncertainty existed among that community about seeking assistance (USEPA, 1999a).

### **2. Key Elements**

Between 1993 and 1999 the SBA and EPA launched six state-level pilot projects assisting small businesses with environmental compliance and pollution prevention through existing state Small Business Development Centers (SBDCs). The EPA's Small Business Division and Small Business Ombudsman provide the direct link between the agency and small businesses. The main objective of their activities is to provide a national network that would provide easier access to information about government regulations and programs, including Cleaner Production, improved service delivery and hence better facilitate the adoption of those practices by small businesses. Part of this involves the collaboration among various service providers to provide complementary services that directly meet the needs of small businesses. One caveat about this program is that it includes Cleaner Production within the larger framework of regulatory compliance. Hence, some small businesses were wary of being penalized for non-compliance with environmental regulations should they approach such a system for environmental assistance (USEPA, 2001b).

The EPA has five lines of assistance to small businesses:

- Small Business Ombudsman (SBO) and Small Business Division
- Regional Small Business Liaisons
- Technical programmatic assistance from headquarters and regional offices
- Communications: hotlines, clearinghouses, newsletters , websites
- Compliance assistance centers (virtual telecommunications centers), education programs

The SBO is the center of activity for environmental assistance to small businesses. The office's main functions are:

- advocacy for small business interests
- coordination of environmental assistance activities at all levels of the agency
- development of policies and guidance
- distribution of print and electronic information
- promotion of education and outreach activities

Pollution Prevention efforts, however are coordinated through the Office of Pollution Prevention and Toxics (OPPT). State Pollution Prevention Technical Assistance Programs are another

resource for small businesses. Training, on-site technical assistance, workshops, information exchange are services offered at this level. Training through the EPA Small Business Training is directed towards compliance with the Clean Air Act. Voluntary programs are open to small businesses including the Energy Star, Design for Environment and Environmental Accounting in the area of Cleaner Production.

### **3. Lessons Learnt**

The SBDC pilot projects were launched with the objectives of:

- Providing technical and financial assistance to small businesses for pollution prevention assessments and projects
- Developing and disseminating marketing materials, including financing options and education curricula
- Developing sectoral focus areas
- Formulating pollution prevention modules into guidance for business development plans

The six pilot projects were all conducted in different ways, bringing a variety of actors together to meet these goals. Important recommendations coming out of these pilot projects were:

- Establishing effective leadership for the environmental assistance role at SBDCs, including training these leaders to incorporate environmental needs into standard business counseling
- Focusing on sectors where pollution prevention opportunities are present and under consideration, and where businesses in the sector have extensive links with the SBDCs
- Strengthening cooperative relationships between the SBDCs and all other providers of environmental assistance through comprehensive planning
- Accurately measuring and assessing the performance of the SBDCs with respect to the project goals

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).

The biggest recommendation coming out of the Environmental Assistance to Small Businesses Meeting in December 1999 was to develop a one stop/first stop for sourcing environmental assistance services so that small businesses are not confused by a plethora of options (on a state or regional level). This implies that collaboration among providers would be necessary such as joint marketing of services, concentration on core competencies among service providers and development of common visions and objectives. Strategies aimed at equipping providers with better means to reach small businesses include:

- Devising environmental performance metrics
- Funding collaborative efforts
- Marketing – targeted, innovative methods
- Standardize delivery – protocols, certifications

A resource guide, in both print and electronic formats, for small businesses was subsequently created to provide relevant stakeholders with guidance in this area. In addition, there is a significant allocation of human resources at various levels in the agency towards this purpose (USEPA, 1999b).

### **References:**

USEPA. 1999a. Environmental Assistance to Small Businesses: An Ex-Post Evaluation of SBDC Pilot Projects. USEPA: Washington, DC.

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USEPA. 2001b. Environmental Assistance Services for Small Businesses: A Resource Guide. Office of Policy, Economics and Innovation, USEPA: Washington, DC.

Weiler, Edward. 1998. A Functional Approach to the Design of an Integrated Environmental Assistance Extension System. USEPA/OPPT Concept Paper. Washington, DC: USEPA

Weiler, Edward. 2002. Personal communication via telephone. April 2002.

## **National Pollution Prevention Roundtable (NPPR)**

### **1. General Description**

The US based National Pollution Prevention Roundtable is a national forum for the exchange of ideas and actual services on pollution prevention. The Pollution Prevention (P2) listserv provides an active exchange of ideas and sources of information for practitioners in the field. Committees are often formed to tackle specific issues, such as the Research and Technology Transfer Workgroup. This group examined the hindrances to the wider dissemination of Cleaner Production practices among firms in the US.

### **2. Lessons Learnt**

The committee cites three technology-based challenges to the diffusion of cleaner production:

- no technologies currently exist that will solve the problem
- technology has been developed but is not commercially available
- technology is commercially available but not accepted in the marketplace.

There is some feeling among professionals in the CP community that researchers developing CP solutions do so without on-the-ground knowledge of problems, gaps; e.g. Internet resources solving undefined problems.

Most CP Technical assistance professionals concentrate on information dissemination, as it is more expensive to do more hands-on, site-specific demos, which can however be more effective. CP has had slow diffusion, despite availability of case studies of excellent CP project solutions. Some reasons that account for this –

- “prevention” is a hard sell
- impetus from government regarded skeptically by private sector
- emphasis on creating awareness of CP concepts
- CP is usually optional for companies, so not a high priority

Adoption/rate of diffusion and acceptance of CP innovations influenced by:

- Relative advantage over current procedures
- Compatibility of technology with existing framework, infrastructure
- Perceptions about complexity of new process
- Visibility to potential adopters
- Ability to try out innovations first-hand

Recommendations to increase the rate of diffusion

- Pilot testing CP innovations and other hands-on demonstrations can lead to greater adoption, however this is very resource-intensive.
- Focus on “opinion-leaders” of a local industry can lead to changing thinking of the sector cohort, hence greater willingness to change and accept practices (targeting market leaders vs. “disadvantaged” companies like SMEs).
- Marketing ideas to industry leaders (segment specific) through use of case studies, technical papers and presentations.

- Short demonstration projects at Technical Assistance (TA) site – means having facilities that can support a wide variety of demonstrations – chemical, mechanical, etc.
- Using student interns to work on projects at client site to demonstrate project or need for change.

**Reference:**

Lindsey, Timothy. 1998. Diffusion of P2 Innovations. *Pollution Prevention Review* (Winter) 1-14

Lindsey, Timothy. 1999. Accelerated Diffusion of Pollution Prevention Technologies (ADOP2T). *Pollution Prevention Review* (Spring) 33-37

National Pollution Prevention Roundtable. 2000. “Pollution Prevention Technology Diffusion: The Role of Technical Assistance Providers.” Research and Technology Transfer Workgroup White Paper. September. NPPR



## **The CNP+L of Mexico**

### **1. General Description**

The Centro Nacional de Producción Mas Limpia (CNP+L) of Mexico is part of the UNIDO-UNEP strategy for National Cleaner Production Centers. The center, initiated by UNIDO, currently works with different national and international organizations on CP promotion. Among these are: USAID, CANACINTRA (Camara Nacional de la Industria de la Transformacion). The CNP+L has shown leadership in bringing together different institutions involved with CP in Mexico and in evaluating the current capacity of the country to apply CP initiatives.

### **2. Lessons Learned**

One of the major constraints for the success of CP initiatives in the country is the fact that external environmental costs are not measured or taken into account. Developing industrial and policy frameworks that measure external environmental costs is one of the main challenges for the country. In general, the Mexican experience has demonstrated the following needs in order to achieve success while implementing CP projects:

- Adapt and develop CP methodologies per industrial sector
- Increase the country's capacity to assess enterprises in CP
- Increase the participation of national ministers and an extended number of governmental agencies in CP activities, in particular the agencies in charge of agriculture, commerce and industrial development, economics and finance, health and tourism
- Increase the participation of academia and higher learning institutions
- Increase the participation of private banks in CP activities

The Center 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 demonstrative scale. There is a need to realize CP diffusion on a more widespread scale, and in particular to reach SMEs. The following are some recommendations from the Director of the CNP+L 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.

### ***Training for CP:***

Mexico has identified a lack of CP education among professional curriculums. Currently, the technical education is oriented towards end-of-pipe solutions more than towards prevention. Internal education given to the employees on enterprises is oriented towards the solution of specific need, but there is not a continuous training on preventive approaches (Mexican Pollution Prevention Roundtable, 2<sup>nd</sup> meeting).

### ***Financing CP:***

Financing CP has been identified as one of the mayor bottlenecks for CP implementation. To overcome these difficulties, the following recommendations have been made (Navarez-Jacobo, 2000):

- Promote the notion of CP among the financial and industrial sectors
- Measure the economic benefits of this approach and relate the benefits to payment capacity
- Take into account specific elements of each project while establishing funding procedure. This includes the adoption of several innovative approaches such as leasing.
- Increase the training of personnel in CP from a financial perspective.

### **References:**

Navarez-Jacobo, Jorge. 2000. Necesidades de Financiamiento en el Sector Empresarial Presented at the 1st. Mexican Roundtable on Pollution Prevention. Promoción y Control Profesional, S.A: de C.V.

Roman, Guillermo. 2000. Inventario de Recursos y Actores Relevantes en el Area de Prevención de la Contaminación. Presented at the 1st. Mexican Roundtable on Pollution Prevention.

## Individual experiences in Latin-America

### 1. CP from the perspective of the Americas

The Americas have been building regional alliances and local capacity for CP since the early 1990s. In 1994, the Partnership for Pollution Prevention was adopted by Heads of States under the Summit of the Americas in Miami. This partnership continued through the Summit of the Americas for Sustainable Development (Bolivia, 1996) and the Second Summit of the Americas (Chile, 1998). Subsequently, the Cleaner Production Conference of the Americas gathered for the first time in Sao Paulo, Brazil in 1998. The following is the definition of CP that resulted from this meeting (Letter of Sao Paulo, 1998):

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

- Productive Processes: conserving raw materials and energy, eliminating toxic raw materials and reducing the quantity and toxicity of all emissions and wastes;
- Products: reducing negative impacts along the life cycle of a product from raw materials extraction to its ultimate disposal;
- Services: Incorporating environmental concerns into designing and delivering services.

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

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

The Cleaner Production Conference of the Americas established recommendations to governments, industry and organizations to promote CP in the Americas. The most relevant of these recommendations are:

- Include CP as a guiding principle in current regulations and policies, in order to foster the adoption of CP principles on local, regional and national policies
- Promote the development of partnerships among different levels of government, segments of civil society and type of institutions
- Foster economic and regulatory incentives
- Develop a set of indicators for CP performance and for consumption patterns
- Publicize information on the economic efficiency of CP
- Promote public disclosure on information related with the material usage and pollution created by industries.
- Foster CP awareness among emerging economies
- Encourage the development of a market for CP/P2 technologies and services

The majority of enterprises in Latin America correspond to SMEs. An example of this is Mexico, where SMEs are 90% of the national industry (Sosa-Reyes, 2001). However, there were no specific recommendations with regards to CP in SMEs in the Letter of Sao Paulo. In the following sections of this document, some cases of CP implementation among SMEs will be mentioned.

## **2. Mexico: Fondo de Proyectos de Prevencion de la Contaminacion – FIPREV (FUNTEC) and Environmental Management System of Tlalpan<sup>3</sup>**

FUNTEC is a private foundation linked to CONCAMIN (Comision para la Cooperación Ambiental de Norte America) to support SMEs in their efforts to increase competitiveness. FUNTEC pursues several activities, including financing and technical support. The FIPREV (Pollution Prevention Fund) was originated to provide awareness of:

- Link between environmental performance and competitiveness.
- Multiple benefits of pollution prevention over pollution control

Its main objective is to award credits for environmental assessments aimed at the identification of CP opportunities and their implementation. It is a revolving fund in operation since 1998. Among its current achievements are credits to 40 SMEs. These companies have reduced the environmental impact of their operations and have improved their environmental performance.

The Environmental Management System of Tlalpan is a program developed with the support of the Mexican CNP+L, USAID and PA Consulting Group, aimed to show the viability of local governmental initiatives for CP (Tlalpan Delegation, Mexico D.F.). The program includes the design of an Environmental Management System at a municipal level, the realization of several assessments on cleaner production for hospitals and governmental facilities, and an assessment for efficient use of domestic water and energy.

### ***Lessons learned from the Mexican experience:***

Alejandro Sosa-Reyes, CEO of the GEMI Initiative in Mexico, considers that the following are the major constrains for improvements in environmental performance in SMEs (Sosa-Reyes, 2000):

- SMEs have different priorities than the environmental performance. Some of these priorities are closely related to the basic continuity of the enterprise.
- SMEs have limited human and economic resources.
- Current regulations that apply to SMEs have language that is difficult to understand, based on a combination of technical and legal terms. This is an obstacle for the application of such regulations.

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<sup>3</sup> Additional information about the Mexican experience is available at the summary of the CNP+L of Mexico, project supported by UNIDO-UNEP.

- Current regulation structure makes it difficult to understand their objectives and follow up the results.
- SMEs lack the basic information regarding environmental regulations and mechanism for improvement.
- Lack of environmental benchmarking
- Lack of governmental incentives to continuous environmental improvement
- Environmental procedures are not perceived as investments, due to a lack of information regarding the benefits and lack of quantification of benefits
- Poor governmental tracking of the environmental performance of companies
- Lack of mechanisms to finance environmental initiatives

Some of the recommendations to solve previous identified problems are as follow (Sosa-Reyes, 2000):

1. Take advantage of the direct contact between enterprises and chambers of commerce.
2. Create and use simple checklists to allow companies to identify opportunities for environmental performance and compliance. These checklists should be elaborated jointly between industrial sectors and governmental organizations.
3. Give technical assistance to SMEs, devoting special attention to schemes that deal with CP financing and emphasize the economic benefits of CP implementation.
4. Develop a set of environmental indicators and homogeneous formats among governmental organizations for the measurement of environmental performance.
5. Develop information sharing initiatives to spread information regarding best practices.

### **3. Recent experiences of Cleaner Production Centers in Latin America: Bolivia, Honduras, and Ecuador:**

The Bolivian Vice-Minister of Energy and Hydrocarbons created the Centro de Promoción de Tecnologías Sostenibles (Center for the Promotion of Sustainable Technologies – CPTS) in September 1998. The CPTS is the result of the fusion of previous CP experiences, among them the EP3/Bolivia project funded by USAID. The objective of the CPTS is to give technical assistance to companies in their efforts to implement pollution prevention and energy efficiency strategies. Currently, USAID, WB, and SECO fund the CPTS.

With similar objectives, in August 2000 the Centro Nacional de Producción Mas Limpia of Honduras was founded (National Cleaner Production Center – CNP+L). The first year of the CNP+L was devoted to organizational development and CP activities began in early 2002. The Consejo Empresarial Hondureño para el Desarrollo Sostenible (CEHDES) and the Cámara de Comercio e Industria de Cortés house the CNP+L.



The Centro Ecuatoriano de Producción Mas Limpia (Ecuadorian Cleaner Production Center – CEPL) was created by the Chamber of Commerce of Pichincha, Ecuador. The CEPL is currently providing technical assistance to companies interested on CP, and giving training.

These three Centers have been recently founded, and no lessons learned can be derived from them as yet. These centers have identified difficulties to work with small enterprises due to a lack of personnel and technical capacity. Also, with respect to SMEs, the lack of initial information regarding environmental performance is also a constraint, making it difficult to create the initial baseline that will permit further measurements.

**References:**

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Sosa-Reyes, Alejandro. 2000. Herramientas que Apoyan la Implantación de la Prevención de la Contaminación. Paper of the 1st. Mexican Roundtable on Pollution Prevention.

CNP+L Honduras. 2001. Brochure

## Australian Cleaner Production Experiences

The South Australia has an SME focus in the Small Business Pollution Prevention Project. Small businesses are targeted through neighborhood canvassing efforts (door to door, local press and letters) by local government and water catchment officers (local environmental authorities) inviting them to introductory sessions. These sessions highlight industrial impacts on the environment, as well as the economic and environmental benefits of Cleaner Production. Participants then attend a series of workshops where they are taught how pollution prevention and Cleaner Production methodologies can be applied to their businesses. Working on a neighborhood basis has increased participant's knowledge of each other's activities, as well as develop a network for collective actions.

Partnerships have developed between industry and government, industry and community, industry and NGOs in the pursuit of environmental improvements. The success of those partnerships often depends on the level of understanding about environmental problem sources and solutions among parties.

Flexible learning programs 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, build in-company teams from all departments including management, production, engineering, marketing, environment and research and development.

Reference:

Carnegie, Kashonia, Howard Nielsen, Colin Glover. 1999. Stepping Upstream 'Naturally' for Cleaner Production Through Community Environmental Learning. *Global Competitiveness through Cleaner Production: Proceedings of the 2<sup>nd</sup> Asia Pacific Cleaner Production Roundtable*.

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Scott, J. Ashley, Sunil Heart. 1999. Cleaner Production Education and Training: Flexible Learning Programs for Industry. *Global Competitiveness through Cleaner Production: Proceedings of the 2<sup>nd</sup> Asia Pacific Cleaner Production Roundtable*.

## **Indonesia's Cleaner Production Award Model**

Cleaner Production in Indonesia is comprised of a mixture of policy tools from command and control approaches to self-regulation and market based instruments. Some of the early tools included low interest loans, eco-labels, ISO 14001 certifications, technical assistance on CP and EMS. National commitment to CP was made in 1995, with the national action plan. Demonstration projects were in place a year later in 1996. The Award program was started in 1997 by BAPEDAL, the Indonesia Environmental Impact Management Agency and Germany-based GTZ to provide greater incentives for the adoption of Cleaner Production among enterprises.

Consultation with local stakeholders led to the development of a single award proposed for recognizing achievers above PROPER standards, which is a national environmental management policy. Awards compare companies against others in its industry, and emphasize public and institutional recognition as a source of marketing advantage. Leadership with respect to awareness raising, treatment of the community and employees is an additional criteria, besides Cleaner Production in the selection process.

### ***Award Objectives***

- Incentives to business for adopting Cleaner Production technologies
- Provide marketing advantage to award winners
- Educate businesses on techniques for Cleaner Production in their industry
- Direct public attention towards importance of CP in an EMS

### ***Stages in Developing Award Model***

- Design stages:
  - Review models from other countries
  - Consult with local stakeholders in designing award (industry, university, NGOs, research institutes, sectoral departments).
- Initiation: designate a lead organization, with multi-stakeholder input
- Organizational Set-up: designate steering and technical evaluation committees.
- Establish Base Criteria: focus on implementing CP (Source Reduction), but also compliance with regulations, Management Commitment, responsibility towards workers and community (Leadership).
- Develop Industry Specific Parameters – using both Industry and Cleaner Production experts to develop quantifiable measures
- Develop Application Materials – guidance on the level of details/numbers should be provided
- Market to Prospective Applicants – reaching the relevant enterprises can be culture dependent, but in-person presentations, direct mail and communication through industry associations can be used.
- Scoring and Ranking – onsite verification as component to ensure credibility
- Recognition – formal ceremonies, media attention



- Project Evaluation
- Pilot award with single industry (textiles in 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).

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).

#### References:

Bratasida, Liana and Lynn Helbrecht. 1999. Development of a Cleaner Production Award Model in Indonesia – A Step by Step Approach. *Global Competitiveness through Cleaner Production: Proceedings of the 2<sup>nd</sup> Asia Pacific Cleaner Production Roundtable*.

Helbrecht, Lynn. 2002. Personal contact via telephone re: Indonesian CP Award Program and Washington State CP initiatives.

## Cleaner Production in Sri Lankan SMEs

Sri Lanka's Small and Medium Enterprise Development (SMED) program developed a set of guidelines for encouraging SMEs to adopt Cleaner Production practices. SMEs account for 86% of industries in Sri Lanka, employing 24% of the workforce, and producing 18% of the national GDP. SMEs were defined by the number of employees, and all companies considered have less than 200 employees. Project SMED was established in 1989 as a cooperation between the Federation of Chambers of Commerce and Industry (FCCISL) and Germany-based Friedrich-Naumann-Stiftung (FNSt). The project includes a CP assessment methodology and framework for implementing solutions. These include:

- Getting Management Commitment
- Formation of CP teams from management and workers, and training them in CP and team-building
- Identification of process flows and waste streams
- Data collection and waste quantification
- Identification of problem sources and alternatives
- Selection of priorities

SME specific barriers include:

- Lack of professional management skills
- Poor record keeping
- Concentration of decision-making in few top persons/owners
- Over emphasis on production
- Non-involvement of workers
- Limited technical capabilities and access to technical information
- Limited skilled human capital
- No in-house monitoring
- Deficiencies in maintenance
- Unstable finances
- High cost and low availability of capital for CP

### ***General recommendations***

The CP implementation team at a firm should be comprised of both supervisory level personnel and workers, the actual selection must be based on the characteristics of the company. Management must be pro-active and willing to accommodate recommendations of the CP Team.

The project is trying a “*pay as you benefit*” approach where the project puts the upfront costs and the company repays them when the benefits are realized. On the whole SMEs need better management training, especially in areas like record-keeping, to improve their productivity – CP is only one dimension of this and can be used as a tool to introduce those other concepts.

Cooray, Nihal. 1999. Cleaner Production Assessment in Small and Medium Industries of Sri Lanka. Global Competitiveness through Cleaner Production: Proceedings of the 2<sup>nd</sup> Asia Pacific Cleaner Production Roundtable.

## Taiwan's Cleaner Production Programs

The CP promotion program officially started in 1988, with the concept of industrial waste minimization (IWM) as a tool for solving environmental problems. CP promotion programs have switched from foci on public education, training, information service and technology demonstration, to providing technical assistance and financial incentives in the last few years. Since 1995, voluntary programs such as ISO 14000, responsible care and life-cycle design have been added to programs. Key factors cited in the success of the IWM programs are:

- High-level government policy commitment
- Prominent organization in charge of promotion
- Well-thought promotion master plan – 5-year plans
- Generous government funding to continuously stimulate programs

In awareness building a variety of media are used to spread the concepts of IWM among both industry and the public. Award competitions are another means of identifying and highlighting achievements.

Training focuses on sector-based programs for technical staff and decision makers in industry. In addition, regulatory personnel also received IWM training to apply it to their programs.

Information on the nature, benefits and examples of IWM technologies are necessary. CP opportunity assessment procedures must also be shared with firms. These have been made available through guidance manuals, fact sheets, reports and computer data systems – for locating experts and providing technical information.

Three nonprofit technical organizations are contracted by the Joint Waste Reduction Task Force, to provide free in-depth technical assistance to selected firms, about seven annually per organization. The technical assistance usually includes on-site audits of waste sources, identification and selection of CP opportunities, technical and economic feasibility analyzes of those opportunities.

Research and Development is another focus area. Research is performed to adapt foreign technologies to local applications as well as devise special equipment and processes to meet the needs of local industries. Priority areas in building Taiwan's CP R&D include:

- Establishing national framework for CP R&D
- Improving data and support for decision making
- Increasing availability of technology and encourage innovation
- Increasing training and awareness

As far as financial incentives, local banks provide low interest loans, while government provides investment tax credits and import tariff exemptions on pollution control and CP technology.

## ***SME Focus***

SMEs are defined as firms having less than 200 employees, capital investments less than US\$1.5 million, total assets less than US\$4.5 million. This applies to 96% of the 90,000 firms in Taiwan. The Corporate Synergy System (CSS) is a management approach that forms partnerships along supply chains. Large businesses usually lead the efforts in initiating, organizing and maintaining the system of cooperation to achieve common goals. The Industrial Development Bureau of the Ministry of Economic Affairs guides the program. The IDB directs the Foundation of Taiwan Industry Service and the China Technical Consultants to assist firms in establishing CSS groups, which is free of charge for the firms involved. The IDB must select firms to be centers of CSS groups after an application process, as there are many more applicants than can be supported. The “center” firm in the CSS must commit resources and manpower. The programs have been designed by the center firms to accommodate ~10 “satellite” firms for one year. The central firm usually serves as a model of Cleaner Production 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.

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Chiu, Shen-yann. 2001. Overview of Cleaner Production Programs For Taipei, China’s Manufacturing Industry. *ADB Regional Training Workshop on Promotion of Cleaner Production Policies and Practices*.

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Tang, Yi-Hua, Ruey-Kuang Tseng, Shen-yann Chiu, Charlie Lee. 1999. Promotion of Industrial Waste Minimization Through Corporate Synergy Systems in Taiwan. *Journal of Cleaner Production*. Vol 7. No 5.

## **Cleaner Production in Thailand**

Three Thai initiatives at introducing Cleaner Production among companies in that nation are described here.

### ***Cleaner Technology Information Center***

The Cleaner Technology Information Center (CTIC) was established in 1997 at the Thailand Environment Institute to promote CP. The center was designed to be self-sustaining, and has adopted several innovative strategies to do so. The CTIC was established with the assistance of the Danish Cooperation for Environment and Development (DANCED). The CTIC has a small staff who compile “digested” research according to customer requests, rather than providing public access to information. A proactive approach is taken in anticipating 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. A Working Group from other national CP organizations assisted in developing CTIC’s core competencies to avoid duplication of activities, including networking with other regional organizations to share information. CTIC includes the sale of information as part of its greater group of CP advisory services including training and advice about technology transfer and setting up centers like itself (Parasnis, 1999).

### ***Samut Prakarn Cleaner Production for Industrial Efficiency***

Samut Prakarn Industrial Province houses 5,200 factories in Thailand. In 1997 the Thailand Pollution Control Department introduced the Samut Prakarn Wastewater Management Project to focus on wastewater collection and treatment, as well as implementing pollution prevention and cleaner technology in industries through the Cleaner Production for Industrial Efficiency (CPIE) program (In-na, 1999). The CPIE focus areas were:

- Promotion-recognition/awareness raising  
Workshops for factory owners, engineers, workers, government officers
- Network building among industry and others  
Set-up industry working groups  
CPIE unit conducts industrial efficiency surveys, audits CP performance, assist in developing policy and implementation strategies
- Institution building  
Four years of training with international experts  
Links to national CP policy

A Pollution Prevention Roundtable was used to obtain opinions and contributions of all stakeholders, promote information exchange, forge consensus regarding pollution prevention activities, and provide ongoing forum to promote coordination and cooperation, as well as accelerate the application of pollution prevention. The first conference was held in 1999 (In-na, 1999).

## ***CP Internship Program***

Thailand has also introduced an internship program for undergraduate students to learn about CP concepts and methodology, followed by practical work within companies (Yuvaniyama et al, 1999). This system enables training of the future generation of industry practitioners while providing low cost CP advice to companies and strengthening the relationship between industry and academia. The Cleaner Production Internship Program (CPIP) was first introduced in 1996 through the International Pollution Prevention Partnership with a grant from the US-Asia Environmental Partnership (USAEP). Students, along with their mentors from 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.

Some of the problems encountered were:

- Inability to accommodate all students who applied, especially in different parts of the country
- Too many topics and speakers were presented in the initial training, so in-depth methodologies were not received
- Some mentors did not attend training or spend enough time consulting, failing to build relationships with students and provide useful contact
- Some students had difficulty understanding the foreign, English speaking speakers
- Some factory coordinators did not understand CP concepts and lacked authority to implement proposed solutions
- Some interns did not have enough CP knowledge about the specific industry
- Distance between factories and mentors presented a barrier for interaction.

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