

**Japan International Cooperation Agency (JICA)**

No.
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**Malaysia**

**SIRIM Berhad**

**The Study  
on  
Promotion of Cleaner Production  
in Industrial Sector**

**Final Report**

**September 2002**

**Mitsubishi Chemical Engineering Corporation**

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## Preface

In response to a request from the Government of Malaysia, the Government of Japan has decided to conduct the Development Study on Promotion of Cleaner Production in Industrial Sector and entrusted the study to the Japan International Cooperation Agency (JICA).

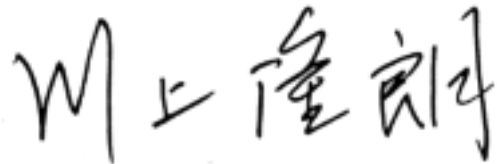
JICA sent a study team, led by Mr. Shigeo Aoki, Mitsubishi Chemical Engineering Corporation, to Malaysia seven times from November 2000 to August 2002.

The team held discussions with the officials concerned of the Government of Malaysia and conducted related field surveys. After returning to Japan, the team conducted further studies and compiled the final results in this report.

I hope that this report will contribute to promotion of Cleaner Production as well as abatement of industrial pollution in Malaysia and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Malaysia for their close cooperation throughout the study.

September 2002

A handwritten signature in black ink, consisting of stylized Japanese characters, likely reading '川上隆郎' (Kawakami Takao).

---

Takao Kawakami

President

Japan International Cooperation Agency

September 2002

Mr. Takao Kawakami  
President  
Japan International Cooperation Agency  
Tokyo, Japan

**Letter of Transmittal**

Dear Sir,

We are pleased to submit to you the final report of “The Study on Promotion of Cleaner Production in the Industrial Sector”.

This study has been conducted aiming at the reduction of industrial pollution through promoting Cleaner Production (CP) in Malaysia and consists of two parts: technical study and policy study.

The technical study conducted a pilot project for CP promotion, which included introduction of CP equipment at selected model factories. CP demonstration projects, which were executed at four model factories selected out of electroplating, aluminum anodizing, food processing and textile sub-sectors, have proved that CP is an effective measure that brings about the reduction of industrial pollution burden as well as improvement of productivity.

On the other hand, however, various barriers exist that prevent industries from investing in CP in Malaysia. The policy study worked out and proposed measures and action plans for promotion of CP, which consist of development of national strategy/policy, awareness raising about CP among industries, access to technology/services, incentives, strengthening of regulatory policy framework and capacity building of related organizations.

The Study Team expects that these proposals be put to their best use to facilitate the promotion of CP in Malaysia in the near future.

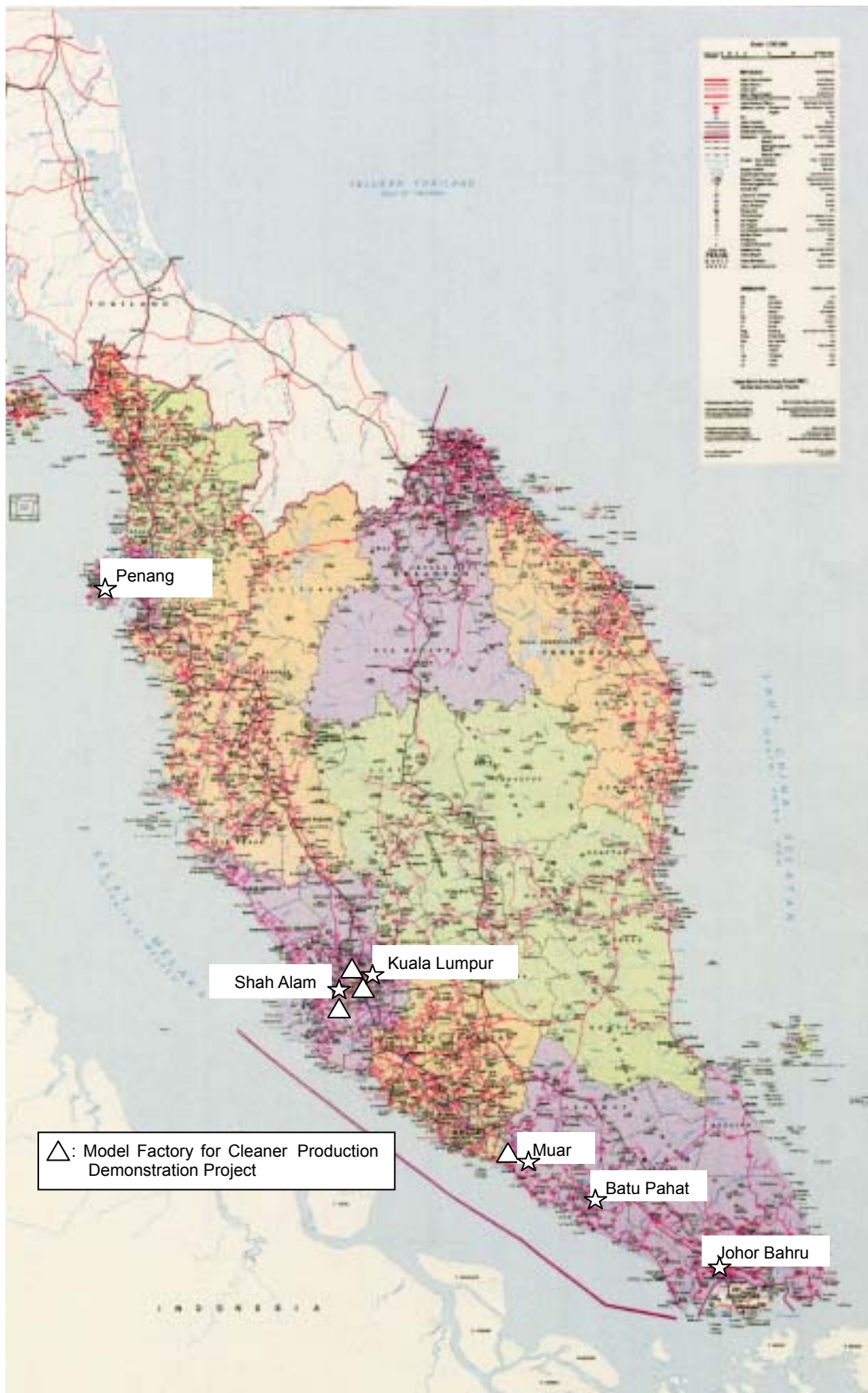
We would like to express our sincere appreciation to the Japan International Cooperation Agency, the Ministry of Foreign Affairs and the Ministry of Economy, Trade and Industry for the support and assistance received while carrying out this project. We also would like to express our deepest gratitude to all those who extended their kind assistance and cooperation to the Study Team, in particular the officials concerned from the counterpart of this Study, SIRIM Berhad, the Economic Planning Unit (EPU), the Ministry of Science, Technology and Environment (MOSTE), the Department of Environment (DOE), and the Ministry of International Trade and Industry (MITI), and the management and staff of the model factories and representative enterprises surveyed and relevant organisations.

Yours sincerely,

Shigeo Aoki  
Team Leader

The Study on Promotion of Cleaner Production in the Industrial Sector

## Study Area (Peninsular Malaysia) Map



## **OUTLINE**

### **1. Introduction**

In response to the request from the Government of Malaysia (GOM), Japan International Cooperation Agency (JICA) concluded the Scope of Work (S/W) on 13 July 2000 regarding the implementation of the Development Study on Promotion of Cleaner Production (CP) in Industrial Sector. This Study has been executed in accordance with the S/W and the Minutes of Meeting (M/M) concerning the S/W in close cooperation with SIRIM Berhad.

The objective of this Study is to contribute towards the abatement of industrial pollution in Malaysia by:

1. Promoting CP through capacity building of SIRIM and other related institutions and human resources; and
2. Making recommendations and an action plan for CP promotion .

The Study covers the following:

- (i) Review of present situation of industrial pollution control;
- (ii) Analysis of industrial pollution in the targeted sub-sectors;
- (iii) Survey for representative factories;
- (iv) Pilot activities for the promotion of CP:
  - Demonstration projects at model factories
  - Dissemination of CP information;
- (v) Comparative analysis on CP promotion measures; and
- (vi) Recommendations on measures and action plan for the promotion of CP and industrial pollution control.

### **2. Summary of Achievement of the Pilot Project for Promotion of CP**

CP Demonstration Projects were conducted by introducing CP equipment to the following four model factories in different fields:

Electroplating: Metal Polishing Industries Sdn. Bhd.

Aluminum anodizing: Perusahaan TGB Sdn. Bhd.

Food: Winner Food Industries Sdn. Bhd.

Textile: South Asia Textiles (M) Sdn. Bhd.

CP equipment introduced to the four model factories proved the function originally

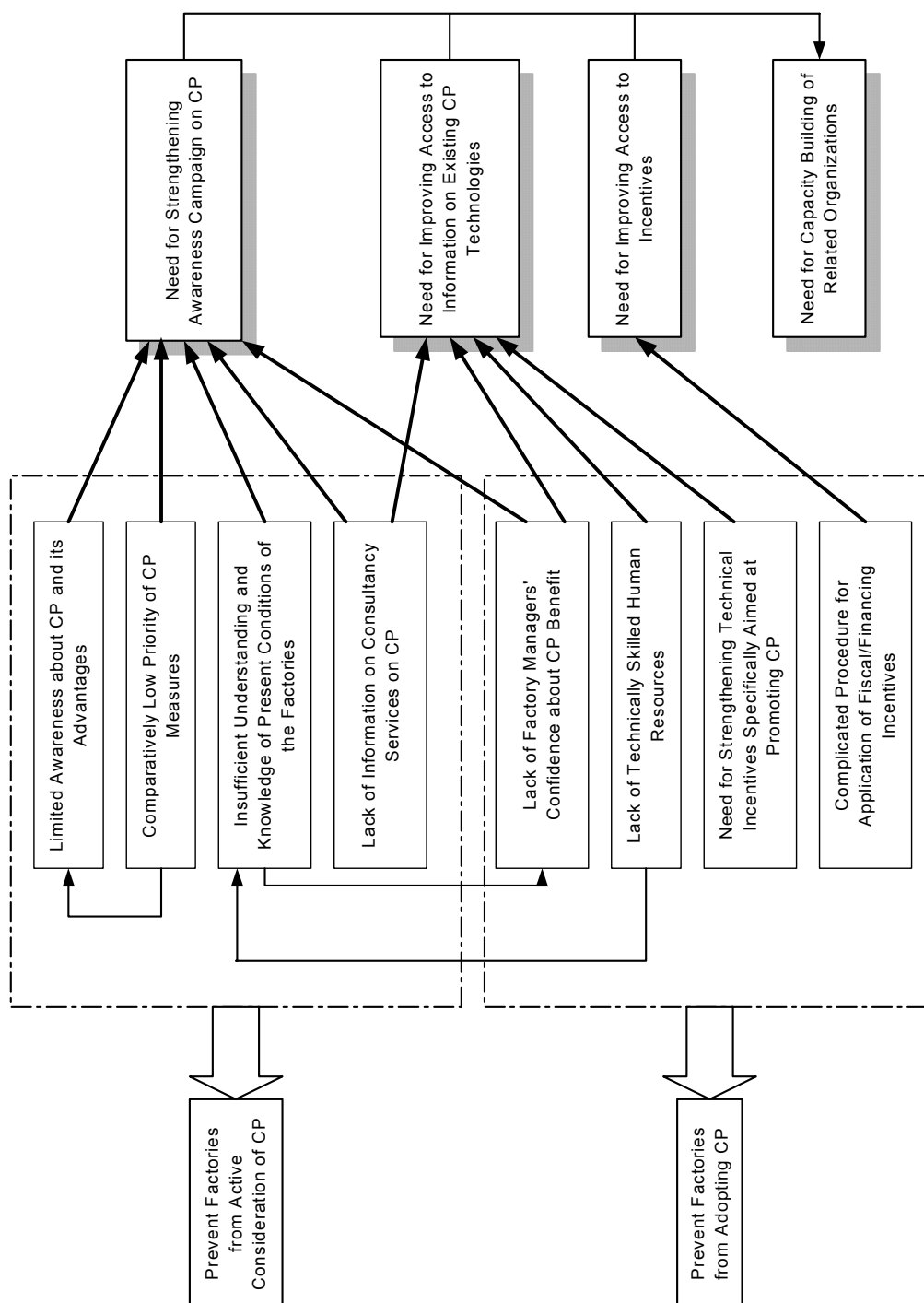
intended. and the The targeted factories will enjoy benefits of improved productivity and product quality while complying with environmental regulations. Additionally, the nation will enjoy the benefit of reduced consumption of precious resources as well as environmental preservation.

On the basis of the achievement of the demonstration projects, it is desirable that appropriate measures be taken to promote the adoption of CP.

### **3. Summary of Proposed Measures**

For promoting CP in the industrial sector, there exist various barriers such as lack of information and knowledge on CP and human resources in enterprises, insufficient access to existing incentives, and lack of implementing rules and provisions relating to CP or waste minimisation practices. Therefore, CP cannot be promoted through a single measure; instead, it is extremely necessary to work out and implement comprehensive measures.

Figure-1 shows how the issues, which factories are currently facing to, are to be incorporated into CP promotion strategy.



**Figure -1 Relation between Issues of SMIs and CP Promotion Measures**



In this Study, measures for promotion of CP mainly in SMIs have been studied and are proposed on the following basis:

It is expected that large industries can implement CP measures by themselves, and

It is expected that large industries can comply with the environmental regulations through command-and-control .

Followings are the set of measures proposed:

- i) Development of National Strategy/Policy on CP
- ii) Awareness Campaign, Networking and Dissemination of Information
  - Demonstration programme
  - Campaign on Benefit of CP and Incentives
  - Industrial Association and NGO
  - CP National Roundtable
- iii) Access to CP Technology/Service
  - Training Programme for Corporate Manager, Engineer and Operator
  - CP Audit
  - Training Programme for CP Auditor
  - Certifying CP Auditor
  - Registration of CP Auditor
  - ESCO (Energy Service Company)
- iv) Incentives
  - Improve SMI Access to Incentives
  - Promote CP Investments through MIDA Incentives
  - Improve Access to and the operation of the Existing Financing Schemes
  - Award System
- v) Strengthening the Regulatory-policy Framework
  - Wider Application of Contravention Licenses
  - Self-environmental Auditing/Monitoring
  - Self Disclosure
  - Energy Efficiency Regulation
  - Economic instruments
- vi) Capacity Building

#### **4. Summary of Proposed Action Plan for CP Promotion**

Chapter 4 in the Report presents action plans for CP promotion, which are comprised of formulating the national policy/strategy, awareness raising in enterprises, improvement of access to technology/services, strengthening the regulatory policy framework, and

capacity building of related organisations. The following summarises actions to be taken by each institution.

**(1) Economic Planning Unit (EPU)**

- (i) Take an initiative to formulate the national CP strategy/policy on a short-term basis; and
- (ii) Work out and secure a new funding system for promoting CP demonstration programmes.

**(2) Ministry of Science, Technology and Environment (MOSTE)**

- (i) Participate in the activities lead by EPU for formulating the national CP strategy/policy;
- (ii) Institutionalise regulations related to the self environmental-monitoring and reporting system, and the system of accreditation and registration of CP auditors; and
- (iii) Work out and secure a new funding system for promoting CP demonstration programmes; and

**(3) SIRIM Berhad**

- (i) Participate in the activities lead by EPU for formulating the national CP strategy/policy;
- (ii) Campaign for the scheme of CP audits and CP demonstration prgrammes, and for the system of accreditation and registration of CP auditors;
- (iii) Conduct CP audits and CP demonstration projects as a main implementing agency;
- (iv) Establish and strengthen the CP network with industrial associations by creating CP forum etc.;
- (v) Conduct planning and coordination activities regarding preparation of a consistent system for CP training programme, prepare and implement training programmes for enterprises and CP auditors; and
- (vi) Establish and activate the National CP Centre.

**(4) Department of Environment (DOE)**

- (i) Participate in the activities lead by EPU for formulating the national CP strategy/policy;
- (ii) Prepare guidelines for environmental auditing, monitoring and reporting system and conduct training for enterprises;
- (iii) Collect, evaluate and analyse basic data from enterprises based on the

environmental monitoring and reporting system and set up benchmarks in collaboration with MITI;

- (iv) Campaign for the scheme of CP audits and CP demonstration programmes;
- (v) Create an Environmental Manager System and introduce a certification and examination system for Environmental Managers;
- (vi) Conduct training for enterprises and environmental consultants on the Environmental Manager System;
- (vii) Establish a Pollution Prevention Partnership (P3) committee;
- (viii) Conduct campaigns for the accreditation and registration system for CP auditors and accreditation and registration of CP auditors based on a state exam; and
- (ix) Create and implement a CP promotion award system.

**(5) Ministry of Finance (MOF)**

- (i) Participate in the activities lead by EPU for formulating the national CP strategy/policy from the point of view of tax incentives.

**(6) Ministry of International Trade and Industry (MITI)**

- (i) Participate in the activities lead by EPU for formulating the national CP strategy/policy; and
- (ii) Set up benchmarks in collaboration with DOE,

**(7) Ministry of Housing and Local Government (MHLG)**

- (i) Participate in the activities lead by EPU for formulating the national CP strategy/policy from the point of view of waste recycling;
- (ii) Include a provision of efficient recycling of waste in the draft of Solid Waste Act; and
- (iii) Set up a clear target for waste recycling.

**(8) Malaysia Industrial Development Authority (MIDA)**

- (i) Participate in the activities lead by EPU for formulating the national CP strategy/policy from the point of view of industrial development promotion;
- (ii) Clarify and add new descriptions indicating that the existing MIDA tax incentives are applicable to environmental and CP investment in the brochure;
- (iii) Provide easy access for SMIs to MIDA and assist SMIs in completing procedures and forms to apply for tax incentives;
- (iv) Conduct training for MIDA officers on CP implementation in order to

- support SMIs; and
- (v) Create incentives for energy conservation promotion.

**(9) SMIDEC**

- (i) Participate in the activities lead by EPU for formulating the national CP strategy/policy from the point of view of SMI development programme;
- (ii) Conduct CP training programmes for financing organisations;
- (iii) Conduct campaign for incentives for CP audits;
- (iv) Improve access to incentives by preparing a brochure on the existing ITAF and factory audit scheme applicable to CP implementation and shortening the application procedure for such incentives; and
- (v) Conduct training for SMIDEC officers on CP implementation in order to support SMIs.

**(10) MECM**

- (i) Gazette the regulations for energy efficient use.

**(11) Energy Commission**

- (i) Participate in the activities lead by EPU for formulating the national CP strategy/policy from the point of view of promoting energy efficiency improvement;
- (ii) Manage enforcement of regulations for energy efficient use and the energy manager system; and
- (iii) Prepare standards and guidelines for energy conservation and promote the implementation of energy audits on a mid- and long-term basis.

**(12) Financing Organisations**

- (i) Provide easy access to financing schemes for SMIs' CP investment by clarifying applicable schemes among various schemes and conduct campaigns for CP financing; and
- (ii) Conduct training for bankers to strengthen awareness on environmental issues and CP.

**(13) Other Organisations**

- (i) Industrial Associations and NGOs are to cooperate with SIRIM and DOE in establishing a CP information network;
- (ii) Industrial Associations, NPC, FMM and/or NGOs are to cooperate with SIRIM in preparing and conducting CP training programmes;

- (iii) Industrial Associations are to cooperate with SIRIM, DOE and other organisations in disseminating CP information ; and
- (iv) Industrial Associations are to cooperate with DOE in conducting the CP promotion award system.

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## **LIST OF ABBREVIATION**

3F	Fund for Food
5S	Seiri, Seiton, Seiketu, Sisou and Shituke
ACA	Accelerated capital allowance
ADA	Accelerated depreciation allowance
AECCOM	Association of Environmental Consultants and Contractors of Malaysia
AFTA	ASEAN Free Trade Area
AIA	ASEAN Investment Area
APEC	Asia-Pacific Economic Cooperation
APHA	American Public Health Association
API	Air Pollution Index
APO	Asian Productivity Organisation
ASEAN	Association of South-East Asian Nations
ASEM	Asian-Europe Meeting
As	Arsenic
BCIC	Bumiputera Commercial and Industries Community
BFW	Boiler Feed Water
BMI	British-Malaysia Institute
BOD	Biochemical Oxygen Demand
CCM	Computerised Colour Matching
CEAR	Centre of Environmental Auditors Registration in JEMAI
CETEC	Centre for Environmental Technologies
CFC	Chlorofluorocarbon
CGC	Credit Guarantee Corporation
CJC	Clean Japan Centre
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CP	Cleaner Production
CPIG	Cleaner Production Interest Group
CRDF	Commercialisation of Research and Development Fund
CT	Cleaner Technology
CTES	Cleaner Technology Extension Service in SIRIM Bhd
CTIS	Cleaner Technology Information Service in SIRIM Bhd
CTRM	Composite Technology Research Malaysia
Cr	Chromium
Cu	Copper
DANCED	Danish Cooperation for Environment and Development
DO	Dissolved Oxygen
DOE	Department of Environment

DPPS	Doktrin Perancan dan Pembangunan Sejagat
ECCJ	Energy Conservation Centre, Japan
ECOTECH	Economic and Technical Cooperation
ECR	Export Credit Refinancing
EETC	Environmental and Technology Centre in SIRIM Bhd
EIA	Environmental Impact Assessment
EMAS	Environmental Institute of Malaysia
EMS	Environmental Management System
ENSEARCH	Environmental Management and Research Association of Malaysia
EOP	End-of Pipe
EPRM	Environmental Professionals Register of Malaysia
EPU	Economic Planning Unit
EQA	Environmental Quality Act
EQC	Environmental Quality Council
EQR	Environmental Quality Report
ESCO	Energy Service Company
FA	Factory Automation
FAO	Food and Agriculture Organisation of the United Nations
FDI	Foreign Direct Investment
FMM	Federation of Malaysian Manufacturers
GDP	Gross Domestic Product
GOM	Government of Malaysia
GTZ	German Deutsche Gessellschaft fur Technishce Zusammenabeit
HACCP	Hazard Analysis and Critical Control Point
HO	Helium Oxide
HRDF	Human Resource Development Fund
HTML	Hyper Text Make-up Language
Hg	Mercury
IAA	Industrial Adjustment Allowance
ICT	Information and Communications Technology
IGS	Industrial Research and Development Grant Scheme
IKLAS	Institut Kemahiran Dan Latihan Alam Sekitar (Environmental Skill and Training Institute)
ILP	Industrial Linkage Programme
IMP2	Second Industrial Master Plan
INTAN	National Institute of Administration
IPCAJ	Industrial Pollution Control Association of Japan
IRG	Industrial Rubber Good
IRPM	Integrated Resources Planning and Management
ISIF	Industrial Structure Improvement Fund (in Japan)
ISO	International Standardisation Organisation

ITA	Investment Tax Allowance
ITAF	Industrial Technical Assistant Fund
ITB	Invitation to Bidder
IWK	Indah Water Konsortium Sdn. Bhd.
JAB	Japan Accreditation Body for Conformity Assessment
JBE&G	Jabatan Bekalan Elektrik and Gas
JBIC	Japan Bank for International Cooperation
JEC	Japan Environment Corporation
JEMAI	Japan Environmental Management Association for Industry
JICA	Japan International Cooperation Agency
JIPM	Japan Institute of Plant Maintenance
JIS	Japan Industrial Standard
JMA	Japan Management Association
JMTI	Japan-Malaysia Technical Institute
JUSE	Union of Japanese Scientists and Engineers
KA	Kualiti Alam Sdn. Bhd.
LCA	Life Cycle Assessment
M/M	Minutes of Meeting
MAESCO	Malaysian Association of Energy Service Company
MAS	Modernisation and Automation Scheme
MASM	Malaysia Environmental Week
MATRADE	Malaysia External Trade Development Corporation
MAWAR	Malaysian Agenda for Waste Reduction
MBI	Market-Based Instruments
MEC	Malaysian Energy Centre
MECM	Ministry of Energy, Communication and Multimedia
MEPS	Minimum Efficiency Performance Standard
METI	Ministry of Economy, Trade and Industry
MFI	Malaysia-French Institute
MIDA	Malaysian Industrial Development Authority
MIDF	Malaysian Industrial Development Finance Berhad
MITI	Ministry of International Trade and Industry
MNC	Multinational Company
MOSTE	Ministry of Science, Technology and Environment
MSC	Multimedia Super Corridor
MSDS	Material Safety Data Sheet
MTCP	Malaysian Technical Cooperation Programme
MTDC	Malaysian Technology Development Corporation
MTR	Mid-Term Review
Mn	Manganese
NEF	New Entrepreneur Fund

NERP	National Economic Recovery Plan
NGO	Non-governmental Organisation
NPC	National Productivity Corporation
Ni	Nickel
OA	Office Automation
ODA	Official Development Assistance
OJT	On-the-Job Training
P3	Pollution Prevention Partnership
PAA	Poly Acryl Amide
PAKSI	Financial Package for SMI
Pac	Poly Aluminum Chloride
PCM	Pollution Control Manager (in Japan)
PR/R	Progress Report
PSC	Project Steering Committee
PTM	Pusat Tenaga Malaysia (Malaysian Energy Centre)
Psi	Pound per Square-inch
QCC	Quality Control Circles
QES	Quality Enhancement Scheme
R&D	Research and Development
RA	Reinvestment Allowance
RC	Reinforced Concrete
RE	Renewable Energy
RM	Ringgit Malaysia
RO	Reverse Osmosis
S/W	Scope of Work
SET	Science, Engineering and Technical
SG	Specific Gravity
SIER	Sewage and Industrial Effluents Regulation
SIRIM	SIRIM Berhad
SME	Small and medium scale enterprise
SMIAN	SMI Association of Malaysia
SMIDEC	Small and Medium Industry Development Corporation
SMIDP	Small and Medium Industry Development Plan
SMIPP	Small & Medium Scale Industry Promotion Programme
SMIs	Small-and Medium-sized Industries
SS	Suspended Solid
Study	Study on Promotion of Cleaner Production in Industrial Sector
TAF	Technology Acquisition Fund
T/C	Polyester/Cotton
TDA	Tioman Development Authority
TDS	Total Dissolved Solid

TIKS II	Fund for SMIs II
TOR	Terms of Reference
TPIKS	Rehabilitation Fund for SMEs
TPM	Technology Park Malaysia
TPM	Total Productivity Maintenance
TQC	Total Quality Control
TQM	Total Quality Management Scheme
TRIPS	Trade-Related Intellectual Property Rights
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
URL	Uniform Resource Locaor
US-AEP	United States-Asia Environmental Partnership
UTM	University Technology Malaysia
W	Watt
WHO	World Health Organisation
WQI	Water Quality Index
WRPC	Water Re-use Promotion Centree
WTO	World Trade Organisation
Wh	Watt Hour
Zn	Zinc
pH	Symbol of acidity and alkalinity
$\mu$ S/cm	Micro Siemens per Centimeter

## **CHAPTER 1**

### **BACKGROUND AND OBJECTIVES OF THE STUDY**

## **CHAPTER 1 BACKGROUND AND OBJECTIVE OF THE STUDY**

### **1.1 Background to the Study**

The average GDP growth rate in Malaysia has been 7-8 % during the 10 years until 1997 and the economy is on recovery from Asian economic crisis. Foreign investment in the industrial sector has increased, particularly after the deregulation in 1986 on foreign investments for export-oriented projects. In addition, Malaysia is aggressively promoting economic and industrial development, with the aim of becoming a fully-developed nation by the year 2020. However, economic development has been accompanied by a big social problem of industrial pollution such as air and water pollution, caused by exhaust gas, wastewater and other waste from factories.

Whereas End-of-Pipe (EOP) technology, which has been conventionally utilized in pollution prevention, treats pollutants by using treatment facilities at the final stage of production, CP technology provides an improvement in productivity as well as the reduction of pollutants discharged, through the improvement of the production process itself. Such a win-win approach can give factories the incentive to adopt CP as an industrial pollution prevention measure. The Government of Malaysia (GOM) is aiming to promote production technologies that bring about less environmental impact, and stated “the promotion of Cleaner Technology” in the environmental control section of the Seventh Malaysia Plan (1996-2000.)

Under these circumstances, in response to the formal request from the GOM in October 1998 regarding the execution of the Study on Promotion of Cleaner Production in the Industrial Sector, JICA dispatched a preliminary study team in July 2000. After confirmation of request background and discussion on the details of the Study with SIRIM and other Malaysian parties concerned, JICA and SIRIM signed the framework document, the Scope of Work (S/W) and the Minutes of Meeting (M/M), on 13 July 2000 regarding the implementation of the Development Study on Promotion of Cleaner Production in Industrial Sector. This Study is to be executed in accordance with the S/W and the M/M.

### **1.2 Objective of the Study**

The objective of the Study is;

To contribute towards the abatement of industrial pollution in Malaysia by:

- i. Promoting CP through capacity building of SIRIM and other related institutions and human resources; and
- ii. Making recommendations and an action plan for promotion of CP.

### **1.3 Scope of the Study**

The Study covers the following:

- i. Review of present situation of industrial pollution control including CP;
- ii. Analysis of industrial pollution in the targeted sub-sectors;
- iii. Survey for representative factories;
- iv. Pilot activities for the promotion of CP;
  - (a) Demonstration projects at model factories;
  - (b) Dissemination of CP information
- v. Comparative analysis on CP promotion measures;
- vi. Recommendations on measures and action plans for the promotion of CP and industrial pollution control.



## **PART 1**

### **PROPOSED MEASURES AND ACTION PLAN FOR PROMOTION OF CLEANER PRODUCTION (CP)**

**National Roundtable on Cleaner Production**  
27 August 2002 at Pan Pacific Glenmarie Resort Shah Alam



Welcoming Address by Mr. Juichiro Sasaki,  
Deputy Resident Representative, JICA Malaysia



Opening Address by Dato' Dr. Mohd Ariffin Hj Aton,  
President & Chief Executive, SIRIM Berhad



Keynote Address 1: Success Stories of CP in Asia-Pacific Region  
Mr. Yuji Yamada, Asian Productivity Organisation



Keynote Address 2: European Experience in the Promotion of Cleaner Production  
Mr. Kristian Lauritsen, NIRAS Consulting



Keynote Address 3: Japanese Experience in Cleaner Production  
Mr. Shigeo Aoki, JICA Study Team



Introduction of the proposed National Strategic Action Plan on Cleaner Production  
Dr. Yeoh Bee Ghin, SIRIM Berhad

**Workshop on Cleaner Production Strategic Action Plan**  
30 May 2002 at Grand BlueWave Hotel Shah Alam



**CHAPTER 2**  
**PRESENT STATUS AND ISSUES**

## **CHAPTER 2 PRESENT STATUS AND ISSUES**

### **2.1 Cleaner Production (CP) in Malaysia**

#### **2.1.1 CP Promotion Activities**

##### **(1) Background**

Cleaner Production (CP), as a win-win approach that brings profit to both enterprises and government, has many advantages over End-of-Pipe technologies in aiming at industrial pollution prevention, especially in developing countries. While CP brings cost reduction and profit increase for enterprises through productivity improvement, improvement of public image as enterprises responsible for environment, better access to special funds, decrease of business risk by resulting strengthened regulations, and improved competitiveness in the international market, it also helps to reduce monitoring costs for the government.

In Malaysia recent changes in the circumstances surrounding industries stimulated awareness about productivity improvement or waste minimisation to some extent, namely:

- The prices of city water supply and fuel oil increased by 40-100% and 30% in 2001 and 2002 respectively. This has prompted factories to reduce utility consumption.
- Some regions are suffering from lack of water resource; accordingly, factories are required to implement measures for rational utilisation of water through the improvement of water utilisation efficiency, water recycling and reuse, and the like.
- As emphasised in the Eighth Malaysia Plan, industries are requested to strengthen their global competitive position. This necessitates enterprises to realise the importance of productivity and quality improvement and to obtain certification of ISO14000 series.
- Continuous efforts undertaken by the Department of Environment (DOE) under the Ministry of Science, Technology and Environment (MOSTE), the Ministry of Education and other governmental and non-governmental organisations raised public awareness of the environmental issues; thus, cost effective measures for environmental protection have become the object of enterprises' attention.

## **(2) CP in Development Plan**

In Malaysia environmental programmes specifically related to Cleaner Production (CP) or waste minimisation were limited before the Sixth Malaysia Plan (1991-1995). Until then, environmental programmes were mainly based on the ‘command and control’ approach.

Nevertheless, emphasis on waste minimisation was given due recognition in the Sixth Malaysia Plan and a fund was allocated for a Study on Waste Minimisation for the Electroplating Industries.

In the Seventh Malaysia Plan (1996-2000) period, efforts to integrate environmental considerations into development planning were intensified and the relevant institutional, legislative and regulatory mechanisms were strengthened. In particular, the promotion of CP was initiated and a market-based approach to address environmental and resource issues was planned. In this regard, **SIRIM Berhad** established a Cleaner Technology Extension Service (CTES) and commenced CP audit and consultancy services for industries, especially SMIs. At the same time the DOE formed a CP Unit to promote CP to industries with the support of SIRIM and other public and private organisation.

**In the Eighth Malaysia Plan**, environmental issues are addressed from various aspects including energy efficiency, resource conservation, cleaner technology and industrial waste.

19.02 in Chapter 19 states that “Steps will be taken to identify prudent, cost-effective and appropriate management approaches that yield multiple benefits in order to ensure that development is sustainable and resilient. Efforts will be continued to address air pollution, mitigate degradation of rivers, improve marine and groundwater quality, as well as deal with waste in a comprehensive manner.”

As mentioned in paragraph 19.26, the strategic policy thrusts for environmental and sustainable resource management include:

- reducing the energy, materials, pollution and waste intensity of urban-industrial activity to address air pollution, mitigate deterioration in water quality and waste disposal;
- increasing the use of fiscal policy in pursuit of environmental objectives and promoting the use of appropriate market-based instruments and self-regulatory measures among industries;

With regard to energy efficiency, paragraph 11.67 states “the implementation of Energy Efficiency programmes will focus on the industrial and commercial sectors being the major consumers of energy. Measures to promote the efficient utilisation of energy include the enforcement of the Energy Efficiency Regulation, extension of financial and fiscal incentives and demonstration projects. In this respect, the establishment of new integrated complexes and townships that are managed in an energy-efficient manner will be encouraged. The implementation of demand-side management will be intensified during the Plan period, which includes retrofitting and district cooling programmes, changing the energy usage pattern and appliance labeling.”

As for industrial waste, 19.30 states that “With regard to industrial wastes, industrial parks will be encouraged to build waste disposal sites for improved management and proper disposal of their waste. A clearing house mechanism to facilitate industrial symbiosis, whereby one industry’s waste could be another’s resource, will also be established.”

With regard to natural resources management, paragraph 19.36 states that “To reduce exploitation of new water sources, emphasis will be given to demand-side management of water instead of concentrating on water supply. This will include measures to improve the efficiency of supply and use, and recycling water, including studying the feasibility of rainwater harvesting. The use of market-based instruments such as rebates, tax credits, and disincentives such as charging actual costs, penalties and fines, will be considered to help convey to users the true value of water and reduce wastage.”

On CP-related matters, paragraph 19.46 states that “Industries, particularly the SMIs will be encouraged to adopt cleaner technologies in their production processes. In this regard, **SIRIM Berhad** will intensify efforts to collect and disseminate information on cleaner technologies to increase the general environmental awareness in the industrial sector. SMIs will be encouraged to take advantage of the funding facilities available at the Small and Medium Industries Development Corporation (SMIDEC) to undertake environmental related activities. To enhance overall environmental management, training programmes will be conducted to encourage firms to adopt company-wide environmental management practices, including environmental costing, auditing, reporting and life cycle assessments, as well as ISO 14001.”

Environmental issues have been also addressed in recent industrial policies in Malaysia. At present, the overall industrial policy of Malaysia is described in the Second Industrial Master Plan (IMP2: 1996-2005). IMP2 contains chapters on individual industrial sectors



as well as a chapter especially for SMIs. IMP2 raises the main issue of enhancing competitiveness through industry cluster development by deepening and broadening industrial linkages and enhancing productivity. It also places emphasis on roles of business support services such as R&D, product design, the supplier, packaging, distribution, and marketing, etc. Textiles and apparel industries, agro-based and food processing industries, and machinery and equipment industries are among the sectors it highlights as comprising of or supporting important industry clusters.

IMP2 also states that extending fiscal incentives such as Pioneer Status and Investment Tax Allowance to new companies are important. For existing companies, continuing the Reinvestment Allowance and reviewing credit schemes like the Industrial Technical Assistance Fund and the Industrial Adjustment Fund are also important.

The IMP2 mentions that SMIs are the critical and strategic link to develop and strengthen cluster formation and increase domestic spin-offs and value added products and services. To address this issue, it proposes enhanced provision of R&D, technical advice, and other support services, with SMIDEC as the key-coordinating agency. It also highlights the Industrial Linkage Programme (ILP). Under this programme, SMIDEC attempts to identify and provide assistance to SMIs.

Pollution has not been ignored in the country's industrial policies as IMP2 states that “Environmental concerns will continue to be emphasised in all future projects” and that “costs are not only financial in nature but also in the form of externalities such as environmental decay and pollution”. Industrial investment projects are subject to the two mechanisms: the Environmental Impact Assessment (EIA) process and the manufacturing license process, which are administered by DOE and MIDA respectively. The manufacturing license application includes a detailed description of pollution discharge points and types and quantities of pollutants, and a description of pollution control equipment. This has made an important contribution to improved awareness and management of industrial pollution problems by licensed companies with shareholders’ funding above RM2.5 million. In order to solve water pollution control issues from SMIs, IMP2 recommends the development of industrial parks with common wastewater treatment facilities; e.g. IMP2 states the following:

- encourage the setting up of dyeing, printing and finishing facilities in Malaysia for locally manufactured fabrics with the appropriate installation of anti-pollution plants and equipment,
- establish specialised textile industrial parks with centralised wastewater treatment plants.

Thus, in addition to conventional environmental pollution control, CP has emerged as an

increasingly important and economically viable option that is acceptable to SMIs. The historical background of CP in Japan is summarised in ANNEX-1 for reference.

The following paragraphs briefly present the status of CP-related activities in Malaysia.

### **(3) Activities of SIRIM**

SIRIM Berhad (SIRIM), as substantially a single government supported agency providing consultancy services for CP in industry, is now aggressively conducting CP related activities as follows:

#### **(i) The Environmental and Energy Technology Centre (EETC)**

The SIRIM Environment and Energy Technology Centre focuses on activities relating to technology development, transfer and promotion in specific areas of environmental and energy technology, namely Cleaner Technology, Advanced Waste Treatment Technology, Energy Technology and Environmental Toxicology & Chemical Safety. It is engaged actively in industrial R&D and technical consultancy services aimed at providing appropriate and cost-effective solutions in environmental and energy management.

#### **(ii) CTES/CTIS**

The Environmental and Energy Technology Centre (EETC), has established a Cleaner Technology Extension Service (CTES) and a Cleaner Technology Information Service (CTIS). EETC is offering cleaner technology audits, consultancy and implementation services to Malaysian industry, by which appropriate and affordable cleaner production options are introduced. These services also cover technical aspects of residual waste management, occupational health & safety, and risk assessment, particularly in the workplace environment.

#### **(iii) Cleaner Technology Audits**

EETC has, since 1996, completed cleaner technology audits for more than 80 companies in Malaysia, more than 90% being small & medium enterprises, covering the food, electroplating, textile, pulp & paper, rubber products and fermentation industries, which have been identified to be the major sources of industrial pollution.

#### **(iv) Workshops and Seminars**

EETC has organised 32 workshops and seminars for promoting CP as shown in Table 2-1. CP promotion activities by SIRIM, which started in 1996, have been gradually and steadily driving industrial people to realise the importance and effectiveness of CP application. Eleven radio programmes have also been aired over the national radio

networks in Malay, English and Chinese languages to create public awareness of cleaner production.

**Table 2-1 Workshops and Seminars conducted by SIRIM**

No	Categories	Title and Content	Venue	Y	M
1	Seminar	CP Project Launching	Shah Alam	96	3
2	Workshop	Electroplating			10
3		Food			11
4		Textile			
5		Electroplating	Melaka	97	3
6		Textile			4
7		Food			5
8	Signing Ceremony	Agreement	Shah Alam		11
9	Workshop	Occupational Safety and Health	Sarawak	98	4
10		Cleaner Technology	Sabah		6
11	National Workshop	Sustainable Development of Malaysian Industries	Shah Alam		8
12	Workshop	Demonstration Project	Shah Alam		10
13			Kedah		
14			Penang		
15			Shah Alam		
16	Seminar	Waste Treatment	Kuala Lumpur	00	9
17	Workshop	CT Awareness for Financial Sector	Shah Alam		12
18	Seminar	CT Launching	Kuching		11
19			Kona Kitabalu		
20			Kwantan		6
21	Workshop	Cost Savings and Waste Management Strategies	Panang	99	11
22			Johor	01	3
23					
24		Cost Savings and Pollution Prevention Strategies for Electroplating		00	7
25	Seminar	Technology Dissemination Wastewater Treatment in Food, Textile and Distilling Industries	Shah Alam	01	4
26		Water Conservation in Industries	Johor		7
27			Penang		
28			Johor		9
29		Textile	Shah Alam	02	11
30		Metal Finishing			
31		Packing	Subang Jaya		2

**(v) SIRIM-DANCED Cleaner Technology Project**

In January 1996, SIRIM launched a Project on the Promotion of Cleaner Technology in Malaysian Industry as one project in the Danish Cooperation for Environment and Development (DANCED) programme. The project was successfully completed in October 1998. The objective of the project was to enhance the sustainable development of Malaysian industry, in particular of SMIs, through the implementation of CP. The EETC conducted industrial audits for approximately 40 companies in the food, electroplating, textile, pulp & paper and rubber products industries and implemented six full-scale cleaner technology demonstration projects in selected companies among the 40 companies. These demonstration projects have been used in showcasing viable and workable CP options.

In October 2000, the SIRIM-DANCED Project entered the second phase that expanded the targeted area to include East Malaysia.

Efforts and accumulated experience by SIRIM will facilitate smooth and effective promotion of CP in the Malaysian industrial sector.

**(vi) SIRIM-JICA Development Study on Promotion of CP in the Industrial Sector**

Since November 2000, SIRIM and JICA have been executing a project for the Study on Promotion of Cleaner Production in the Industrial Sector through the JICA Development Study Programme.

The project aims to contribute towards the abatement of industrial pollution in Malaysia by promoting Cleaner Production (CP) through various activities that include factory audits for selected enterprises, in particular, small- and medium-scale industries (SMIs), CP demonstration projects and dissemination of CP information.

The project conducted CP audits for 20 factories in the metal finishing and electroplating, food processing and beverage, pulp & paper, and textile industrial sub-sectors and selected four factories for a CP demonstration project. A pilot project for CP promotion has been carried out including:

- CP demonstration projects at four selected factories,
- CP information dissemination by seminars, preparation of tools such as display panels, video records of CP demonstration projects, animated flow models, a CP newsletter publishing, and preparation of Internet links to a CP database.

As the outcome of the Study, recommendations on measures and an action plan for promotion of CP are formulated and presented in this Report.

**(vii) Waste Database Establishment**

EETC established a database on industrial waste.

EETC dispatched a comprehensive questionnaire to many small and medium scale industries. In this questionnaire, the possibility of recycling and reuse of wasted materials are included together with other important environmental information.

SIRIM's efforts to collect information and to establish the database could surely contribute towards drawing up the future direction of CP promotion and industrial waste recycling activities in Malaysia.

**(viii) Newsletter "Cleaner Technology"**

A newsletter "Cleaner Technology" has been regularly published for communicating news on cleaner production to industry and other related recipients.

**(ix) Cooperation with Relevant Agencies and Organisations**

EETC is also cooperating closely with relevant agencies and organisation, specifically a joint task with the Department of Environment Malaysia, in promoting cleaner production awareness, technologies and practices in Malaysian industry.

The Centre has also completed a joint project under the auspices of the ASEAN-Australia Economic Cooperation Programme in establishing cleaner production practices and producing associated promotional materials for the ethanol distillery industry.

With the recognition accorded to SIRIM by the Malaysian Government, as highlighted in the recently launched the Eighth Malaysian Plan 2001-2005, as the lead agency in the promotion of cleaner production technologies in Malaysia, EETC is poised to play an even more significant role accordingly.

**(3) Activities of DOE**

As the leading agency in industrial pollution abatement and control, the Department of Environment (DOE) is undertaking programmes related to CP as summarised in Table 2-2.

**Table 2-2 DOE Programmes related to CP**

Period	Programme	Target
6 <sup>th</sup> Plan	1. Study on waste minimisation for electroplating industries	Electroplating Industry
7 <sup>th</sup> Plan	1. Malaysian Agenda for Waste Reduction 2. National workshop on CP (12-13/5/1999) and other workshops on CP 3. Awareness Campaign on CP 4. Study on Economic Incentives to facilitate CP Adoption 5. CP Handbooks	Generators of toxic and hazardous waste Electroplating Industries  Electroplating Industries in Negeri Sembilan, Selangor, KL, Malacca and Penang Industrial sector  Licensing agencies and industrial sector Metal finishing, palm oil, rubber, textiles and food (noodle) sectors
8 <sup>th</sup> Plan	1. Study on CP Implementation 2. Awareness Campaign 3. Training of DOE Officers on CP Audits 4. Environmental Auditor Registration	Industrial sector Textile Industry  Environmental Consultants

**(i) Awareness Campaign Seminar/Workshop**

The DOE organised a National Workshop on Cleaner Production on 12 – 13 May 1999 in Shah Alam, Selangor. The main objectives of the workshop were to identify issues related to the promotion of CP and to propose recommendations for planning and implementation of a National Cleaner Production Programme. The workshop highlighted the following:

- (a) Economic instruments, incentives and funding mechanisms to facilitate CP adoption and waste minimisation.
- (b) Institutional roles identified and support obtained from various agencies to encourage CP practices and interagency cooperation.
- (c) Regulatory measures to be in place to achieve better environmental performance and to support CP using auditing schemes, Cleaner Production/ Environmental Management System (EMS) and use of environmentally sound technologies.
- (d) CP education, awareness and training programmes to be conducted for different target groups including industries, communities and relevant government agencies.
- (e) CP database and information systems for information dissemination,

communication and networking.

- (f) Technical assistance, case studies and demonstration projects to illustrate the cost benefits of CP.
- (g) Research initiatives for CP applications in the different industrial sectors.

Following the workshop mentioned above, the DOE also organised awareness campaigns via seminars/dialogues for implementation of CP for the electroplating industries in Selangor, Negeri Sembilan and Kuala Lumpur in 1999.

This awareness campaign was further extended to the states of Malacca and Pulau Pinang in 2000, also targeting SMIs in the electroplating sector.

## **(ii) Study on CP Implementation**

The study was conducted with SIRIM through questionnaires to selected industries to assess the degree of awareness on and willingness to implement CP. The objective of this study was to identify issues and problems relating to CP implementation and to study, analyze and make recommendations relating to the issues identified. A third objective is to conduct on-site training on CP for DOE officer. The study was conducted with the help of a questionnaire survey. A total of 862 forms were sent to factories covering 7 industrial sectors – chemical, distillery, food, metal finishing, pulp and paper, rubber based industry and textile. The study was conducted between June to December 2001.

A total of 311 replies were received. The following issues were identified:

- general lack of awareness about CP among SMIs
- some SMIs ignorant of benefits, know-how and design of CP technology
- many SMIs were not aware of CP technology when they are making investments
- many SMIs do not implement CP due to lack of funds
- many financial institutions were not playing their role in financing CP projects
- most levels of staff in industries are not aware about CP nor are they trained to operate machinery and equipment at optimum levels
- SMIs face high investment and operating costs of waste water treatment plants and performance upgrading
- chemical suppliers do not give MSDS (Material Safety Data Sheet) and CSDS data sheets and equipment suppliers do not provide performance specifications for machinery and equipment
- some of the turnkey waste water treatment plant suppliers do not provide correct designs

### **(iii) Training of DOE Officers on CP Audits and CP handbooks**

Training of DOE officers on CP Audits consists of a one-day walk through CP audits to identify potential CP options. CP audits were conducted at five sites comprising of different types of industries including metal finishing, textile, food etc.

Also, DOE developed CP training modules together with CETEC for training DOE officers. One training seminar using the developed training modules was held in Malacca and was attended by DOE officers with the participation of a few selected industries.

DOE established the Environment Institute of Malaysia (EMAS) in August 2001. By obtaining lecturers from DOE, SIRIM, CETEC and overseas institutions, EMAS provides various kinds of training courses related to environmental pollution management as well as CP for DOE officers and outside participants. 50 training courses are programmed in 2002.

The DOE has made efforts to promote public understanding on CP and environmental issues through the publication of CP handbooks (Industrial Processes and the Environment). Handbooks for the following five industry sectors were published as of the end of 2001:

- Metal Finishing – Electroplating
- Raw Natural Rubber Industry
- Crude Palm Oil Industry
- Textile Industry
- Food Industry – Rice Noodle Processing

It is expected that the operation and services of DOE's enviro-library will be expanded during the Eighth Malaysia Plan (2001 – 2005) period.

### **(iv) MAWAR**

During the Seventh Malaysia Plan (1996-2000) period, the DOE launched the Malaysian Agenda for Waste Reduction (MAWAR) that basically aimed at awareness among industrial sectors generating hazardous waste on the need for waste reduction and minimisation.

Based on individual industrial initiatives and efforts on waste minimisation, the DOE currently maintains a list of factories practicing waste minimisation and reduction under the MAWAR programmes. At its initial launching in 1996, five factories registered under the programme and the number has recently increased to more than twenty. The outline of MAWAR is shown in ANNEX-2.



#### **(v) Environmental Auditor Registration**

This is described in 2.2.1.

#### **(4) Productivity Improvement Programmes**

The National Productivity Corporation (NPC) under the Ministry of International Trade and Industries (MITI) is the primary organisation responsible for the promotion and enhancement of productivity in the industrial sector. Seminars, conferences and training related to productivity improvement which involves management development such as quality control circles (QCC), 5S, benchmarking, Green Productivity programmes and others, are conducted on a routine basis either based on requests from the industrial sectors as in-house programmes or public programmes conducted at NPC.

##### **(i) National Convention**

Prior to the National Convention, 5S Programmes were conducted as in-house programmes or public programmes. In the year 2001, NPC conducted over 30 in-house programmes covering electronic sector SMIs, the manufacturing and service sectors, as well as 7 public programmes. The number of participants attending 5S programmes in 2001 ranged from 700 to 800.

A series of QCC programmes were conducted for the industrial sectors either on an in-house or public basis. Approximately 50 QCC related programmes covering a wide range of industrial sectors were conducted in 2001 on an in-house basis. Participants in these in-house programmes ranged from 20 to 25 for each programme. As a whole, as many as 1200 participants attended the QCC programme in 2001. The National Convention on QCC is conducted on a yearly basis normally in the month of October. The venue for the convention changes from year to year and approximately 800 – 1,000 participants attend the convention.

##### **(ii) Training course**

In 2000, on productivity and quality enhancement, 152 programmes with 3,432 participants were conducted in in-house training, and 50 programmes with 976 participants were conducted in scheduled training.

Training programmes being conducted by NPC include the following:

- QCC courses for managers, leaders, facilitators, QC tools and techniques, statistical process control, 5S, TQM, introduction to ISO9000 and benchmarking skill & application, etc.;
- Productivity management courses such as “understanding productivity for

supervisors”, “Filing and records management”, “Company productivity assessment”, and “ Counseling for higher productivity”;

- Human resources management courses;
- Production management courses;
- QCC conventions.

In addition to NPC, the National Institute of Administration (INTAN) also conducts courses and training related to productivity improvement normally designed for the government agencies and selected industrial companies -- usually SMIs under specialised programmes.

### **(iii) Green Productivity**

The Asian Productivity Organisation (APO), which is an inter-governmental regional organisation established in 1961 by several governments in Asia, aims to increase productivity and accelerate economic development in Asia and the Pacific region through mutual cooperation. APO is recognised as one of the promoters of CP practices and is a major provider of Green Productivity assistance. NPC, the Malaysian counterpart for APO is making an effort to bring Green Productivity consultancy and training activities into Malaysia. They conducted a number of planning meetings and workshops for Green Productivity professionals and held a National Productivity Conference in late 2000.

NPC has also conducted Green Productivity demonstration projects, which are addressed to agriculture farm level:

## **(5) The Ministry of Housing and Local Government**

Most of the programmes related to waste reduction, reuse and recycling were initially promoted by the Ministry of Housing and Local Government for municipal wastes with the aim of reducing domestic and unregulated industrial waste at their source prior to final disposal in sanitary landfill sites operated by the local authorities.

The Ministry of Housing and Local Government in cooperation with State Governments is trying to establish in the near future a database on solid waste as an activity of the National Strategic Plan.

The First and Second National Recycling Programmes started in 1996 and December 2001 respectively.

The most recent campaign, targeted at public awareness of waste recycling, is being implemented through mass-communication such as TV, newspapers and school education.

This campaign is intensive and is participated in by various organisations, especially during the recycling month – October of every year.

Although this programme targets every kind of waste, only waste items such as plastic, aluminum, steel and paper are dealt with at present. The contribution by local organisations is still not satisfactory judging from the low participation rate of about 50 %.

## **(6) Activities of Industrial Associations and NGOs**

### **(i) SMI Association of Malaysia**

The SMI Association of Malaysia is the largest association of SMIs in Malaysia consisting of more than 2000 SMIs. The Association is able to a) study and summarise needs for CP in SMIs through its database of participating SMIs, and b) disseminate CP information provided that appropriate materials are ready.

The Association held the first SMI One Stop Solution 2000 at the Malaysia International Exhibition & Convention Centre in July 2000 and has already carried out 3 road shows to promote CP to its members in 2001.

### **(ii) ENSEARCH**

Formed as a non-profit, membership organisation, the Environmental Management & Research Association of Malaysia (ENSEARCH) is conducting various activities to promote and increase environmental awareness and to provide training on available environmental management methodologies and technologies.

ENSEARCH activities related to CP are listed as follows:

- Endorsement of the Cleaner Production Interest Group (CPIG): formerly called the Cleaner Production Network.
- Tea-talks on CP related topics.
- Initiation of the Centre for Environmental Technologies (CETEC) in 1992.
- Formation of the Environmental Professionals Register of Malaysia (EPRM) as the first environmental professional body in Malaysia.
- Organising the first National Cleaner Production Roundtable in 1998.
- Publication of the Journal focusing on CP (ENSEARCH Vol. 11, No.1/2, 1998)

### **(iii) Federation of Malaysian Manufacturers (FMM)**

The Federation of Malaysian Manufacturers (FMM) is conducting a Waste Exchange Registry Campaign (Solid and Scheduled Wastes). The purpose of this campaign is to recycle waste materials by connecting waste generators with waste “re-users”, leading to

a cut in the amount of waste to landfill, preserving more natural resources, reducing disposal costs, and lessening the likelihood of incorrect disposal of hazardous materials. The analysis of the results of the Waste Exchange Registry Campaign is shown in ANNEX-2.

As the industries under the umbrella of FMM activities are generally medium to large in size, information about SMIs is not comprehensive. In addition, FMM has not yet dealt with the issues of solid waste and industrial product waste generated by industries.

Judging from the FMM activities in the promotion of waste exchange, not only SMIs but also large industries still have difficulty coping with the disposal of scheduled waste even though the government is systematically tackling the problem of its treatment and disposal.

#### **(7) Ministry of Energy, Communication and Multimedia (MECM)**

In the energy area, the government has initiated efforts towards promoting energy efficiency and renewable energy in order to minimise pollution effects and to encourage environmental-friendly processes and technologies. For energy efficiency the government intends to introduce the Energy Efficiency Regulation that would make it mandatory for large energy consumers above 360,000 kWh/year to regulate themselves. Through the Regulation, the government aims to decrease power consumption by up to 10% and reduce the impact of using non-renewable energy sources on the environment.

Concerning the draft Energy Efficiency Regulation, the drafting committee headed by the Energy Commission has a final draft that is now with the Chairman of the Energy Commission.

The certification of the Efficiency Manager, Efficiency Officer, Energy Technician and Energy Auditor is provided for under the draft regulation and the positions will require certificates that will be issued by the Energy Commission. There is, however, no provision for the registration of energy service companies.

Presently, energy service companies need not register themselves with the Energy Commission. The proposed draft Electricity Efficiency Regulation also does not provide for any certification. They can be companies involved in training, energy management, engineering-related services and/or companies selling and maintaining energy-efficient products. The Malaysian Association of Energy Services Companies has recently been established and there are about 30 members.

The Malaysian Energy Centre (MEC), established in 1998 under MECM, undertakes energy-related research and development. Activities of the Centre include energy audit services conducted by the energy conservation group.

A number of energy service companies (ESCOs) are working closely with MECM and MEC to provide audit and consultancy services in energy efficiency, renewable energy and demand management to the public and private sectors.

## **(8) Other Activities**

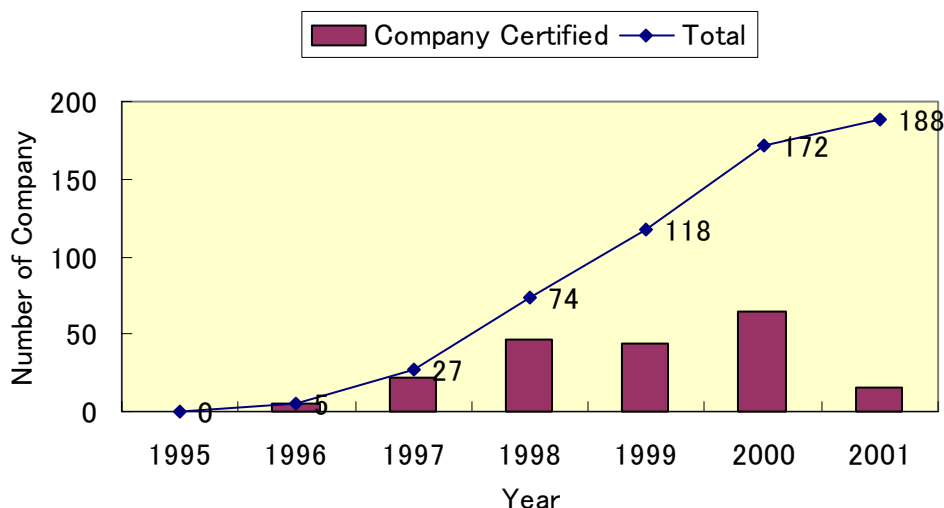
### **(i) Certification of ISO 14000**

Since published in 1996, the ISO14001 series of standards for Environmental Management System (EMS) has attracted significant attention from industries.

Enterprises are trying to acquire certification of ISO14001 to meet the following objectives:

- To meet customer requirement,
- To improve corporate image,
- To improve the environment,
- To ensure compliance with legal requirements, and
- To reduce environmental related risk.

The number of companies certified for ISO14001 in Malaysia increased steadily and reached 188 as of May 2001 as shown in Figure 2-1.



**Figure 2-1 Number of Companies Certified for ISO14001 in Malaysia**

Source: Environmental System Certification Unit, SIRIM QAS Sdn. Bhd.

## **(ii) US-AEP**

The United States-Asia Environmental Partnership (US-AEP), founded in 1992 to assist in addressing environmental degradation and sustainable development issues in the Asia/Pacific region, is conducting activities in the following five categories:

- Professional and organisational development,
- Technology cooperation,
- Environment and energy infrastructure,
- Biodiversity conservation, and
- Partnership activities.

The US-AEP Office of Technology Cooperation in Malaysia was established in 1994 and focuses on business to business partnerships between the U.S. and Malaysia with intent to improve the environmental quality in Malaysia. It acts as a liaison and information resource for local businesses and government entities through technology sourcing and partnership activities, short-term training and fellowships. Due to recent restructuring in 2001 its functions in Malaysia were taken over by the trade and commercial division of the US Embassy.

### **2.1.2 Present Status of CP in Industries**

#### **(1) Findings from SIRIM-JICA Study**

No specific CP measures were implemented at the other 16 of 20 factories audited, although a few exceptional cases were found among the 20 companies audited in the Study as follows:

- Two food processing factories are equipped with new production facilities.
- Wastewater is treated and recycled for reuse in the production process at one dyeing factory. The rate of reuse of wastewater was 30%.
- One dyeing factory is introducing high-efficiency dyeing machines, which can significantly reduce wastewater volume.

The present situation of production management or productivity improvement activities at the 20 companies audited can be summarised as follows:

- In general, factory managers have strong intentions to reduce production costs; however, they are not certain about what to do because real problematic issues to be solved are hidden or not clear to them. This is mainly due to insufficient knowledge and understanding about the present and actual condition of production processes, including process data. For example, in all the electroplating factories, rinsing time is shortened with the aim of increasing productivity, but unfortunately to the extent that it is difficult to assure product

quality.

- Awareness about utility costs was raised by the increase in the prices of city water and fuel oil as follows:

City water    40% up in Johor State in January 2001

60% up in Selangor State in January 2001

30-100% up in Negri Sembilan State in May 2002

Fuel            30 % up in 2001

One of the demonstration projects aims to replace city water with underground water in a food processing factory and another project aims to decrease the consumption of city water through recycling and reuse of wastewater in a dyeing factory. Another factory has a plan for replacing boiler fuel oil with saw dust, although the plan has not been implemented.

## **(2) Findings from DANCED project**

The status of CP in Malaysia during the phase 1 SIRIM-DANCED project, which started in 1996, is summarised as follows:

- SIRIM's activities had been addressed mainly to waste minimisation. Awareness about CT among industries was quite low;
- Especially in SMIs, resources such as water and electricity were not efficiently utilised; and
- SMIs were not interested in improvement by automation, because labour cost was low.

Afterwards, SIRIM conducted CT promotion activities as mentioned in 2.1.1(3), and it was recognised in the workshops held in 2001 that awareness about CT was higher than the initial stage of the phase 1 SIRIM-DANCED project.

The phase 2 SIRIM-DANCED project, which started in 2000, expanded its targeted area to the East Malaysia. The status in the East Malaysia is similar to the phase 1 SIRIM-DANCED and awareness about CT is very low. Most of SMIs expect a lot of governmental support as well as technology transfer.

## **(3) CP Demonstration Projects**

It was reported that six demonstration projects, as listed in Table 2-3, were conducted during the first phase SIRIM-DANCED project for the Promotion of Cleaner Technology in Malaysian Industry.

In the SIRIM-JICA project, four demonstration projects were conducted as listed in Table 2-4.

**Table 2-3 Summary of SIRIM-DANCED CT Demonstration Projects**

Sector	Company	CP Option	Investment	Benefit
Electro-plating	Kilang Sadur Letrik QUALITY Sdn. Bhd.	(1) Counter current rinsing with an ion exchange system in the Zinc plating process	RM170,000	1) Cost savings: • Water RM 12,000 • Wastewater treatment RM120,000 • Manpower RM30,000 2) Product quality improvement
		(2) Counter current rinsing with an ion exchange system in the Chromating process		
Metal Finishing	Aluminium Anodizers (M) Sdn. Bhd.	(1) Counter current rinsing system	RM60,000	1) Cost savings • Water RM4,000 • Wastewater treatment RM10,000 • Sludge disposal RM90,000
Textile	Xie Li Dyeing Sdn. Bhd.	(1) Waste heat recovery and recycle by installing plate heat exchanger	RM400,000	1) Cost savings: • Fuel oil RM 150,000 2) Improved WWTP efficiency
Textile	Penang Batik Factory Sdn. Bhd.	(1) Filtration of dyeing wastewater by prefilter and reverse osmosis system for reuse		1) Reductions in water and chemical consumption 2) Reduction of pollution load to WWTP
Food	In'Joy Marketing (M) Sdn. Bhd.	(1) A hot process water supply system by an efficient boiler and plate heat exchanger	RM280,000	1) Cost savings: • Water RM4,000 • Wastewater treatment RM20,000 2) Product quality improvement
		(2) Rinse water recycling		
Food	Kong Guang Sauce & Food Manufacturing Co. Sdn. Bhd.	(1) Prevention of soya sauce spillage by introducing an automation system in transfer with a frame filter press	RM300,000	1) Cost savings: • Water RM 7,000 • Wastewater treatment RM35,000 • Manpower RM24,000 • Production cost RM100,000 2) Product quality improvement



**Table 2-4 Summary of SIRIM-JICA CP Demonstration Projects**

Sector	Company	CP Option	Investment	Expected Benefit
Electro-plating	Metal Polishing Industries Sdn. Bhd.	(1) Water conservation by controlling the city water inlet pressure (2) Rinsing water recovery and reuse (3) Filtering systems on Cr tanks	RM216,000	1) Cost savings <ul style="list-style-type: none"> <li>• Water: RM3,000</li> <li>• Wastewater: RM24,000</li> <li>• Manpower: RM53,000</li> <li>• Increased operation cost: RM11,000</li> </ul> 2) Productivity improvement: RM76,000 (5%) 3) Product quality improvement 4) Reduction of wastewater volume by 70%
Metal Finishing	Perusahaan TGB Sdn. Bhd.	(1) Electrical energy conservation by improving the electrical system (2) Wastewater reuse	RM400,000	1) Cost savings <ul style="list-style-type: none"> <li>• Electricity: RM105,000</li> <li>• Water: RM7,000</li> <li>• Manpower: RM28,000</li> </ul> 2) Productivity improvement: RM174,000 (20%) 3) Product quality improvement 4) Reduction of wastewater volume by 20%
Food	Winner Food Industries Sdn. Bhd.	(1) Water conservation by introducing a new rice washing machine (2) Effective cooling system for the noodle cooling unit (3) Sanitary treatment and softening of underground water for process and boiler use	RM270,000	1) Cost savings <ul style="list-style-type: none"> <li>• Water RM17,000</li> <li>• Increased operation cost: RM6,000</li> </ul> 2) Reduction of required WWTP size
Textile	South Asia Textiles (M) Sdn. Bhd.	(1) Wastewater quality improvement for recycling for process use	RM305,000	1) Cost Savings <ul style="list-style-type: none"> <li>• Water RM161,000</li> <li>• Increased operation cost: RM51,000</li> </ul> 2) Reduction of wastewater volume by 40%

It is worth noting that all the projects mentioned above have been successfully implemented and have realised their expected benefits. Accordingly, it is expected that by adopting CP, Malaysian Industry and SMIs in particular, have potential for improvement in productivity and reduction in environmental pollution load.

### **2.1.3 Issues**

So far, promotion of CP in Malaysia has shown limited progress.

Many factors still limit the application of CP, especially in SMIs. Figure 2-2 shows factory managers' decision steps up to CP implementation. There are four steps of barriers to be cleared before CP is implemented in industries as follows:

- Intention to introduce CP;
- Capability of working out CP measures;
- Confidence in CP benefits; and
- Financing.

The following subsections summarise issues that may cause obstacles at each decision step above.

#### **(1) Obstacles for being less Active to Introduce CP**

Initially, the following factors prevent factory managers or decision-makers from actively considering the introduction of CP into their factories.

##### **(i) Limited Awareness about CP and its Advantages over Pollution Control**

Most SMIs are family-owned and operated. In many cases SMI owners are confident of their technologies that were inherited from their predecessors and are still considerably profitable to operate. Thus, they are reluctant to recognise the potential benefits of new technologies including those called CP, especially in cases where their introduction requires large investment.

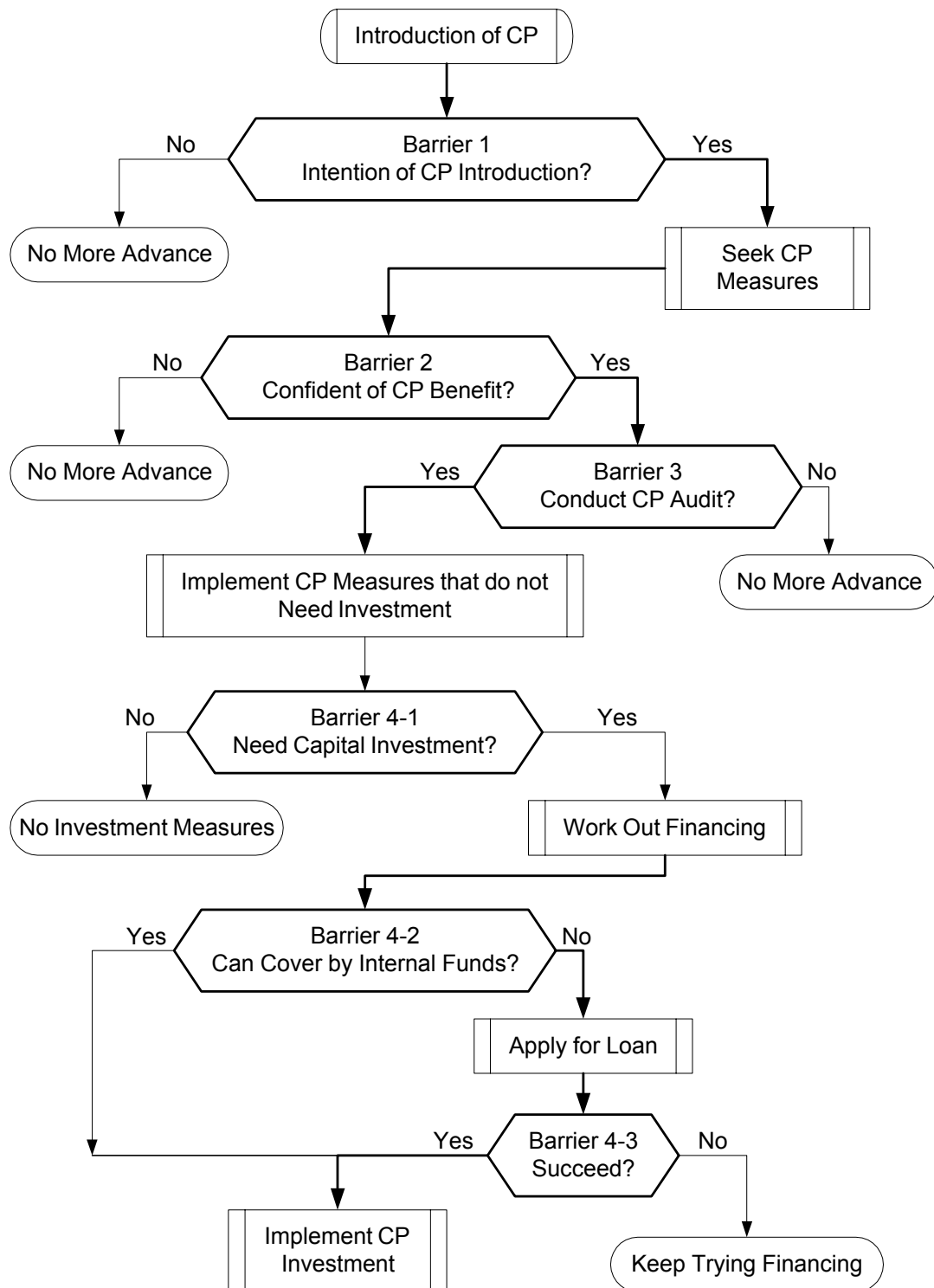
##### **(ii) Comparatively Low Priority of CP Measures**

CP measures are often seen as a low priority in SMIs because the highest priority in SMIs is to survive. As a single decision-maker, as is usually the case with a SMI, the factory manager has to work out measures to solve issues the factory is confronted with, and thus tends to be sales-oriented and reluctant to change existing facilities.

##### **(iii) Insufficient Understanding of Present Conditions of the Factories**

In many SMI factories, the present conditions are not sufficiently known nor understood

by managers; i.e. basic data are not collected and analyzed in a short management cycle, for example, daily. Therefore, an essential issue may be hidden under the daily problems the factory managers are facing, until a really serious problem occurs.



**Figure 2-2 Factory Manager's Decision Steps up to CP Implementation**

It is extremely important for factory managers to know and understand current conditions based on basic data gathering starting from good house-keeping activities or activities such as “5S movements” that require participation of all employees. Through appropriate understanding of current conditions, it becomes possible to reveal actual problematic issues that may otherwise have been hidden.

A successful example is seen in one factory selected as a CP demonstration model factory in this Study. After a continuous effort to record daily water consumption, the factory was able to recognise losses in water consumption, which could be then be reduced without additional investment.

**(iv) Insufficient Maintenance of Production Equipment**

Maintenance of equipment in SMI factories tends to be insufficient due to lack of human resources and/or lack of managers’ attention; accordingly, issues caused by insufficient maintenance may necessitate immediate attention and sidetrack consideration of CP measures.

**(v) Free or Cheap Pricing of Resources**

The charge of water supply is in the level of half of operation and maintenance cost. The price of city water was raised by 40-60% in January 2001; e.g. from 160 to 224 RM/m<sup>3</sup> in Johor Bahru, and from 120 to 192 RM/m<sup>3</sup> in Selangor. The price of fuel oil was also raised from 0.48 to 0.68 RM/litre in 2001. These had a certain impact on companies’ consideration of adopting CP measures for reducing the consumption of city water and fuel oil.

On the other hand, there is no encouragement for factories to introduce measures for reducing the consumption of underground water, which still remains substantially free.

**(vi) Lack of Access to Information on Existing CP Technologies**

It is possible for SMI owners to get general ideas on CP through published material and seminars or workshops being held by various organisations as mentioned in 2.1.1. However, such information is not generally sufficient for SMI owners to judge whether such CP measures can be applicable to their factories or not. It is difficult to encourage factory owners to consider the introduction of CP unless they are provided with easier access to information on CP measures that can be practically adopted in their factory and that meet their unique industrial needs. Thus, the final solution is to provide information based on an actual audit conducted on their factory.

## **(2) Obstacles to Working Out CP Measures**

In general, most SMIs are not capable of working out CP measures by themselves, due to one or more of the following reasons.

### **(i) Lack of Technically Skilled Human Resources**

Most SMIs depend on one or two limited key staff for factory operation, technical investigation, troubleshooting, maintenance and/or daily management. Such staff lacks the capability to work out CP measures on the following grounds:

- In order to develop their ability, they need experience of actual practices to reduce losses by reducing process input or to minimise waste by reutilising non-product output. Actually in general, however, they have no opportunities because factories are not aware of such CP measures as mentioned in 2.1.3 (1).
- In some cases CP measures require process modifications based on new technologies, of which they are not aware due to issues mentioned in 2.1.3 (1).

They need information and advice on practical CP measures from outsiders; thus, consultancy services will play an important role in promoting CP in Malaysian industry. On the other hand, a promising example is seen in a CP demonstration model factory in this Study. After introducing CP equipment under the SIRIM-JICA project, new university graduates in the factory, under a dynamic owner, are actively making efforts to solve problems that were newly discovered after factory conditions had been improved by the introduction of CP. This indicates that, once encouraged, Malaysian SMIs have good potential for human resource development. In order to realise full potential, however, a step-by-step process should be practiced with the full involvement of an active management.

### **(ii) Lack of Consultancy Services on CP**

Due to the lack of internal capabilities, SMIs unavoidably depend on outside consultants for working out CP measures; however, there are a limited number of consultants at present, with SIRIM being virtually the sole government supported agency currently providing CP consultancy services. This matter is discussed in Section 3.4.

## **(3) Obstacles to Confidence of CP Measures**

A large barrier against the adoption of CP is the reluctance of managers to take risks with new technologies, because they are sceptical of the benefits or technological soundness of CP measures.

As an example, in one demonstration project in this Study, CP measures were worked out,

designed, provided by the SIRIM-JICA project, and could be proved to be effective and beneficial so that the pay back period was expected to be fairly short. However, management could not see the effectiveness and benefits until the demonstration equipment was brought into actual operation. Therefore, sometimes it is very difficult to convince SMI managers to invest in CP measures.

Accumulation of success stories, demonstration programmes and marketing activities are often not enough to convince SMI owners to introduce CP in their companies, although it is important for the enterprise managers to realise that they can often start CP without investment.

#### **(4) Obstacles to Financing**

The final barrier is financing. If a company cannot afford to provide its own funds, it can apply for external funds such as loans; however, the current system has a number of problematic issues, which impede financing for SMIs. This issue is discussed further in Section 2.3.

#### **(5) Others**

In order to solve the issues impeding CP promotion as mentioned above, various measures can be taken, while at the same time fulfilling the continuous need to build the capacity of related organisations.

## **2.2 Present Status of Environmental Regulations**

### **2.2.1 Environmental Regulations**

#### **(1) Environmental Quality Act, 1974 (EQA)**

The environment as a contemporary issue began to receive attention in Malaysia in the 1970s when the country embarked on its industrialisation programme. This was followed by the enactment of EQA.

The EQA is considered the most comprehensive legislation on environmental matters in Malaysia. The word ‘environment’ in the Act is defined as the physical factors of the surroundings of human beings including land, water, atmosphere, climate, sound, odor, taste, the biological factors of animals and plants and the social factor of aesthetics.

The underlying principles adopted in the formulation of the EQA include:

- Pollution should be controlled at source;
- Polluters must pay or bear the costs of their waste or wastewater treatment and disposal;
- Discharge standards should be uniform for a particular source, type of industry or activity;
- Uniform discharge standards could be contravened for polluters whose discharge does not affect the ‘carrying capacity’ of receiving water; however the polluters must bear the costs of investigative studies required by the relevant authorities; and
- Variable discharge standards are to be introduced if the uniform standards imposed on pollution sources within a water body are inadequate to protect and maintain the beneficial use of the environment.

To bring the law and other environment-related laws into effect, regulations and orders have been introduced and strictly enforced to control pollution from the industrial sector, such as:

#### **Control of water pollution**

- Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, 1977
- Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978
- Environmental Quality (Sewage and Industrial Effluent) Regulations, 1979

#### Control of air pollution

- Environmental Quality (Clean Air) Regulations, 1978
- Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985
- Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996
- Environmental Quality (Control of Emission from Petrol Engines) Regulations 1996

#### Control of scheduled waste

- Environmental Quality (Scheduled Wastes) Regulations, 1989
- Environmental Quality (Prescribed Premises) Scheduled Wastes (Treatment and Disposal Facilities) Order 1989
- Environmental Quality (Prescribed Premises) Scheduled Wastes (Treatment and Disposal Facilities) Regulations 1989

#### Environmental Impact Assessment

- Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order, 1987

However, new environmental problems had emerged since then, with each environmental problem becoming more prominent and complex. Responses in the form of growing public interest and increasing pressure on industry to improve environmental performance saw the setting up of a law review committee to examine environmental issues and to identify measures. Based on the law review committee's findings, prior consultation with other government agencies, private sector and non-governmental organisations, the EQA was amended again in August, 1996 to include emerging environmental issues and problems, increase effectiveness of environmental management, strengthen operational enforcement needs and to increase the quantum of penalty payment as a further deterrent measure.

Nevertheless, although major amendments were made to the EQA in 1996, preventive mechanisms directly related to CP and waste minimisation were unavailable and as such, regulations relating to CP and waste minimisation would not be forthcoming until such a time when the EQA is amended again to provide provisions for these activities.



## **(2) CP and EQA**

In the EQA, the terms CP, waste minimisation, recovery, recycling, reuse or reutilisation are not defined nor interpreted. This is quite understandable as the EQA is an enabling Act to prevent, abate and control pollution by regulating emissions, discharges and wastes from source points.

### **(i) Effluent-related license fee**

Effluent-related license fee, which is command & control cum market-based instruments method, is applied in regulation only in palm oil and raw natural rubber.

### **(ii) Contravention license**

A contravention license is a license to pollute beyond the limits permitted by the provisions of the EQA. Contravention licenses are issued when there is an absence of technology to efficiently dispose of waste, hazardous and non-hazardous, such as saw dust and rice husks. It is issued at the discretion of the authorities for a period of 6 months or in the usual case, one year.

The conditions or reasons for contravention include the following:

- During the upgrading of Effluent Treatment Plant
- During construction of Effluent Treatment Plant
- Relocating operations, when not all facilities are in place
- When the cost of technology is not economical
- When there is a shortage of land for installing a treatment system

So far, acceptable conditions have been specified in two sets of regulations:

- a) Acceptable conditions on pollution of the atmosphere (section 22) were set in the Clean Air Regulations.
- b) Acceptable conditions on pollution of inland waters (section 25) were set in the Sewage and Industries Effluent Regulations.

Section 21 of the EQA empowers the Minister to specify conditions of emission, discharge or deposit of environmentally hazardous substances, pollutants or wastes or the emission of noise into any area, regnant or element of the environment, within which the emission, discharge or deposit is prohibited or restricted.

Section 25(1) EQA 1974 is also applicable for sewage treatment plants operated by the Indah Water Consortium a privatised company providing sewerage services.

In 1997, 3,263 contravention licenses were issued to IWK for non-compliance with the stipulated effluent discharge standards under the Sewage and Industrial Effluents Regulations. In 1998, the number dropped to 2,762 of which 83% were for renewal of existing licenses while the other 17% were new applications.

Our analysis of past annual Environmental Quality Reports, shows that the DOE wants to limit the number of licenses to only those cases with justified reasons as those stated earlier. In addition, DOE will not grant a contravention license if by so doing it causes adverse impact to the surroundings.

(iii) Environmental audit in Section 33A

The section empowers the Director General to require an environmental audit from the owner or occupier of any vehicle, ship or premises. The report must be submitted in a prescribed format. Only qualified personnel registered with the DOE can conduct environmental audits. The section also empowers the Director General to maintain a list of qualified personnel (Registration of Environmental Auditors).

DOE has proposed a set of guidelines for Environmental Auditing. For the purpose of Section 33A of the Environmental Quality (Amendment) Act 1996, the Malaysia Registration of Environmental Auditors is established to register qualified personnel who have met specific criteria to perform environmental audits.

The Handbook of Environmental Audit (EA) Guidelines is intended to define and specify the legal framework of environmental audit undertaken under this section of the EQA. The Handbook discusses the types of audits covered by this Act, the procedures, the types of reports, as well as the qualifications of the person that is carrying out an EA. Three important appendices accompany this Handbook. The first is a road map of the basic steps of undertaking an EA; the second is a register of Environmental Auditors in Malaysia, together with a set of forms for registration, plus a code of conduct for Environmental auditors.

In Appendix 2 of the Handbook, the qualifications of an Environmental Auditor are stated, and they cover:

- A certificate grading system (Provisional auditor grade, environmental auditor grade and lead environmental auditor grade))
- Registration criteria (Formal education, auditor training course, work experience in environmental field and auditor experience)
- Requirements for auditor certification
- Personal attributes and skills

- Re-Registration procedures
- Registration and Renewal Fees
- Upgrade Application
- Code of Conduct

Currently, the DOE wants environmental auditors to attend an auditor-training course that is approved by the DOE. This is intended to standardise the system of environmental audit work, as well as to ensure that there is a level of quality of training provided to all practicing environmental auditors. Even though the DOE has set up EMAS, a training institute for the DOE, it wants to speed up the process of extending the training to the private sector as well. Hence, the DOE is inviting consultants to submit training modules for DOE approval, which can then be opened up for private sector clients.

(iv) Environmentally hazardous substance in Section 30A

This section empowers the Minister to issue an order that

- a) Prescribes any substance as an environmentally hazardous substance which requires the substance to be reduced, recycled, recovered or regulated in the manner as specified in the order, and
- b) Prescribes any product as a prescribed product for sale and that the product shall contain a minimum percentage of recycled substances and to carry an appropriate declaration on its recycled constituents, method of manufacture and disposal.

An order made under the Section may specify rules on the use, design and application of the label in connection with the sale of the substance or product that claims to be environmentally friendly.

The penalty for any person who fails or refuses to comply with the order made under this section is a fine not exceeding fifty thousand Ringgit or to imprisonment for a period not exceeding five years or to both.

Implementation of this section:

Even though this section was gazetted in 1996, there is no implementation of this amendment so far. No regulations, guidelines, rules, etc., have been produced as a result of this amendment. So far, this amendment has merely remained on the statutes.

(v) Deposit and rebate scheme” in Section 30B

The section empowers the Minister after consultation with the Council, to specify the guidelines and procedures on deposit and rebate scheme in connection with the disposal of products that are considered

- a) Environmentally unfriendly; or
- b) Causing adverse constraint on the environment for the purpose of collecting products efficiently in order to ensure that recycling or disposal of products is done in an environmentally sound manner.

The objective of section 30B is to empower the Minister to specify guidelines and procedures on deposit and rebate schemes for products that are considered environmentally unfriendly and which are causing adverse constraints on the environment in connection with their disposal. The rationale of this new section is to promote the collection and recycling of wastes by putting a value (deposit) on the price of the product, and letting the market respond to the price of the waste (refund). In this manner, wastes would be collected back as people respond to the incentive of the refund.

Implementation of this section:

Implementing this section requires close collaboration between government agencies, such as domestic trade, finance, and the DOE. It might even involve the setting up of a “middleman” agency to reduce chances of fraud and to prevent collusion amongst the stakeholders. The regulatory function will involve setting up rules and regulations to ensure fair play under a new system of collection. However, there is no implementation of this amendment nor is there any regulations, guidelines or rules, etc., to date.

(vi) Environmental Fund in Section 36E

Implementation to date:

There is no implementation of the amendment so far nor are there any rules, regulations or guidelines.

(vii) Use of material substitution for banned substances

Notwithstanding the above there are a few orders/regulations, which indirectly promote CP through requiring the use of material substitution for banned substances. They are:

- Environmental Quality (Prohibition on the Use of Chlorofluorocarbons and other gases as Propellants and Blowing Agents) 1993
- Environmental Quality (Prohibition on the Use of Controlled Substances in Soap, Synthetic Detergent and Other Cleaning Agents) Order 1995
- Environmental Quality (Halon Management) Regulations 1999
- Environmental Quality (Refrigerant Management) Regulations 1999

### **(3) Energy Efficiency Regulation**

Today, there are no laws or regulations to promote energy efficiency being enforced in Malaysia.

When first disseminated for comments, the energy efficiency regulations were known as the proposed Energy Efficiency Regulations 1999 under the Electricity Supply Act 1990. This Act was amended in 2000 and called the Electricity Supply (Amendment) Act 2000 but it only provides for Electricity Efficiency and not Energy Efficiency. Thus the decision to change to Electricity Efficiency Regulation was made.

The draft Electricity Efficiency Regulation has gone through several rounds of discussion and dialogue between the government, industries and academics. Based on feedback, amendments/refinements, the drafting committee headed by the Energy Commission has a final draft that is now with the Chairman of the Energy Commission. This draft is currently being revised and is not finalised yet. When it is finalised, it will be then be sent to the Minister for endorsement.

The objective of the regulation is contributing to the development of the national economy by specifying the action required and necessary measures for the rational use of factories, buildings, machinery and equipment and other necessary measures for promoting comprehensively the rational use of electricity and resources in order to ensure the effective use of resources which will meet the economic and the social development.

There are two main parts of the regulation:

- (i) The responsibilities and obligations of specified installations
- (ii) The labeling of electrical products.

The proposed regulation is expected to affect about 500 users, mainly the big installations initially and it would be enforced in several stages according to the type of specified installation as shown in Table 2-5.

**Table 2-5 Obligation of Specified Installation**

Type of specified installation	Obligation	Qualification of efficiency manager	Proposed year of enforcement
Type 1 of Specified Installation with a specified electricity equal or more than 10,000,000 kWh per year (833,000 kWh/month) (equivalent to RM 2.5 million per year)	<ul style="list-style-type: none"> <li>• Make efforts in electricity efficiency and rational use of electricity according to guideline</li> <li>• Select efficiency manager within 6 months</li> <li>• Submit periodical report</li> <li>• Make medium to long term plan</li> <li>• Appoint efficiency committee to look after efficiency programme</li> </ul>	Efficiency manager must hold a certificate of efficiency manager after passing an examination	Year 2003
Type 2 of Specified Installation Category A – for an installation with a specified electricity consumption Equal or more than 8,000,000 kWh/year (660,000 kWh/month) (RM1.9million / year) and less than 10,000,000 kWh/year (833,000 kWh/month) (RM 2.4 million/year)	<ul style="list-style-type: none"> <li>• Make efforts in electricity efficiency and rational use of electricity according to guideline</li> <li>• Select efficiency officer within 6 months</li> <li>• Record electricity usage</li> </ul> <p>Appoint efficiency committee to look after efficiency programme</p>	Efficiency officer must hold a certificate of efficiency officer after passing an examination or attend course and pass examination of a holder of Certificate of efficiency manager	Year 2004
Type 2 of Specified Installation Category B – for an installation with a specified electricity consumption equal or more than 5,000,000 kWh/year (400,000 kWh/month) (RM 1.2 million /year) and less than 8,000,000 kWh/year (660,000 kWh/month) (RM 1.9 million/year)	<ul style="list-style-type: none"> <li>• Make efforts in electricity efficiency and rational use of electricity according to guideline</li> <li>• Select efficiency officer within 6 months</li> <li>• Record electricity usage</li> <li>• Appoint efficiency committee to look after efficiency programme</li> </ul>	Efficiency officer must hold a certificate of efficiency officer after passing an examination or attend course and pass examination of a holder of Certificate of efficiency manager	Year 2005

Source: Notes on the draft electricity efficiency regulation circulated for dialogue in Dec 2001

The certification of the Efficiency Manager, Efficiency Officer and Energy Technician and Energy Auditor is provided for under the draft regulation. All these positions require certificates, which are issued by the Energy Commission. They must pass the examinations conducted by the Energy Commission and courses conducted by the training body accredited by the Energy Commission.

The specified installation shall be mandatory audited every 5 years by an Efficiency Auditor and this shall be enforced in year 2006.

As the focus on high-energy consumption installations, they may not affect the SMIs. However, SMIs may require the services of certified energy/electricity efficiency staff such as efficiency managers, officers or auditors. Also, the provision to prescribe electricity efficient products will have impact on SMIs manufacturers or on SMIs using such products.

The second part of the draft regulation concerns the approval and labeling of Electricity Efficient Products as shown in Table 2-6.

Electricity-using products shall be enforced approval and labeling in stages taking into considerations such as:

- (a) Development of efficiency standard
- (b) Survey on market penetration among consumers
- (c) Minimum efficiency performance standards (MEPS)
- (d) Testing facilities capability, manufacturers capability
- (e) Labeling rating
- (f) Volume on market of new product
- (g) The new phasing out of old product from market and old stock issue
- (h) Economic situations

**Table 2-6 Labeling of Electricity Efficient Products**

Electricity Efficient Products	Products	Proposed year of enforcement
1. Schedule product	Ballast for fluorescent lamp	2002
	Ceiling fan, standard fan, table fan, wall fan, box fan	2002
2. Electricity using product	Refrigerator	2004
	Room air conditioners not exceeding 3kW	2004
	Washing machine	2006
	Lamp fitting	2004
	Compact fluorescent lamp fitting, etc.	2004
	Ballast for high density discharge (HID) lamps	2004
	Thermal storage or instant water heater of capacity not more than 3kW	2006
	Television	2008
	Video monitor / computer	2008
	Vacuum cleaner not exceeding 3kW	2006
	Rice cooker	2006
	Kettle	2006
	Iron & microwave oven	2006

Source: Notes on draft electricity efficiency regulation circulated for dialogue in Dec 2001

## **2.2.2 Present Status of Industrial Pollution**

### **(1) Status of Industrial Sector**

The Malaysian economy grew rapidly at 4.7% p.a. during 1995 and 2000 as shown in Table 2-7. Particularly the manufacturing, construction, and transport, storage and communication sectors enjoyed high growth. The manufacturing sector grew at 9.1% p.a. during the same period. The manufacturing sector's contribution to GDP grew year by year from 27.1% to 33.4% in the period between 1995 and 2000. The manufacturing sector is projected to continue to register positive growth and retain its position as the leading growth sector in the economy. The Government will continue to furnish and implement policy measures that will sustain the growth momentum and strengthen the competitiveness of the manufacturing sector. The share of each sub-sector in GDP is shown in Table 2-7. The share of value added of electronics showed 27.9% in manufacturing industries, which is the largest share among the sector. Of the share of sub-sectors in manufacturing industries, metal products showed 4.6%, textile food processing was 3.5%, food processing, beverages & tobacco indicated 6.8% and paper & paper products was 4.0% in 2000. A major focus of the Government's development



planning strategy is to promote sustainable development through the integration of environmental consideration into all sectors.

**Table 2-7 Growth of Manufacturing Industry**

Industry	Value Added (RM Million in 1987 prices)		Share of Value added (5)		Average Growth %
	1995	2000	1995	2000	
Resource based	21,814	29,939	48.3	42.9	6.5
Vegetables, Animal Oils & Fats	12,03	2,222	2.7	3.2	13.1
Other Food Processing, Beverages & Tobacco	3,504	4,724	7.8	6.8	6.2
Paper & Paper Products	3,030	3,196	6.7	4.6	1.1
Wood and Wood Products	1,888	2,802	4.2	4.0	8.2
Industrial Chemical & Fertilizer	2,581	3,495	5.7	5.0	6.3
Other Chemical & Plastic Products	2,613	3,528	5.8	5.0	6.2
Petroleum Products	2,477	4,262	5.5	6.1	11.4
Rubber Processing & Products	1,549	1,853	3.4	2.7	3.6
Non-Metallic Mineral Products	2,969	3,867	6.6	5.5	5.4
Non-Resource-Base	22,306	38,439	49.4	55.0	11.5
Textiles, Wearing Apparel & Leather	2,311	2,451	5.1	3.5	1.2
Basic Metal Industry	513	1,049	1.1	1.5	15.4
Metal Products	1,551	3,182	3.4	4.6	15.5
Manufacture of Machinery except Electrical	2,675	3,434	5.9	4.9	5.1
Electronics	10,288	19,460	22.8	27.9	13.6
Electrical Machinery	832	1,507	1.8	2.2	12.6
Transport Equipment	4,136	7,356	9.2	10.5	12.2
Others	1,055	1,489	2.3	2.1	7.1
Total	45,175	69,867	100.0	100.0	9.1
% to GDP			27.1	33.4	
Agriculture, Forestry, Livestock & Fishing	17,115	18,154	10.3	8.7	1.2
Mining & Quarrying	13,643	13,907	8.2	6.6	0.4
Construction	7,411	6,996	4.4	3.3	-1.1
Electricity, Gas & Water	5,876	7,090	3.5	3.4	3.8
Transport, Storage & Communication	12,298	16,643	7.4	8.0	6.2
Wholesale & Retail Trade, Hotels & Restaurants	25,304	31,081	15.2	14.9	4.2
Finance, Insurance, Real Estate & Business Services	17,287	24,643	10.4	11.8	7.3
Government Services	11,803	14,678	7.1	7.0	4.5
Other Services	12,780	15,599	7.7	7.5	4.1
(-) Imputed Bank Service Charge	8,888	14,252	5.3	6.8	9.9
(+) Import Duties	6,823	4,864	4.1	2.3	-6.5
GDP	166,625	209,269	100.0	100.0	4.7

Source: Eighth Malaysian Plan

In 2001, the manufacturing sector continued to attract both new investment and reinvestments. A total of 813 applications was approved for manufacturing projects. Of these, 413 applications were new projects and 400 were expansion or diversification projects as shown in Table 2-8. Approvals were in a broad range of industries. The electronics & electrical products remained the leading industries, with the highest number of approvals (249). This was followed by machinery (82), chemical & chemical products (54), fabricated metal products (51) and food products (50).

## **(2) Status of Industrial Pollution**

Industrial pollution can be categorised mainly as air pollution, water pollution and waste. The DOE monitors various pollutant levels on a regular basis. In the industrial sector, water pollution from factories appears to be more significant than air pollution.

### **(i) Air Pollution**

The total number of stationary air pollution sources identified in 2000 was 14,996. The air emission load for the year 2000 was about 2,271,596 metric tonnes (mt) of carbon monoxide, 134,227 mt of hydrocarbons, 349,005 mt of oxides of nitrogen, 374,223 mt of sulphur dioxide and 109,386 mt of particulate matter. Emissions from mobile sources were the most significant contributor to air pollution (81.6%), followed by emissions from stationary sources, such as power stations (8.9%); industrial fuel consumption (6.3%); industrial process (2.0%); domestic fuel consumption (0.3%) and open burning at solid waste dumping sites (0.9%). (Environment Quality Report 2000)

### **(ii) Water Pollution**

For the year 2000, a total of 901 water quality stations along 120 rivers were monitored. The 6 main parameters taken for consideration to compute the water quality index (WQI) include: pH, DO, COD, ammoniac nitrogen and SS. The 2000 WQI reported by the DOE showed that 34 rivers were categorised as clean, 74 rivers slightly polluted and 12 rivers polluted.

The number of polluted rivers had decreased from 13 in 1999 to 12 in 2000 and the number of slightly polluted rivers had increased from 72 to 74 in the same period. The number of clean rivers had decreased from 35 in 1999 to 34 in 2000. The main sources of river pollution are agro-based industries, manufacturing industries, sewage, earthworks and land clearing activities. The main sources of biochemical oxygen demand (BOD) were sewage, agro-based industries and manufacturing industries. The main sources of ammoniac nitrogen were sewage, earthworks and land cleaning.

**Table 2-8 Approved Manufacturing Projects by Industry and Status, 2001 and 2000**

	2001					2000				
	New		Exp./Div.		Total	New		Exp./Div.		Total
	Number	Total Capital Investment US\$	Number	Total Capital Investment US\$	Number	Total Capital Investment US\$	Number	Total Capital Investment US\$	Number	Total Capital Investment US\$
<b>Non-Resource Based</b>										
Electronics & Electrical Products	92	1,323,604,671	157	1,359,539,141	249	2,683,143,812	87	997,049,606	137	2,208,865,475
Transport Equipment	19	248,868,425	20	41,444,514	39	290,312,939	32	153,471,302	14	23,602,918
Scientific & Measuring Equipment	6	116,847,368	11	51,185,682	17	168,033,050	4	7,641,857	6	40,759,928
Machinery Manufacturing	52	119,165,691	30	35,851,286	82	155,016,977	47	191,587,754	17	24,407,954
Basic Metal Products	14	61,283,758	10	92,397,683	24	153,681,441	28	201,044,046	7	5,974,558
Fabricated Metal Products	38	86,185,410	13	33,126,316	51	119,311,726	30	79,436,577	18	28,499,864
Textiles & Textile Products	15	55,790,905	23	20,108,412	38	75,899,317	30	274,134,322	14	38,059,723
Leather & Leather Products	-	-	2	69,474	2	69,474	2	1,515,357	-	-
Miscellaneous	7	25,859,286	5	4,144,737	12	30,004,022	8	12,164,666	8	14,250,482
Sub-Total	243	2,037,605,515	271	1,637,867,243	514	3,675,472,758	268	1,918,045,488	221	2,384,420,902
<b>Resource Based</b>										
Paper, Printing & Publishing	13	1,291,388,582	10	29,260,615	23	1,320,649,197	12	65,243,296	14	335,825,801
Non-Metallic Mineral Products	11	44,677,705	11	475,662,470	22	520,340,175	14	87,906,015	11	376,900,704
Chemicals & Chemical Products	31	120,966,609	23	173,609,174	54	294,575,783	31	120,362,501	21	133,226,393
Food Manufacturing	31	156,333,055	19	77,787,654	50	234,120,709	47	198,412,653	27	79,920,716
Rubber Products	12	23,724,880	25	117,931,280	37	141,656,160	13	192,172,698	15	55,956,761
Plastic Products	28	92,345,868	18	37,781,621	46	130,127,489	24	108,454,591	13	53,728,080
Wood & Wood Products	20	68,569,321	12	36,423,861	32	104,993,182	12	47,613,547	10	47,060,853
Furniture & Fixtures	18	27,992,587	8	14,075,195	26	42,067,782	25	73,200,906	11	17,594,053
Petroleum Products (Incl. Petrochemicals)	3	11,399,061	3	22,611,842	6	34,010,903	3	233,538,395	4	384,086,316
Beverages & Tobacco	3	6,930,778	-	-	3	6,930,778	4	11,893,173	4	18,013,158
Natural Gas	-	-	-	-	-	-	1	1,901,244,737	-	-
Sub-Total	170	1,844,328,446	129	985,143,713	299	2,829,472,159	186	3,040,042,510	130	1,502,312,835
Total	413	3,881,933,961	400	2,623,010,956	813	6,504,944,917	454	4,958,087,999	351	3,886,733,737

Source: MIDA

The estimated number of effluent-related sources for the year 2000 was 13,992 comprising mainly of agro-based industries, manufacturing industries, pig farms and sewage treatment plants. The pollution load contributed by these four sectors significantly affects the river water quality in Malaysia. Based on the source inventory compiled in 2000 by DOE, as shown in Table 2-9, out of the 16 types of manufacturing industries, the main water polluting sources were the food and beverage industry with 1,538 sources constituting 23.7% in the total number, followed by electric and electronic industry (1738, 1.4%), chemical based industry (729, 11.2%), paper (571, 8.8%), textile (481, 7.4%), metal finishing & electroplating (343, 5.3%).

**Table 2-9 Industrial Water Pollution Sources**

	1998	1999	2000
Leather	59	55	13
Others	75	73	34
Refinery/Petroleum	70	73	53
Rubber Mill	162	134	54
Machinery	143	135	59
Wood-based	172	161	94
Plastic	77	170	128
Transport-based	222	175	182
Mineral Finishing & Electroplating	433	241	341
Palm oil Mill	326	337	343
Non-Metallic Mineral	267	346	343
Rubber-based	285	372	357
Electric & Electronic	452	443	432
Textile	387	452	481
Paper	409	468	571
Metal Fabrication	195	568	729
Chemical –based	638	687	738
Food& Beverage	1,158	1,424	1,538
Total	5,530	6,314	6,490

Source: Environmental Quality Report 2000,1999 and 1998

### **(iii) Solid Wastes from Factories**

As industrial activities are not directly under the purview of the local authorities, data of

solid waste directly discharged from factories is not available to the local authorities, unless the industry is concerned about applying for the disposal of industrial wastes at the local authority's dumping/landfill site. For the time being, the data of MAWAR by DOE, SIRIM's information, and FMM information described in 2.1.1(2) are available in the Study.

(a) Types of Solid Wastes from Factories

The solid wastes directly discharged from factories are paper, cartons, plastics, bottles, metal scraps (copper, aluminum, tin, zinc and solder etc.), which currently are disposed via licensed vendors at landfill sites or resold to other industrial premises for the purposes of recovery and recycling.

(b) Scrap Vendors

Currently, the local authorities license these scrap vendors under the Licensing By-Laws of the Local Government Act, 1976. Licensed vendors or contractors can dispose at approved landfill sites with permission from local authorities. If licensed vendors and contractors request to change the category of an industrial waste from scheduled waste to solid waste, it is required to get additional permission from DOE after strict screening by DOE. These licensed vendors therefore act as the middleman in the trading of scraps and unregulated solid wastes between industries.

(c) Illegal Dumping and Trade

Based on the DOE's records and media coverage pertaining to illegal dumping of waste, such illegal dumping of scheduled wastes has been quite rampant over the years especially when the central waste management centre for toxic and hazardous wastes operated by Kualiti Alam Sdn. Bhd. started operation. The rampant illegal dumping of scheduled waste appears to be the result of ignorance and unscrupulous tactics in trying to avoid the attention of the authorities as well as paying for the disposal of scheduled wastes at the licensed central waste management centre.

There is also illegal dumping in rivers and remote rural areas, depending on the severity of monitoring and law enforcement.

Based on media coverage pertaining to illegal dumping of waste, there are definitely traders or recyclers who are illegally collecting or recycling wastes from the industrial sectors. One area of concern is the recycling of used oil (hydraulic oil) from workshops and motor service stations, which is conducted mostly in an illegal manner. However, the activity has not posed obvious environmental problems so far and therefore has been

going on for years.

Although the disposal of wastes requires a license from the local government, many traders have no license at all.

#### **(iv) Recovery and Treatment Facilities of Scheduled Waste**

##### **(a) Treatment of Scheduled Waste in 1999 and 2000**

Table 2-10 shows scheduled wastes treated in 1999 and 2000.

**Table 2-10 Treatment of Industrial Waste and Clinical Waste (tones)**

#### **1999**

Treated Waste	Amount Treated	Percent
Kualiti Alam Sdn. Bhd	70,479	18.4
Clinical incinerators	4,571	1.2
Exported for recovery	5,186	1.4
Off-site recovery	189,306	49.4
Kept inside factory premises	113,640	29.6

#### **2000**

Treated Waste	Amount Treated	Percent
Kualiti Alam Sdn. Bhd	84,321	24.5
Clinical incinerators	3,781	1.1
Exported for recovery	4,878	1.4
Off-site recovery	120,571	35.0
Kept inside factory premises	130,998	38.0

In spite of the Government's efforts to facilitate treatment and control of disposed industrial wastes by constructing good treatment facilities, there still exists 29.6% (1999) and 38.0% (2000) of untreated waste kept inside factory premises while 49.4% (1999) and 35.0% (2000) of scheduled waste is recycled in off-site recovery plants.

There are two significant problems associated with waste treatment facilities - high capital and operating costs and demand on technical capabilities.

First, based on the waste management fees charged by Kualiti Alam Sdn. Bhd., there is a big difference between the cost of direct disposal at municipal landfills and the cost of disposal at Kualiti Alam, which requires some form of treatment before disposal. This difference in cost is the main reason for the high percentage of untreated waste still kept inside factory premises.

Secondly, the current organic waste profile received at Kualiti Alam shows a very high concentration of solid and sludge wastes. High solid content in wastes is of concern because of the potential of solids entrainment and carryover to downstream devices. The effect of such carryover can significantly reduce on-stream availability and operation of the entire system, especially the boiler and cooling tower. Several interruptions have been encountered due to this phenomenon.

#### **(b) Recovery and Utilisation Facilities**

Currently, there are thirty-five (35) off-site waste recovery facilities and five (5) approved facilities licensed by the DOE for the utilisation of wastes. The growth of off-site recovery plants over the past seven years (7 in 1993 and 35 in 2001) indicates that the market demand has grown over the years. These facilities are licensed by the DOE on a yearly basis. Approved waste utilisation facilities and a list of waste recovery off-site facilities as of 2001 are shown in ANNEX-2.

#### **(c) Recovery within Manufacturing Factories**

Some manufacturing industries have associated incorporated recycling facilities within their process operations. For example, one battery manufacturing industry carries out the recycling of acid lead batteries within the plant and uses recovered lead for new battery manufacturing. Lead is recovered up to almost 100% by the application of comparatively simple technology.

As another example, one solder manufacturing plant incorporates recycling within its manufacturing process and thus is effectively recycling solder dross generated within its own operations as well as that collected from outside.

Most of the information on recovery and recycling activities within manufacturing processes is difficult to obtain, because it is of a confidential nature and contains knowledge of the whole process in many cases.

#### **(v) SMIs**

The other main contributors to these environmental problems are SMIs that supply goods and services to larger corporations. Based on the Eighth Malaysian Plan, SMIs accounted for more than 90% of total manufacturers. SMIs are in the traditional sectors of food and food products, furniture and fixtures, chemical and chemical products and metal products sub-sectors.

Waste treatment and disposal methods were generally lacking or poor in SMIs. SMIs are thus seen to be a major source of industrial pollution due to their use of old technologies, and lack of proper waste management and pollution control practices. SMIs face various constraints such as low capital investment, low profit margins, lack of technical know-how and lack of access to modern technologies, low budget operations and inadequate management. All these therefore identify SMIs as the primary targets for adoption of CP.

#### **(vi) Overview of Targeted 4 Sectors and Factories**

Four industrial sectors were selected for the application of CP and conducted CP audit and demonstration project. These are metal finishing and electroplating, food, textile and pulp and paper industries, which recorded a low compliance status under the Environment Quality (Sewage and Industrial Effluents) Regulations, 1979. Though the palm oil and raw natural rubber industries mark low compliance rate, these industries were not selected because of insufficient experience in Japan.

##### **(a) Metal finishing and electroplating industry**

The electroplating industry is unique in that it consists of a scattered distribution of numerous backyard factories. Most are SMIs engaged in plating component parts with heavy metals for supply to multi-national corporations. The industry produces waste and wastewater, which contain large amounts of heavy metals. It has historically been problematic due to inability to comply with environmental and waste disposal regulations.

There is hardly any report available about recycling within these factories. However, much of the wastes generated from this industry are collected and transported to off-site recovery plants for recycling. These are as follows;

- Spent aqueous alkaline solutions / Degreasing and rinsing (N101 and N111)
- Spent aqueous acid solutions / Acid pickling and rinsing (N131)
- Spent aqueous inorganic solutions / Acid pickling and rinsing (N132)
- Metal hydroxide sludge / Wastewater treatment plant (N151)
- Plating bath sludge containing cyanide / Plating (N161)

Recycling or recovery of nickel and copper are businesses that are doing very well because of the high prices for these metals. However, metal recovery from chromate, zinc and zinc dross is difficult because of the comparatively lower prices of these metals.

DOE currently targets the electroplating industry for environmental enforcement. The



electroplaters were fined repeatedly due to non-compliance to discharge limits. The effluent from electroplaters, which contains heavy metals and other toxic chemicals, is a serious problem in areas where there is a concentration of plating industries.

The electroplating industries however would prefer to have DOE enforce the law across the board to all factories in the electroplating sector instead of selectively as it is done at present. The electroplating factories that had installed waste treatment facilities have incurred higher costs of operation and thus have become less competitive.

Electroplating is a very competitive industry in Malaysia. A slight increase in the cost of regulatory compliance can price them out of the market. Although quality is important, price is often the determining factor to customers.

#### (b) Textiles

The definition of textile industry is very wide - from the upstream synthetic fiber and natural fiber manufacturing, to the downstream fabrication, dyeing and apparels (finished products) manufacturing. In Malaysia, the business of fabrication and finishing products is active so both these two areas were surveyed in this study.

##### (Preparation of fabric)

Recycling of fiber wastes is not practical in Malaysia. During production of yarn, fiber wastes are generated but the volume is not large enough to warrant the installation of a recycling unit that recycles the wastes into yarn again. In addition, due to the advancement of technology the volume of wastes is becoming smaller and smaller in the industry. Today the waste percentage is targeted at 4% (as compared to 5% as the general standard). Furthermore, the cost of collecting the wastes could be too high for the recovery of waste fiber. In foreign countries, such recycling is practiced to a certain extent, due to the availability of a large volume of wastes. The yarn wastes are used to produce some other products like mops and cleaning cloth for workshops.

Environmental issues include the discharge of coloring chemicals and spillages in the production processes. However, so far no one is doing any recycling of dye/chemicals in Malaysia.

In foreign countries, the recycling of the dye has just started in Sweden. The technology of dyeing has improved from drum-type dyeing to current high pressure and vaporised dyeing. This will increase the efficiency of dye usage in the process because of the decreased liquid ratio. This means the percentage of dye in the wastes will be even

smaller.

#### (Finished products)

Wastes are high in the form of work piece remnants, over purchased stocks, and off-spec products. Some people buy these wastes to do other things like making cheap apparel, rags, blankets and other cloth-related products. The recycling initiative is done at the cottage industry level. The collection of remnant wastes is done by the manufacturer and subcontractors of these recycled products.

#### (c) Food and Beverage

There are not many reports on recycling of industrial wastes within or outside the factories.

A few of the recycling initiatives include the following:

- The use of coconut wastes to make animal feed
- The use of skin and bones from abattoirs to make glue
- The use of prawn shells to make Chitosan for removing fats

Investigation was carried out on five factories. The wastes were found to be mainly packaging materials for products, feedstock and auxiliary materials, which were of small amounts and not considered harmful. These are reused, returned to suppliers or treated in factories.

#### (d) Pulp and Paper

There are no reports on industrial waste recycling within or outside the factories. However, used newspapers, computer printing paper, magazines and cardboard and cartons are actively being collected for recycling at a number of paper factories.

Three factories were investigated. Among them, one factory uses used cardboard as feedstock after removing plastic in the pre-treatment stage. All the three factories discharge sludge containing no harmful materials like heavy metals.

#### **(vii) Status of compliance with the Sewage and Industrial Effluents Regulations 1997 (SIER)**

The Environmental Report 1998 stated that 86% out of 3,889 manufacturing industries inspected under the SIER, complied with the Regulations. Specifically, those industries with low compliance rate were Food and Beverage (72%), Paper (71%), Metal Finishing and Electroplating (65%), Textiles (60%) and Fisheries and Animal Food (50%). Table 2-11 shows the compliance rate of the four targeted sectors.

**Table 2-11 Comparison of Selected Sub-sectors**

	% of Compliance	Number of industries
Food & Beverage	72	603
Paper	71	127
Metal Finishing and Electroplating	65	190
Textile	60	176

Source: DOE, Environmental Quality Report (1998)

### **2.2.3 Issues of Environmental Regulations**

#### **(1) CP**

Although the EQA has sections related to promotion of CP, they are not implemented.

#### **(2) Enforcement of Regulation**

- Because factories need investment to meet regulation standards, factories need time to prepare design and raise fund. This requires a wider application of contravention licenses for such factories.
- It is observed that regulatory enforcement by DOE needs to be strengthened and the costs of conducting enforcement and the associated site visits are expensive.
- Although the Energy Efficiency regulation was drafted, it is not yet enforced.

#### **(3) Pollution prevention approach**

- The use of economic instruments is limited, while the effectiveness of economic instruments is proven in Malaysia, especially in palm oil effluents.
- Voluntary approach, such as self-environmental auditing/monitoring and self-disclosure by the factories, is not advocated.

## **2.3 Incentives**

### **2.3.1 Present Status of Incentives**

Incentives currently applicable in Malaysia are shown below.

#### **(1) Tax Incentives For Investment**

Tax incentives, both direct and indirect, for the manufacturing, agriculture and tourism sectors are provided in the Promotion of Investments Act 1986, Income Tax Act 1967, Customs Act 1967, Sales Tax Act 1972 and Excise Act 1976. The direct tax incentives are designed to grant partial or total relief from the payment of income tax for a limited period of time. Indirect tax incentives are given in the form of exemptions from import duty, sales tax and excise duty.

Incentives for CP investment are not specified in Malaysia. The applicable incentives for CP investment are described hereafter.

#### **(i) Incentives for the Environmental Protection**

##### **(a) Incentives for the Storage, Treatment and Disposal of Toxic and Hazardous Wastes**

Incentives exist to encourage the setting up proper facilities to store, treat and dispose toxic and hazardous wastes. Companies that are directly involved in these three activities in an integrated manner qualify for:

- Pioneer Status (income tax exemption on 70% of statutory income for five years); or
- Investment Tax Allowance of 60% of capital expenditure incurred within a period of five years to be set off against 70% of the statutory income in the assessment year. Any unutilised allowance can be carried forward to subsequent years until the whole amount has been used up; or
- Activities located in the promoted areas (Sabah, Sarawak and the “Eastern corridor” of Peninsular Malaysia) are eligible for Pioneer Status or Investment Tax Allowance in accordance with that given in the promoted areas.

Applications should be submitted to MIDA.

##### **(b) Incentives for Energy Conservation**

In order to reduce operation costs and at the same time promote environmental preservation, companies providing energy conservation services qualify for Pioneer Status or Investment Tax Allowance. Activities located in the promoted areas are offered

higher exemptions/allowances under Pioneer Status or ITA to set off against their statutory income. The companies must implement their projects within one year of approval. This incentive applies to applications received by 31 December 2002.

Applications should be submitted to MIDA.

**(c) Incentives for Waste Recycling Activities**

Companies undertaking waste recycling activities that are of high value added and use high technology enjoy Pioneer Status or Investment Tax Allowance. Activities located in the promoted areas are offered higher exemptions/allowances under Pioneer Status or ITA to set off against the statutory income. This includes recycling of agricultural wastes or agricultural wood-based panel boards or products.

Applications should be submitted to MIDA.

**(d) Incentive for Utilising Biomass**

To encourage the generation of energy using biomass which is renewable and also environment friendly, companies, which undertake such activities, qualify for Pioneer Status or Investment Tax Allowance, with activities located in the promoted areas offered higher exemptions/allowances under Pioneer Status or ITA to set off against the statutory income. This is on the condition that the company implements the project within one year from the date of approval. This incentive applies for applications received by 31 December 2002.

For the purpose of this incentive, ‘biomass sources’ refers to palm oil mill/estate waste, rice mill waste, sugar cane mill waste, timber/sawmill waste, paper recycling mill waste, municipal waste and biogas (from landfill, palm oil mill effluent (POME), animal waste and others), while energy forms in this incentive refer to electricity, steam, chilled water, and heat.

Applications should be submitted to MIDA.

**(e) Additional Incentives for Environmental Protection Projects**

■ **Accelerated Capital Allowance**

This incentive is for a special allowance at an initial rate of 40% and an annual rate of 20% (to be written off within a period of 3 years) for all capital expenditure on related machinery and equipment incurred by:

- Companies, which are themselves waste generators and wish to establish facilities to store, treat and dispose of their wastes, either on-site or off-site.
- Companies, which conserve their own energy consumption.
- Companies undertaking waste recycling activities.

Applications should be submitted to IRB. In the case of companies, which conserve their own energy consumption, application should be accompanied with a letter from the Ministry of Energy, Communications and Multimedia certifying that the related equipment is used exclusively for the purpose of conservation of energy.

**(ii) Exemption from Import Duty and Sales Tax on Machinery and Equipment**

Import duty and sales tax are not imposed on most machinery and equipment not produced locally. Where import duty and sales tax applies, exemption can be obtained for machinery and equipment used:

- Directly in the manufacturing or agricultural processes, approved services projects, film and music production houses or manufacturing related services
- For environmental protection, energy conservation, biomass energy, waste recycling, storage, treatment and disposal of toxic and hazardous waste
- For maintenance and quality control
- For approved R & D activities
- In approved training programmes
- In the plantation sector

Companies can also obtain sales tax exemption for machinery and equipment that are produced locally.

Applications should be submitted to MIDA.

**(iii) Incentive for the Use of Environmental Protection Equipment**

Companies using environmental protection equipment receive an initial allowance of 40% and an annual allowance of 20% on the capital expenditure incurred on such equipment. Thus, the full amount can be written off within three years.

Claims should be submitted to the IRB.

**(iv) Incentives for the Manufacturing Sector**

**(a) Main Incentives for Manufacturing Companies**

The major tax incentives for companies investing in the manufacturing sector are the Pioneer Status or Investment Tax Allowance.

Eligibility for Pioneer Status or Investment Tax Allowance is based on certain priorities, including the levels of value-added, technology used and industrial linkages. Such eligible projects are termed as “promoted activities” or “promoted products” (please refer to the list by MIDA).

■ **Pioneer Status**

A company granted Pioneer Status enjoys a 5-year partial exemption from the payment of

income tax. It will only have to pay tax on 30% of its statutory income, with the exemption period commencing from its Production Day (defined as the day its production level reaches 30% of its capacity).

As an additional incentive, companies located in the States of Sabah and Sarawak and the designated “Eastern Corridor” of Peninsular Malaysia, will only have to pay tax on 15% of their statutory income during the 5-year exemption period. All project applications received until 31 December 2005 are eligible for this additional incentive.

Applications for Pioneer Status should be submitted to the Malaysian Industrial Development Authority (MIDA).

\* Statutory Income is derived after deducting revenue expenditure and capital allowances from the gross income.

+ The “Eastern Corridor” of Peninsular Malaysia covers the States of Kelantan, Terengganu and Pahang, and the district of Mersing in the State of Johor.

#### ■ Investment Tax Allowance (ITA)

As an alternative to Pioneer Status, a company may apply for Investment Tax Allowance (ITA). A company granted ITA gets an allowance of 60% of qualifying capital expenditure (such as factory, plant, machinery or other equipment used for the approved project) incurred within five years from the date on which the first qualifying capital expenditure is incurred.

Companies can offset this allowance against 70% of their statutory income in the year of assessment. Any unutilised allowance can be carried forward to subsequent years until fully utilised. The remaining 30% of statutory income will be taxed at the prevailing company tax rate.

As in the case of Pioneer Status companies, an additional incentive is enjoyed by companies located in the States of Sabah and Sarawak, and the designated “Eastern Corridor” of Peninsular Malaysia. These companies can obtain an allowance of 80% of the qualifying capital expenditure incurred. The allowance can be utilised to offset 85% of their statutory income in the year of assessment. All applications received until 31 December 2005 are eligible for this additional incentive.

Applications for ITA should be submitted to MIDA.

#### (b) Additional Incentives for the Manufacturing Sector

Companies investing in Malaysia’s manufacturing sector are also eligible for the following incentives :

#### ■ Reinvestment Allowance (RA)

All manufacturing companies that have been in operation for at least 12 months and incur qualifying capital expenditure to expand production capacity, modernise and upgrade production facilities, diversify into related products, and automate its production facilities can obtain a Reinvestment Allowance (RA).

The RA is 60% of qualifying capital expenditure incurred by the company, and can be offset against 70% of its statutory income for the year of assessment. Any unutilised allowances can be carried forward to subsequent years until fully utilised.

The RA will be given for a period of 15 consecutive years beginning from the year the first reinvestment is made. Companies can only claim upon completion of the qualifying project, i.e. after the building is completed or when the plant/machinery is put into operational use. Assets acquired for the reinvestment cannot be disposed during two years from the time of reinvestment.

Companies which undertake reinvestment projects in Sabah, Sarawak and the designated “Eastern Corridor” of Peninsular Malaysia can offset the RA against 100% of their statutory income for the year of assessment.

Applications should be submitted to the IRB.

#### ■ Accelerated Capital Allowance (ACA)

After the 15-year period of eligibility for Reinvestment Allowance (RA), companies that reinvest in the manufacture of promoted products are eligible to apply for Accelerated Capital Allowance (ACA). The ACA on capital expenditure is to be utilised within three years, i.e. an initial allowance of 40% in the first year and annual allowances of 20%.

Applications should be submitted to the IRB accompanied with a letter from MIDA certifying that the companies are producing promoted manufactured products.

#### ■ Tax Exemption on the Value of Increased Exports

To promote exports, manufacturing companies in Malaysia qualify for:

- A tax exemption on statutory income equivalent to 10% of the value of increased exports, provided that the goods exported attain at least 30% value-added; or
- A tax exemption on statutory income equivalent to 15% of the value of increased exports provided that the goods exported attain at least 50% value-added.

Claims should be submitted to the IRB.

Table 2-12 lists up-dated MIDA incentives available for investment in general.



**Table2-12 Incentives for Investment**

1.	Incentives for the Manufacturing Sector
1.1	Main Incentives for Manufacturing Companies
	Pioneer Status
	Investment Tax Allowance
1.2.	Incentives for High Technology Companies
1.3.	Incentives for Strategic Projects
1.4	Incentives for Small-Scale Companies
1.5	Incentives to Strengthen Industrial Linkage
1.6	Incentives for the Manufacture of Machinery and Equipment
1.7	Additional Incentives for the Manufacturing Sector
2.	Incentives for Agricultural Sector
3.	Incentives for the Tourism Industry
4.	Incentives for Environmental Protection
4.1	Incentives for Forest Plantation Projects
4.2	Incentives for Storage, Treatment and Disposal of Toxic and Hazardous Waste
4.3	Incentives for Energy Conservation
4.4	Incentives for Waste Recycling Activities
4.5	Incentive for Utilising Biomass
4.6	Additional Incentives for Environmental Protection Projects
5.	Incentives for Research and Development
6.	Incentives for Training
7.	Incentives for Information and Communication Technology
8.	Incentives for Approved Service Projects
9.	Incentives for the Shipping and Transportation Industry
10.	Incentives for Manufacturing Related Services
11.	Incentives for Multimedia Super Corridor
12.	Incentives for Operational Headquarters
13.	Incentives for International Procurement Centre
14.	General Incentives

Source: MIDA

## **(2) Grant**

Grants specifically designed for CP investment are not provided in Malaysia. There are various kinds of grants for SMIs investments. Among the grant schemes, the Industrial Technical Assistance Fund (ITAF) Scheme and Factory Auditing Fund provided by SMIDEC will be applicable to SMIs' CP for obtaining consultancy and advisory services. ITAF1 is available for technology feasibility study for CP. ITAF2 is applicable to improvement and upgrading of existing processes for CP and ITAF3 is applicable for productivity improvement which is one of main scheme of CP. In addition to ITAF, the Factory Auditing Grant for assisting SMIs in auditing their capabilities of management,

financial, production, logistic, marketing and R&D is one of the applicable grants for CP promotion, which have potential to be linked to the large companies.

Among Grant schemes for SMIs, details of ITAF and Factory Auditing Grant are described below:

**(i) Industrial Technical Assistance Fund (ITAF) by SMIDEC**

The Industrial Technical Assistance Fund (ITAF) Scheme has been in operation for 10 years, since its inception in 1990. Over the period, the scheme had been reviewed and fine-tuned to meet the different needs of SMIs at different stages of their development. The scheme has four components:

**(a) ITAF 1: Business Planning and Development Scheme**

Business Planning and Development Scheme (ITAF 1) is an assistance scheme in the form of a matching grant to SMIs for consultancy and advisory services in business planning and development.

The Scheme provides matching grants to consultancy services in the following areas:

- Market feasibility studies
- Technology feasibility and feasibility studies
- Business planning studies
- Studies on market strategy both domestic and export

**(b) ITAF 2: Process and Product Development Scheme**

Product Development and Process Improvement Scheme (ITAF 2) is an assistance scheme in the form of a matching grant to SMIs to improve and upgrade indigenous technology through the development of new products, designs and processes.

The Scheme provides matching grants to SMIs for:

- Upgrading of existing product
- Upgrading of product design
- Upgrading of existing process

**(c) ITAF 3: Productivity and Quality Improvement Scheme**

Productivity and Quality Improvement, and Certification Scheme (ITAF 3) is an assistance scheme in the form of a matching grant to SMIs to upgrade productivity and quality and achieve international standards and certification.

The Scheme provides matching grants to SMIs for:

- Productivity and quality improvement

- Productivity and quality improvement based on customer's requirements
- Documentation of productivity and quality improvement
- Productivity and quality system certification
- Total Quality Management Scheme (TQM)
- Other quality development systems such as 5S, Production and Planning Control (PPC), Quality Control Circles (QCC) and Total Productivity Maintenance (TPM).
- Occupational and safety measures
- Quality series: ISO 9000, ISO 14000, ISO 18000
- HACCP

(d) **Factory Auditing Grant**

Factory Auditing Grant is a financial assistance scheme given in the form of a matching grant to SMI companies covering areas such as management, financial, production, logistic and marketing as well as the research and development (R&D) capabilities.

The scheme provides matching grants to SMIs for consultancy services in the following areas:

- To undertake diagnostic audits on SMI companies that have potential to be linked to large companies.
- To assist SMIs in identifying their strengths and weakness in order to help them undertake remedial measures to enhance their capabilities.

(ii) **Grants dedicated for SMIs and Manufacturing including SMIs**

Table 2-13 lists the outlook of grants dedicated for SMIs and for Manufacturing including SMIs.

**Table 2-13 Grant for Investment**

Facilities	Purpose	Condition	Implementing Agency
Grant Dedicated for SMIs			
1. Industrial Technical Assistance Fund (ITAF)	(a) ITAF1: Assist in Business Planning and Development	50% matching grant, up to RM40,000 per company	SMIDEC
	(b) ITAF2: Assist in Process and Product Development	50% matching grant, up to RM250,000 per company	
	(c) ITAF3: Assist in Productivity, Quality Improvement and Certification	50% matching grant, up to RM250,000 per company	
	(d) ITAF4: Assist in Export Market Development	50% matching grant, up to RM40,000 per company	
2. E-Commerce Grant	Assist SMIEs to integrate themselves into the mainstream of the Information and Communication Technology	70% of project cost, max RM10,000 per company	SMIDEC
3. Factory Auditing Grant	Assist SMIEs in auditing their capabilities of management, financial, production, logistic, marketing and R&D	50% of project cost, max. RM 10,000 per company	SMIDEC
Grants for Manufacturing including SMIs			
1. Technology Acquisition Fund			MTDC
i) Purchase of high-tech equipment and machinery	Promote technology upgrading through introduction and utilisation of modern and efficient technology	50% of total cost	
ii) Technology licensing	To acquire high-tech machinery and equipment to enhance production processes and physical development of new products.	70% of licensing fees	
iii) Acquisition of patent rights, prototypes and design	Facilitate the transfer of technology to local companies.	70% of cost	
iv) Placement of Malaysians in foreign technology-based companies and foreign technology institutes	Expose Malaysians and upgrade their knowledge of technology development.	50% or RM30,000, 3 persons per project.	
v) Expert Sourcing Programme	Assist firms to engage foreign technical experts and consultants in upgrading their products and processes	50% or RM30,000, whichever is lower	
vi) Information dissemination seminar/workshop	Assist industry associations and chambers of commerce to engage foreign experts to advise in upgrading current technological capacity of its member companies	RM50,000	
2. Industry Research & Development Grant Scheme (IGS)	To encourage Malaysian companies to be more innovative in using and adopting existing technologies and creating new technologies, products and processes which will benefit the national economy	70% of project cost	MOSTE

Source: MITI

### **(3) Loans for SMIs**

There are many loan schemes providing low interest loan for SMIs. Especially during and after currency crisis, Government provided more preferential conditions for SMIs, such as the Financial Package for SMIs. The following loans are useful for promotion of CP investments among various finance sources for SMIs.

(a) Modernisation and Automation Scheme (MAS)

Purchase of machinery & equipment for modernisation and automation

(b) Quality Enhancement Scheme (QES)

Purchase of machinery & equipment for quality enhancement

(c) Financial Package for SMI (PAKSI)

Purchase of factory, machinery & consultancy

(d) Small & Medium Scale Industry Promotion Programme (SMIPP)

Purchase of fixed assets, machinery & equipment

Table 2-14 shows the loans for investment.

**Table 2-14 Loans for Investment**

Facilities	Purpose	Condition	Implementing Agency
<b>Loans Dedicated for SMIs</b>			
1. Modernisation and Automation Scheme (MAS)	Purchase of machinery & equipment for modernisation and automation	Period: 5-10 years Interest: 4% a.m.	SMIDEC/MIDF
2. Quality Enhancement Scheme (QES)	Purchase of machinery & equipment for quality enhancement	Period: 5-10 years Interest: 4% a.m.	SMIDEC/Bank Pembangunan
3. Financial Package for SMI (PAKSI) i) Project ii) Working Capital	Purchase of factory, machinery & consultancy Purchase of raw materials	Period: 10 years Interest: 3.5-4% a.m. Period: Full completion of contract	SMIDEC/Bank Industri & Teknologi manufacturing industries
4. Small & Medium Scale Industry Promotion Programme (SMIPP)	Purchase of fixed assets, machinery & equipment	Period: 15 years Interest: 7% a.m.	Bank Industri & Teknologi, Bank Pembangunan, MIDF
5. Fund for SMIs II (TIKS II)	To promote export oriented SMI companies	Period: 7 years Interest: 6% a.m.	CGC
6. Rehabilitation Fund for SMIs	To assist viable SMIs that have defaulted on loan payments	Period: 7 years Interest: 5% a.m.	Bank Negara Malaysia
7. Special Loan Scheme i) ASEAN-Japan Development Fund	Promote development of Malaysian SMIs	Period: 5-12 years Interest: 6.5 & 7.75% a.m.	MIDF, EXIM Bank: for Bumiputera only
<b>Loans for Manufacturing Sector including SMIs</b>			
1. Normal Loan Scheme: i) Project ii) Leasing iii) Share Financing	Fixed asset loan, working capital and syndicated loans. Leasing financing of machinery & equipment.  Take up equity in companies.  Assist exporters to finance part of their working capital during production stage.	Period: Fixed asset: 12 years. Working Capital: 2-4 years. Interest: BLR1+2% Period: 5 years Interest: 5% Period: 5 years Interest: 5%	Bank Pembangunan
2. Suppliers' Credit Scheme i) Pre-shipment ii) Post-shipment	Assist exporter to finance part of their working capital during production stage Provide funds to exporters for their export sales on credit.	Period: 120 days Interest: 9%  Period: 180 days Interest: 9%	Bank Industri & Teknologi  Bank Industri & Teknologi

**Table 2-14 Loans for Investment (2)**

Facilities	Purpose	Condition	Implementing Agency
Loans for Manufacturing Sector including SMIs (cont'd)			
3. Buyer's Credit Scheme	Assist foreign importers to purchase Malaysian manufactured goods.	Period: 10 years Interest: 9%	Bank Industri & Teknologi
4. Import Trade Financing	Assist Malaysian importer for purchase of raw materials, industrial intermediate goods and capital goods.	Mark-up: based on 12 months US\$ * LIBOR months + spread of mm 2.0% for member countries; non-member countries is 2.5%	Bank Industri & Teknologi (Exim Bank)
5. Export Financing Scheme	Purchase of consumer goods, intermediate goods and capital goods.	Mark-up based on 12 months US\$ LIBOR + spread of 0.175% to 0.464%~	Bank Industri & Teknologi (Exim Bank)
6. Installment Sale / Leasing	(i) Purchase of ocean-going ships and industrial machinery and equipment  (ii) Leasing of industrial machinery equipment	12 years Mark-up: 5.5, rebate of 15% of mark-up 15 years Mark-up: 5.5, rebate of 15% of mark-up	Bank industri & Teknologi (Exim)
7. Special Loan Scheme i) New Entrepreneur Fund  ii) New Entrepreneur Fund Guarantee Scheme  iii) Bumiputera Industrial Fund	Purchase of fixed assets, machinery, equipment and working capital. To provide 80% guarantee of principal loan  Purchase of machine equipment and for working capital	8 years, 5%  8 years guarantee period, 5% 8 years, 5%	Bank Pembangunan CGC Bank Pembangunan, MIDF, CGC
8. New Principal Guarantee Scheme	For Export Credit Refinancing (ECR), bills purchased, trust receipts, hire purchase, leasing, bank guarantees	BLR+2	CGC
9. Flexi Guarantee Scheme	For guarantee SMI financing for: Fund 2 (TIKS2), Rehabilitation Fund for SMEs	TIKS: 6.5, 3F: 4/0, NEF: 8.0	CGC
10. Banker's Export Finance Insurance Policy	(TPIKS), New Entrepreneur Fund (NEF), Fund for Food (3F)	180 days credit	Malaysian Export Credit insurance Bank
11. Majlis Amanah Rakyat (MARA)	Indemnifies local banks against loss from the failure of an exporter/supplier to repay export loans/advance due to insolvency and/or protected default.	1-10 years, 5.5-7.0	MARA
12. Fund for Food (3F)			Bank Negara Malaysia

Source: MITI

#### **(4) Award**

The prestigious Hibiscus award was introduced in 1996 as a premier private sector environmental award for business and industry in Malaysia. In 1999 however, the award was renamed the 'Prime Minister Hibiscus Award' after obtaining the consent of the Prime Minister's Office of Malaysia. The winner of the award receives a plaque, certificate and the entitlement to use the Hibiscus Logo for publicity purposes.

#### **2.3.2 Issues of Incentives**

Though the tax incentives for promotion of CP among tax incentives are available and some soft financing for CP investment is applicable, the bottlenecks are listed below.

- (i) SMIs' lack of awareness of incentives for CP investment
- (ii) Difficult access to incentives
  - SMIs lack of awareness of incentives for CP investment
  - SMIs lack of knowledge of the procedures to approach such incentives
  - Complicated application forms for accessing incentives
  - Lack of friendly support for SMIs to access incentives
- (iii) Lack of clarity on eligibility of incentives
  - CP is not mentioned in the documents on eligibility
  - No indication of ITAF availability for CP promotion
- (iv) Difficult access to bank financing and poor operation of existing financing schemes
  - Poor support for SMIs to access to bank finance, particularly on the issue of collateral
  - Complicated financing scheme
  - Lack of bankers' understanding on CP
- (v) Lack of award system for CP promotion



## **2.4 Potential of Cleaner Production (CP)**

### **2.4.1 Market Assessment of CP**

No reports are currently available on the market for CP in Malaysia. Instead, a limited number of information is provided for the environmental market as follows:

- (a) “Malaysia Sector Summaries: Environment” by British High Commission, ([http://www.britain.org.my/trade/sector\\_summary/environment.htm](http://www.britain.org.my/trade/sector_summary/environment.htm))
- (b) “Malaysia: Environmental Market Analysis” by US-AEP (<http://www.usaep.org/export/em-malaysia-ema-v4.htm>)
- (c) “Overview of the Market for Environmental Technologies, Malaysia” by ITA (<http://web.ita.doc.gov/etc/eteinfo.nsf/>)

According to the report (a) mentioned above, “the market for wastewater treatment plants is estimated to be around RM300 million per annum and is seen as a potential growth area.” In addition, the report refers to clean technologies, i.e. manufacturing process that reduce waste, as an area with great potential.

The report (b) states “the market for environmental goods in Malaysia stood at \$720 million in 1997. There also remains a demand for environmental engineering and auditing services for Environmental Impact Assessment (EIA) reports that are required by law or undertaken to meet ISO14000 certification. The environmental equipment market relies heavily on new plant investments retrofits and upgrades to existing plants for sales growth. In this respect, Malaysia’s new investments in information technology and the petrochemical sector should present business opportunities.”

The report also analyzes various industries’ motivation and ability to purchase environmental goods and services based on environmental regulatory compliance data and economic performance data. Table 2-15 shows the estimated market size for environmental investments in 1997.

The report (c) states “In 1997, Malaysia’s environmental market is estimated between \$700-\$750 million. Water utility revenues make up nearly half (about 48%) of the country’s total environmental market. The remaining 52% of total revenues is sourced from federal/state/local government and industry clients.” The report adds “In the services sector, opportunities exist in: environmental auditing, management systems, impact assessments, GIS technology and consultants, oil spill recovery and remediation technology, and soil erosion technology. The consulting and engineering market was estimated to be \$30 million in 1997.”

**Table 2-15 Estimated Environmental Market (1997)**

Segment		RM million
Equipment	Water Equipment & Chemicals	330
	Air Pollution Control	85
	Instruments & Monitoring Systems	65
	Waste Management Equipment	65
	<b>Process &amp; Prevention Technology</b>	<b>15</b>
Services	Solid Waste Management	160
	Hazardous Waste Management	15
	<b>Consulting &amp; Engineering</b>	<b>100</b>
	Remediation	10-15
	Analytical Services	35
	Water Treatment Works (municipal & Industrial)	330
Resources	Water Utilities	1100
	Resource Recovery	7-10
Total		2,300

Source: Environmental Business International, Inc. (San Diego, California)  
(Figures recalculated using exchange rate RM3.3=US\$1)

To summarise, the environmental market in Malaysia is estimated at RM1,200 million per annum excluding the market of RM1,100 million for water resources. It should be noted that treatment technology related businesses account for the majority of the estimated market.

Table 2-16 shows percent investment in the manufacturing industry in Japan classified by objectives. The METI has published investment statistics based on information gathered by the questionnaire method every year. The figures were made up by averaging the approximate component ratios of investment objectives, which were given by enterprises in the manufacturing industry in response to the questionnaire; therefore, they are not necessarily consistent with those obtained by averaging the investment amount in the manufacturing industry. Besides, the statistics before 1985 are not published. The classification of investment objectives are as follows:

Objective-A Increase of Production Capacity: Installment or enhancement of factories, facilities or equipment aiming to increase production capacities;

Objective-B Renewal, Repair: Renewal, replacement or partial repair of worn-out or old-fashioned factories or production facilities;

Objective-C R&D: Installation or introduction of equipment or facilities for the purpose of research and development;

Objective-D Energy Conservation: Introduction of equipment or facilities for energy conservation or energy conversion such as waste heat recovery

systems, cogeneration systems, or the like;

Objective-E Environmental Protection: Introduction of equipment or facilities concerning industrial pollution prevention (prevention of air pollution, water pollution, noise and others), waste treatment or recycling, or post CFCs;

Objective-F Rationalisation: Introduction of equipment or facilities that are helpful in cost reduction; e.g. computer systems for Factory Automation (FA) or Office Automation (OA), or investment for rationalisation or laborsaving in each area of production, sales or administration;

Objective-G Others: Investment in IT technology that does not belong to other categories, or other investments.

**Table 2-16 Investment Ratio by Objectives in the Manufacturing Industry  
in Japan**

Unit: %

Year	Category						
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
1985	30.9	14.2	10.7	3.8	<b>1.9</b>	19.4	19.1
1986	28.2	15.5	11.4	3.7	<b>1.8</b>	19.2	20.0
1987	31.0	14.1	12.8	3.0	<b>1.1</b>	19.2	18.8
1988	35.6	12.5	12.3	2.3	<b>1.3</b>	16.9	19.0
1989	36.8	12.6	10.8	2.2	<b>1.4</b>	16.3	19.8
1990	37.4	11.3	10.5	1.7	<b>1.5</b>	15.7	22.0
1991	34.9	11.5	10.3	1.6	<b>1.9</b>	16.6	23.2
1992	33.0	13.2	9.7	1.7	<b>2.4</b>	17.3	22.6
1993	33.5	16.2	9.1	1.9	<b>2.9</b>	17.0	25.9
1994	31.3	16.0	9.9	1.5	<b>2.5</b>	17.4	23.3
1995	33.4	15.4	9.4	2.1	<b>2.9</b>	17.5	21.4
1996	35.3	15.2	10.1	2.0	<b>2.8</b>	16.1	20.9
1997	42.2	12.7	9.8	1.4	<b>2.4</b>	13.9	18.7
1998	38.8	14.4	9.7	1.5	<b>2.5</b>	15.4	18.6
1999	41.3	14.8	9.7	2.1	<b>2.6</b>	14.3	15.5
2000	48.3	13.6	1.01	1.3	<b>2.3</b>	11.9	13.0

Source: Research and Statistics Department, Economic and Industrial Policy Bureau, METI

A large investment was made in Japan for End-of-Pipe (EOP) technology aiming at prevention of industrial pollution that had become serious during 1960s. As industrial pollution prevention was settled temporarily, the ratio of pollution prevention investment

had decreased afterwards and leveled off at 1-3% after 1985.

Among the investment objectives A through G mentioned above, D (energy conservation) and a part of B (Renewal, maintenance and repair) and F (Rationalisation and laborsaving) are deemed deserving to be CP. It is considered that an approximately same level of investment has been made for CP although an accurate evaluation is impossible because details of individual investment are not clear.

In order to estimate the market for CP in Malaysia, the following should be incorporated as well as referring to the data in Japan:

- The environmental market in Malaysia mentioned before could be relatively larger than the pollution prevention investment in Japan in 1980s where pollution prevention measures had already been taken. Accordingly, the CP market should be estimated to be smaller than that in Japan.
- CP should be adopted before treatment technologies; i.e. End-of-Pipe (EOP) technologies, so that the environmental investment is reduced, because CP provides cost-effective solutions compared with EOP. CP is more acceptable than EOP technologies to industries, SMIs in particular; therefore, the potential market for CP is expected to be large in case an appropriate promotion measures are implemented.
- CP is not to replace all of EOP technologies.

It may be given as a conclusion that the market for CP in Malaysia is estimated at approximately RM1,000 million per annum.

#### **2.4.2 Role and Effectiveness of CP in Industrial Development**

As CP has a position as a Win-Win approach, it is expected that CP can play a more important role in industrial development as well as contributing to the environmental protection. CP should bring about benefits to both an implementing enterprise and the whole society.

Benefits that an enterprise can enjoy are summarised as follows:

- Productivity improvement through cost reduction comprised of the following elements:
  - Reduction of treatment cost required for the prevention of air pollution and water pollution through waste minimisation,
  - Cost reduction through improving unit consumption of raw materials, supporting goods and utilities, and/or
  - Reduction of labour cost through improved efficiency.
- Compliance with the environmental regulations.

- Improvement of product quality through optimal operation,
- Improved corporate image, and
- Enhanced business opportunity as an integrated effect of the factors mentioned above.

Accordingly, it is expected that CP contribute to improving the corporate nature of SMIs as a cost effective measure.

On the other hand, CP promotion cannot be conducted autonomously but needs strong leading measures supported by the government. In the case where CP is successfully promoted in Malaysia, not only enterprises but also the society can enjoy benefits, which are summarised as follows:

- Reduction of the environmental pollution burden,
- Preservation of precious resources through decreased consumption of electric power and industrial water,
- Enhancement of industrial linkage through improved production management standard in SMIs,
- Promotion of CP consulting business and CP equipment supply business,
- Improved international competitiveness as an integrated effect of the factors mentioned above.

Thus CP should be strongly promoted as one of the important pillars in industrial development, as it contributes to strengthening industrial structure.