

**ASIAN DEVELOPMENT BANK**

**TAR:PHI 34080**

**TECHNICAL ASSISTANCE**  
**(Cofinanced by the Governments of Norway and Spain)**

**TO THE**

**REPUBLIC OF THE PHILIPPINES**

**FOR THE**

**PROMOTION OF CLEANER PRODUCTION**

**September 2002**

## **CURRENCY EQUIVALENTS**

(as of 1 August 2002)

Currency Unit	–	peso ( <del>P</del> )
₱1.00	=	\$0.0195
\$1.00	=	₱51.180

## **ABBREVIATIONS**

ADB	–	Asian Development Bank
CP	–	cleaner production
DOST	–	Department of Science and Technology
EMS	–	environmental management system
EPI	–	environmental performance indicator
ITDI	–	Industrial Technology Development Institute
SME	–	small or medium enterprise
TA	–	technical assistance

## **NOTE**

In this report, "\$" refers to US dollars.

This Report was prepared by a team consisting of Yue-Lang Feng, Senior Environment Specialist, SEID (Team Leader) and Xinning Jia, Project Economist, SEID.

## I. INTRODUCTION

1. Cleaner production (CP) is the continuous use of preventive and integrated environmental management strategies related to production processes, services, and products to improve an organization's profitability as well as to reduce risks to human health and the environment. CP principles are now widely recognized as one of the major strategies for pursuing sustainable developments. The Government of the Philippines asked the Asian Development Bank (ADB) for advisory technical assistance (TA) to promote CP to industries to strengthen their competitiveness in international and domestic markets and reduce negative environmental impact. In December 2001 and April 2002, ADB missions were fielded to meet with the Department of Science and Technology (DOST) to develop the objectives, scope, costs, implementation arrangements, and consultants' terms of reference for the TA.<sup>1</sup> The TA framework is in Appendix 1. The TA is included in the 2002 TA program for the Philippines.

## II. ISSUES

2. While the Government has placed high priority on economic growth in its development plans, rapid industrialization and population growth have resulted in continued environmental degradation. More notably, industries have engaged in inefficient processes that often discharge untreated waste materials into the environment. Although this is one of the major causes of environmental pollution, industries are still reluctant to establish waste treatment systems because they see them as having additional overhead costs without any return. Such production inefficiencies, and the globalization of markets, may render the Philippines' industries uncompetitive, because their clients and potential clients require and will require them to produce goods in an environment-friendly manner. Small and medium enterprises (SMEs) need more good operating practices to remain competitive in domestic and international markets. They need to upgrade their processes and equipment to minimize wastes to meet national and international standards.

3. In finding a win-win solution to deal with pollution from industrial activities, CP is regarded as one of the promising approaches and consists of a wide range of market-based concepts and practices, such as pollution prevention, opportunity assessment, environmental management system (EMS), waste minimization and clean technology. Employing CP strategy and practice can increase the efficiency of natural resource use, minimize wastes, and reduce pollution and risks to human health and safety at the source. In practice, CP modifies the manufacturing process to reduce manufacturing inefficiencies, resulting in less waste discharge to the environment, better product quality, and cheaper products. By improving overall production efficiency, CP also generates tangible economic savings for a business enterprise. Unlike common waste treatment or "end-of-pipe" technologies that impose a financial burden on industries, CP often pays for itself within a year or so, however this has not been widely disseminated to and acknowledged by industry. The Government has thus developed strategies and policy options<sup>2</sup> to help establish a framework for a more sustainable industrial development scheme. For instance, the Bureau of Product Standards of the Department of Trade and Industry has adopted ISO14001: 1996<sup>3</sup> and associated guidelines for the auditing of EMS as

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<sup>1</sup> The TA was first listed in *ADB Business Opportunities* on 12 February 2002.

<sup>2</sup> ADB provided assistance through a regional TA (ADB. 1999. *Promotion of Cleaner Production Policies and Practices in Selected Developing Member Countries*. Manila) and Philippines, one of the five selected countries participating, prepared a national CP action plan.

<sup>3</sup> ISO14001 is a standard developed by the International Organization of Standards, which specifies requirements for an environmental management system, to enable an organization to formulate a policy and objectives taking into account legislative requirements and information about significant environmental impacts.

Philippine national standards. DOST has been trying to modify the ISO14001 EMS to make its adoption by SMEs easier.

4. As industries are beginning to implement good housekeeping practices to improve their efficiency and reduce waste generation, previous projects have made the industry sector more aware of its role in preserving the environment while increasing its productivity. Nevertheless, the results of these activities have not been fully disseminated, and industries, particularly SMEs, have yet to realize the full benefits of CP. CP has begun to take shape in the country but the spread of its acceptance has been rather slow. Industries could push the limits of CP through technology change, i.e., utilization of more efficient equipment and processes, automation, process optimization, and/or layout changes. Further more, the environmental performance of industries would be improved significantly through adoption of CP, which will improve environmental quality and benefit the poor's living environment.

5. In this regard, TA is needed, as well as more information on available CP strategies and clean technologies appropriate to the country's conditions. Aside from upgrading the technical capabilities of Filipino providers of industrial extension services on CP, the industry sector needs assistance to adopt sector-specific management practices and technologies to upgrade its manufacturing operations. Training manuals and sector-specific best environmental management handbooks may be produced and updated by government agencies to guide industries in adopting CP.

6. The Government needs to support CP integration in industrial activities through industrial development policies that would promote CP. DOST has included the Integrated Program on Cleaner Production Technologies as one of its flagship programs to assist SMEs in adopting appropriate clean technologies. Appendix 2 provides information on assistance provided by international institutions to the Government for industrial pollution reduction. However, these projects focused mainly on industrial surveying, data collection, or preparatory study. Little has been done to demonstrate and evaluate the practicability and effectiveness of CP practices in the country, and to strengthen a government agency's capacity to promote and transfer CP. The TA will focus on these activities to supplement other environmental management initiatives.<sup>4</sup>

### **III. THE TECHNICAL ASSISTANCE**

#### **A. Purpose and Output**

7. The TA's primary purpose is to enhance DOST's capacity to promote sustainable development in the Philippines, and to strengthen the competitiveness of its industry sector through the understanding and adoption of CP practices. The TA will (i) build the capacity of DOST staff, concerned government agencies, and industry to identify, evaluate, develop, and promote CP; and (ii) assist industries, especially SMEs, to adopt an environment management system and practices through training and demonstration programs.

8. The TA's outputs include (i) developing guidelines and tools for local industries to facilitate their adoption of CP practices; (ii) establishing support mechanisms primarily for the industry sector to identify, evaluate, select, and acquire cost-effective technologies for CP; (iii) providing TA to SMEs including CP assessment, training, and demonstration programs; (iv)

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<sup>4</sup> The TA will also support the Metro Manila Air Quality Management Program loan (ADB. 1998. *Metro Manila Air Quality Improvement Sector Development Program*. Manila), by improving industrial efficiency and thus reducing waste production, including air emissions. The TA includes a CP study for the transport sector to examine possible approaches to reducing air pollution of transportation.

preparing a business plan for DOST to promote CP in the country; (v) designing and implementing training programs to improve the technical capacity of CP promotion for staff from the government, industry, and banking sectors; (vi) developing technical manuals on cleaner production for specific industry sectors; and (vii) providing a study tour in one or two similar institute(s) in the region to learn the operation and management of a CP institute.

## **B. Methodology and Key Activities**

9. The TA will develop CP strategies and technical guidelines appropriate to the country to accelerate the adoption of CP by industries, and conduct pilot tests and capacity building training for both government and industries to supplement the Government's current efforts to promote CP. Six key outputs are envisaged under the TA. Their methodology and key activities are described below:

10. **Environmental Performance Indicators (EPIs).** EPIs provide information about an organization's environmental performance. EPIs are classified as management performance indicators and operational performance indicators. EPIs developed in other countries will be reviewed. EPIs appropriate for local SMEs will then be formulated and introduced to selected companies to track their productivity and waste management improvements. The EPIs must be in a form that SME operators can easily understand and relate to their in-plant practices. Twenty SMEs will be selected to pilot test the use of the EPIs. The pilot test results will be used to revise and finalize the EPIs.

11. **CP and Environmental Management Systems for SMEs.** A number of environmental management systems have been developed by different countries and organizations. These existing models will be reviewed and modified to meet the needs of industries in the Philippines. CP-EMS guidelines will be developed to help SMEs choose a generic model that they can identify with, and implement within their resources and available assistance from projects and programs. Ten to twenty industries, including SMEs and the Industrial Technology Development Institute (ITDI) of DOST, if feasible, will be selected to demonstrate the development of the EMS in their management system.

12. **Business Plan for Promotion of Cleaner Production.** A 5-year business plan for ITDI will be developed to ensure the sustainability of CP promotion and adoption in the country. The business plan will address ITDI's key functions and operational goals in terms of CP development and promotion, short- and midterm agenda, information dissemination, training needs, and human resources and budget requirements. The operations of similar institutes in the region will be reviewed and analyzed. A study tour to one or two similar institute(s) in the region will be arranged as part of the capacity building activities.

13. **Environmental Technology Verification Protocols.** Although ITDI has initiated the process of establishing environmental technology verification protocols to identify environmentally sound technologies, the protocols have yet to be tested. The TA will review clean technologies for at least eight industry subsectors (such as metals and allied industrial entities, coconut-based manufacturing, food processing, textiles, livestock, forest-based products), test the evaluation criteria and verification process of the protocol, make appropriate modifications, and present it to industry and concerned government agencies for finalization.

14. **Cleaner Production Technical Manuals.** At least four CP technical manuals will be produced for industry (e.g., furniture making, ceramic production) and services (e.g., transport,

materials handling, utilities) sectors. The manuals, including best environmental management handbooks for sector-specific activities, will supplement the training programs of the TA.

15. **Capacity Building Training Programs.** The TA will review the existing performance management system of DOST, and identify its shortcomings for organization improvement. The TA will identify training needs of stakeholders and design training programs to train approximately 500 staff from DOST, government, industry, banking, and other sectors on CP policies and strategies, environmental management systems and practices, clean technology verification, and conduct of a feasibility study on CP technology. The EMS and environmental technology verification protocols, and their demonstration results will be used as training materials. The participants in the training programs will be requested to evaluate and discuss the appropriateness of the system and the protocols. Identification of potential trainers in the country and a training-for-trainers program will also be included to ensure the sustainability of the TA.

### **C. Cost and Financing**

16. The total cost of the TA is estimated at \$1.12 million equivalent. ADB will provide \$400,000 on a grant basis from the ADB-funded TA Special Fund. The governments of Spain and Norway will also provide grants for \$300,000 equivalent and \$75,000 equivalent, respectively, from the Channel Financing Agreement Facility, to be administered by ADB for activities within the TA scope. The Government of the Philippines will finance \$345,000 equivalent in kind for counterpart staff, office space and provisions, administrative support, services, and logistics. Detailed cost estimates and financing plan are presented in Appendix 3.

### **D. Implementation Arrangements**

17. DOST, as the Executing Agency of the TA, will have overall responsibility for TA management and implementation. A steering committee will be set up to review and advise on the implementation and the results of the TA. The committee will be chaired by the secretary of DOST, and consist of representatives from the departments of Environment and Natural Resources, Energy, Trade and Industry, and Interior and Local Government; industry associations; academe; and professional organizations. The director of ITDI of DOST will be the TA director, responsible for TA implementation.

18. The TA will be carried out in 12 months from November 2002 to October 2003. An international consulting firm associated with domestic consultants will be engaged to undertake the TA. Two to three individual consultants or resource persons will be engaged to prepare technical manuals and special studies for specific industry subsectors. The total consulting services will include 20 person-months of international consulting, and 40 person-months of domestic consulting. Expertise required includes environmental management, industrial ecology, strategic environmental assessment, environmental policy and institutional analysis, environmental economics, environmental engineering, chemical engineering, information technology and public awareness, and business management. The international and domestic consultants will be recruited in accordance with the ADB *Guidelines on the Use of Consultants*. Simplified technical proposals will be evaluated using the quality and cost based selection method for the consulting firm. The consultants will work closely with the TA director. The outline terms of reference of the consultants are in Appendix 4. Equipment required for the TA implementation will be procured in accordance with the ADB *Guidelines for Procurement*, and retained by DOST upon TA completion.

19. The consultants will submit (i) an inception report at the end of the first month, (ii) brief monthly progress reports, (iii) an interim report at the end of the sixth month, (iv) a draft final report at the end of the eleventh month, and (v) a final report within three weeks after the final tripartite meeting. The consultants will submit hard and electronic copies of all the reports to DOST, the steering committee, and ADB. Tripartite meetings including DOST, the consultants, and ADB, will be held after submission of the inception, interim, and draft final reports. The TA outputs will be posted on the ITDI website.

#### **IV. THE PRESIDENT'S DECISION**

20. The President, acting under the authority delegated by the Board, has approved (i) ADB administering a portion of technical assistance not exceeding the equivalent of \$75,000 to be financed on a grant basis by the Government of Norway, (ii) ADB administering a portion of technical assistance not exceeding the equivalent of \$300,000, to be financed on a grant basis by the Government of Spain; and (iii) ADB providing the balance not exceeding the equivalent of \$400,000 on a grant basis to the Government of the Philippines for the Promotion of Cleaner Production, and hereby reports this action to the Board.

### TECHNICAL ASSISTANCE FRAMEWORK

Design Summary	Performance Targets	Monitoring Mechanisms	Assumptions and Risks
<b>Goal</b> Support sustainable development in the Philippines	Cleaner production (CP) strategies and practices adopted by government and industries	Policy dialogue with the Government, represented by Department of Science And Technology (DOST), Department of Energy and Natural Resources (DENR), Department of Energy (DOE), Department of Trade and Industry (DTI), and Department of Interior and Local Governments (DILG)	Political will and commitment to act on pressing ecological issues, coordinated efforts to obtain cost-efficient resources for improving the knowledge base, favorable economic condition in the country, and presence of fiscal and non-fiscal incentives for the adoption of CP
<b>Purpose</b> 1. Strengthen DOST's technical capacity to promote cleaner production  2. Improve the competitiveness of the industry sector	CP guidelines and strategies integrated into DOST's operation plan. Staff trained with CP concepts and promotion skills. CP-related practices adopted by Industries.	Policy dialogue at the national and local levels, targeted stakeholders consultation	Information gaps among industries vary, presenting a challenge to developing guidelines and strategies. Active participation of policy makers and decision makers is also at stake once guidelines are developed.
<b>Output</b> 1. Environmental performance and production indicators (EPIs) formulated  2. Environmental management system (EMS) for SMEs developed  3. Environmental technology verification (ETV) protocol established	EPIs suitable for local industries, including SMEs are screened and formulated. Start: month 2 Complete: month 6  EMS appropriate for local industries, including SMEs developed. Start: month 1 Complete: month 2  EMS pilot-tested with 10-20 industries. Start: month 3 Complete: month 9  Review of ETV protocols developed in other countries. Start: month 1 Complete: month 2  ETV protocols suitable for the Philippines screened. Start: month 2 Complete: month 4	Workshops, progress reports, meetings  Workshops, progress reports, meetings  Workshops, progress reports, review missions, meetings	Availability of information, willingness of SMEs to participate in demonstration project, commitment of SMEs to apply EPIs.  Incomplete information limits the understanding of significant aspects and impacts of SMEs, willingness of SMEs to participate in piloting the implementation of EMS, commitment of SMEs to continue implementation of EMS.  Political will and commitment to act on the developed ETV protocols, coordinated Efforts among concerned agencies in testing the established ETV protocols, and rapid developments in the availability of cleaner technologies might significantly affect the development of protocols



4. Business plan for the Industrial Technology Development Institute (ITDI) developed.	<p>ETV protocols pilot-tested by evaluating clean technologies for 8 industries. Start: month 5 Complete: month 11</p> <p>Operations of similar CP centers or institutes reviewed. Start: month 2 Complete: month 4</p> <p>Short- and midterm operational plan for ITDI identified and Prepared. Start: month 5 Complete: month 9</p>	Workshops, dialogues, progress reports, study tour report, review missions, meetings	Availability of information on operations of CP centers, political will, and commitment in developing and implementing operational plan for ITDI support from other government agencies in implementing the business plan
5. Technical manuals on cleaner production practices produced	<p>Review of technical manuals from at least three countries. Start: month 2 Complete: month 5</p> <p>Manuals introduced and finalized in trainings. Start: month 8 Complete: month 10</p>	Review missions, workshops, trainings, progress reports, meetings	Political will and commitment in developing the CP technical manuals, availability and accessibility of information, willingness of SMEs to apply the developed manuals, SME's operations may be too diversified to form a uniform manual
6. Government and industrial staff trained	500 staff from government, industry, and banking sectors trained with CP concepts, assessment, and verification. Start: month 8 Complete: month 10	Progress reports, training proceedings	Geographical and/or sectoral migration of trained government staff (brain-drain), strategic positioning of trained government and industrial staff in their respective organizations
<b>Inputs</b>			
1. Consultants	International consultants 20 person-months Domestic consultants 40 person-months, \$658,000.	Progress reports, meetings	Consultants have sufficient capability
2. Training programs	Training sessions delivered on CP assessment and verification, \$117,000.	Progress reports, training proceedings	Appropriateness of training programs, sufficient capability to participate in the training programs
3. Government counterpart salaries/logistic support	Counterpart staff and logistic support allocated to the TA, \$345,000.	Progress reports, meetings	Competence and availability of counterpart staff. Availability of logistic support.

## INDUSTRIAL POLLUTION REDUCTION PROJECTS BY INTERNATIONAL INSTITUTIONS IN THE PHILIPPINES

1. **Industrial Efficiency and Pollution Control** (United Nations Development Programme [UNDP], World Bank, Department of Environment and Natural Resources [DENR], 1991). The study proposed institutional, management, economic, regulatory, and financial, and technical measures to establish the conditions to achieve a significant reduction in industrial wastes.
2. **Industrial Environmental Management Project** (United States Agency for International Development [USAID], DENR, 1991–1996). The project aimed to encourage sustainable growth in the industry sector, while reducing industrial pollution and improving human health and the environment. It conducted pollution management appraisals at 150 facilities nationwide to identify pollution prevention opportunities.
3. **Industrial Waste Exchange Program** (USAID, Philippine Business and Environment, 1994 to present). The project promotes resource recovery and recycling in industries. It uses the *Business and Environment* magazine as a tool to disseminate information and maintain a database of industrial wastes.
4. **US-ASEAN Environmental Project** (Association of Southeast Asian Nations, 1995). The project conducted waste reduction assessments of the industry sector (e.g., food, cement, pulp and paper, and iron and steel). In 1999, a United Nations Industrial Development Organization (UNIDO) study evaluated the results of US-Asia Environmental Partnership in pulp and paper, and cement plants in the Philippines. Among the study's preliminary general conclusions were (i) many firms are aware of cleaner production (CP) as a practical means to reduce costs, measuring how much they benefited from it, is difficult; (ii) most firms would not make substantial capital investments in CP, except with new plants; (iii) supportive policy elements are needed in finance, environment, education, and science and technology; and (iv) integrated national CP policy and planning is needed to accelerate adoption of CP.
5. **Green Productivity Program** (Asian Productivity Organization, 1997 to present). The program aims to minimize all pollution sources to achieve continuous improvement and higher productivity in the industry sector. It also tapped the Private Enterprise Accelerated Resource Linkages of the Canadian International Development Agency to develop the program's institutional capabilities.
6. **Industrial Initiatives for Sustainable Environment** (USAID, DENR, 1998–2002). The project aims to (i) promote the widespread use of environmental management systems and pollution prevention practices in industries in the Visayas and Mindanao; and (ii) establish policy incentives to adopt them to enhance stakeholder awareness of CP, and strengthen local consulting capacity to support the adoption of pollution prevention.
7. **Private Sector Participation in Managing the Environment** (UNDP, Department of Trade and Industry-Board of Investments, 1998–2002). The project aims to enhance the (i) business competitiveness in the global marketplace through environmental management, and (ii) private sector's voluntary participation in protecting the environment and reducing pollution of industries. It maintains a database of environmental information (e.g., regulations and clean technologies). It also formulated Business Agenda 21 policy statements for various industries and chambers of commerce.

8. **Environmental Technology Assessment System Preparatory Study** (UNIDO, DENR-Environment Management Bureau, 1997–1998). The study aimed to (i) develop a basic system design and pilot program for the specific needs and situation in the Philippines, and (ii) evaluate the system's potential benefits and financial sustainability. The system is a support mechanism for the industry sector to identify, evaluate, select, and acquire cost-effective technologies for pollution prevention and control.

**COST ESTIMATES AND FINANCING PLAN**  
(\$'000)

<b>Item</b>	<b>Foreign Exchange</b>	<b>Local Currency</b>	<b>Total Cost</b>
<b>A. Financed by the Asian Development Bank<sup>a</sup> and Governments of Norway and Spain</b>			
1. Consultants			
a. Remuneration and Per Diem			
i. International Consultants	412.0	0.0	412.0
ii. Domestic Consultants	0.0	160.0	160.0
b. International and Local Travel	61.0	10.0	71.0
c. Reports and Communications	10.0	0.0	10.0
2. Equipment (Computer, Printer, etc.)	8.0	0.0	8.0
3. Workshops, Training/Seminars, & Conferences			
a. Resource Persons	5.0	0.0	5.0
b. Training Program	0.0	20.0	20.0
4. Study Tour	5.0	0.0	5.0
5. Miscellaneous Administration and Support Costs	5.0	0.0	5.0
6. Contingencies	54.0	25.0	79.0
<b>Subtotal (A)</b>	<b>560.0</b>	<b>215.0</b>	<b>775.0</b>
<b>B. Financed by the Government</b>			
1. Office Accommodation and Transport	0.0	90.0	90.0
2. Counterpart Staff	0.0	170.0	170.0
3. Others	0.0	85.0	85.0
<b>Subtotal (B)</b>	<b>0.0</b>	<b>345.0</b>	<b>345.0</b>
<b>Total</b>	<b>560.0</b>	<b>560.0</b>	<b>1,120.0</b>

<sup>a</sup> From the Asian Development Bank Technical Assistance Special Fund.  
Source: Asian Development Bank estimates.

## OUTLINE TERMS OF REFERENCE FOR CONSULTING SERVICES

### A. Consulting Firm

1. A consulting firm consisting of international and domestic consultants will be recruited to assist in the implementation of the technical assistance (TA). The firm will provide a team of specialists with expertise and experience in promoting and demonstrating cleaner production (CP), environmental management system, waste minimization, technology verification, environmental auditing, institution development, financial analysis for CP, and capacity building with small and medium enterprises (SMEs) in Asia.

2. The inputs of the international consultants will be 16 person-months, including (i) a senior cleaner production (CP) specialist and team leader, who will be responsible for the management and coordination of the TA as a whole, implement TA tasks not covered by other team members, and develop training program; (ii) a Senior environmental policy development specialist to develop a business plan for Department of Science and Technology (DOST) to promote CP; and (iii) an environmental technology verification specialist with expertise and experience in chemical engineering, environmental engineering, cleaner technology, and/or technology evaluation and training to develop and pilot test environmental technology verification protocols. The inputs of domestic consultants will be approximately 32 person-months, including (i) two environmental specialists to assist in the development and demonstration of environmental management system, and financial benefits of CP; and to ensure the guidelines and technical manuals developed are in harmonization with the Government's procedures and regulations, (ii) an institutional specialist to assist in developing the business plan; and (iii) an environment audit specialist to assist in evaluating and demonstrating environmental performance indicators and best technologies for SMEs in the Philippines.

3. The consultants will provide the following outputs:

- (i) pilot models on employing CP-EMS in selected industry sectors;
- (ii) model for a performance-based monitoring system for SMEs to ensure that environmental concerns are properly addressed in their practices;
- (iii) environmental technology verification protocols;
- (iv) CP technical manuals and operational guidelines for selected industrial sectors;
- (v) training model for SMEs and other relevant institutions to promote CP adoption;
- (vi) business plan on the development and promotion of cleaner production; and
- (vii) assess the impact of CP on poverty reduction.

4. The consultants will undertake four tasks.

**5. Task 1—Development and Demonstration of Environmental Performance Indicators (EPIs) and Environmental Management System (EMS) for Industries.** Activities include the following:

- (i) Review related reference materials and all previous, existing, and proposed CP projects in the Philippines. Evaluate lessons learned particularly from previous projects, and identify their implications to (a) legislation, regulation, and enforcement; (b) business operations; and (c) civil society involvement.
- (ii) Identify the economic, social, and psychological driving and restraining forces on CP implementation adoption, inside and outside the Philippines, and provide recommendations on how these forces can be directed or overcome to promote CP adoption.
- (iii) Review and discuss with DOST the preliminary set of EPIs developed by DOST, and prepare a plan to pilot test the EPIs with selected companies, document the pilot test results, and recommend modifications of and finalize the EPIs.
- (iv) Review the EMS developed by DOST, and prepare a plan to demonstrate the development of the EMS in a company management system with 10-20 selected industrial entities and ITDI, if feasible, and modify the EMS based on the demonstration results if necessary.
- (v) Assess the private and social net benefits of the EMS and EPIs.

**6. Task 2—Development of Environmental Technology Verification Protocols.** Activities include the following:

- (i) Review the environmental technology verification protocols developed by DOST, consult with industries, and provide recommendations on revisions if necessary.
- (ii) Identify environmental technology needs for 8 selected industry subsectors and conduct technology scan to screen appropriate technology for the 8 subsectors.
- (iii) Use the protocols to evaluate clean technologies for 8 selected industrial subsectors.
- (iv) Review technical manuals developed for the selected industries in other countries, make appropriate revisions as necessary, and introduce the technical manuals to the selected industry subsectors for best operations.

**7. Task 3—Development of a Business Plan for ITDI.** Activities include the following:

- (i) Review current CP programs and projects implemented by various government agencies, and provide recommendations on consolidation if necessary.
- (ii) Review current functions, including provisions for certification and operational goals of ITDI in terms of CP development and promotion; and identify its roles, performance requirements, and expected benefits of its products and services.
- (iii) Review and analyze the operations of CP centers or institutes in the region and lessons learned from their management.

- (iv) Develop for the center short- and midterm agenda, training needs, an extension services mechanism, and human resources and budget requirements; and provide recommendations on improving linkages and coordination among ITDI and other government agencies, local government units (LGUs), the academe, and industries
- (v) Develop an incentive program that discloses information, promotes best practices, and rewards SME's good environmental performance.
- (vi) Arrange a study tour for two DOST staff to a similar center in the region as part of the capacity building program to learn the actual operation and management of a CP center.

8. **Task 4—Capacity Building Program.** The consultants will undertake the following activities to strengthen the capacity of DOST and other related government agencies, and their beneficiaries (e.g., LGUs, academe, industries).

- (i) Conduct a stakeholder analysis to generate common understanding of the role of each stakeholder, and organize meetings and workshops to ensure stakeholder coordination and involvement.
- (ii) Review the existing performance-based management system in DOST, if any, identify gaps and shortcomings of the system, and make recommendations on how they can be addressed.
- (iii) Identify the capacities required of DOST and related agencies, industries, and the academe; evaluate the current capacities relative to the ideal; and then use that evaluation to identify and address the necessary training needs of these stakeholders.
- (iv) Develop and implement training programs for DOST staff and other government agency personnel. They should be flexible to meet the training needs of the industries, LGUs, academe, etc, and cover CP policies and strategies, environmental management systems and practices, CP technology verification and feasibility study.
- (v) Identify opportunities and constraints to improving training programs, and make recommendations for future training.
- (vi) Develop a trainer's training module, identify potential trainers in the country, and conduct the training for DOST and line government agencies.

9. The consultants will submit the following reports:

- (i) inception report at the end of month 1, covering the (a) mobilization of consultants, (b) detailed work plan (e.g., proposed training schedule), and (c) preliminary review of the works;
- (ii) monthly progress reports documenting major activities over the last month, issues encountered, and activities to be undertaken in the following month;

- (iii) interim report at the end of month 6, covering the (a) draft business plan on the development and promotion of CP; (b) draft EMS, including EPIs, for SMEs; (c) draft technical verification protocols for selected industries; and (d) draft training program;
- (iv) draft final report at the end of month 11, covering overall work achievements which will include (a) the business plan on the development and promotion of CP; (b) the environmental management systems and their demonstrations for SMEs; (c) the technical verification protocols and technical manuals for selected industries; and (d) training manuals on promoting CP; and
- (v) final report within 3 weeks after the final tripartite review meeting.

## **B. Individual Consultants**

10. One to two international individual consultants will be selected to conduct special studies for specific topics, such as CP in transport sector, which may include air emissions reduction, waste disposal and passenger safety. A total input of 4 person-months will be required.

11. The international consultants will have expertise in cleaner production, environmental management and engineering, chemical engineering, energy efficiency, and/or environmental auditing, and experience in developing CP practices for related industry or service sectors.

12. A research assistant of 8 person-months will be provided to assist the international consultants to conduct the special studies. The domestic consultant will have expertise and experience in promoting CP, environmental management system and CP training with industry or service sectors in the Philippines.

13. The international consultant will, for each special topic,

- (i) undertake an in-depth review of the general technical operations of the selected sector in the country, conduct a field visit, and identify its weakness and environment-related issues;
- (ii) review successful stories in the region and available reference materials, and identify the applicability of CP practices to the selected sector in the Philippines; and
- (iii) develop recommendations on time-bound actions in final report for the implementation of CP practices for the selected sector.

14. The research assistant will conduct the following work:

- (i) assist the international consultants in collecting related information materials for the selected sectors;
- (ii) help the international consultants to identify survey to be carried out in the field, and arrange and help to conduct field visits;
- (iii) assist the TA steering committee to coordinate the TA activities; and
- (iv) assist ADB staff to organize various TA activities and manage the TA.