Acknowledgment

This document is the culmination of efforts and between various entities cooperating towards improving the performance of the Egyptian industry and the environment. We hereby acknowledge the effort of all entities particularly the internal working groups within the different concerned ministries who enriched the work with their valuable contributions and comments. We also acknowledge the role of the local and international consultants who contributed significantly in preparation of this document.

Preamble

Cleaner Production in the industrial production process consists of one of the following measures, or combination thereof:

- Conserving raw materials
- Energy and water conservation
- Elimination of hazardous raw materials through material substitution
- Reducing emissions to all environmental media through technology modification, pollution abatement and good management within the establishments such as good housekeeping practices
- Reduction of waste generation at the source

The cleaner production concept is not new to Egypt, and forms of it have been applied in a variety of settings. However, Egypt has had no formal policy or strategy on cleaner production. As such, the Egyptian Government, represented by Egyptian Environmental Affairs Agency (EEAA) has set forth to develop such a policy and strategy.

The current document is the culmination of an effort that spanned the period of about two years. In the third quarter of 2001, the Environmental Pollution Abatement Project (EPAP) of EEAA initiated Phase 1 of the activities towards cleaner production policy. This activity was carried out by EPAP, and local and international consultants, who reviewed the existing practices in some industrial sectors in Egypt, identified the existing and perceived barriers against cleaner production implementation, and proposed a framework for encouraging cleaner production uptake in Egypt.

In March 2002, these initial activities resulted in the preparation of a two-volume background document, representing the framework for cleaner production implementation in Egypt. The document was reviewed by the stakeholders.

In November 2002, Phase 2 of the cleaner production activities was initiated with the formation of an inter-ministerial committee, representing the following organizations:

- Ministry of State for the Environment/EEAA
- Ministry of the Industry
- Ministry of Electricity
- Ministry of Finance
- Ministry of Public Enterprise
- Ministry of Foreign Trade
- Ministry of Petroleum
- Ministry of State for Scientific Research
- Federation of Egyptian Industry
- Industry Modernization Program
- Local consultants

Internal working groups within each ministry were later established to formulate each ministry's position on cleaner production.

During the year 2003 discussions were carried out with the internal working groups within each ministry. Based on the provided comments and inputs from the different working groups, a first daft of this document was issued and discussed with a group of local and international experts. Based on such discussions the document was revised, elaborated and presented to the working groups and the inter-ministerial committee members for their review, comments and guidance.

This document was presented to the inter-ministerial committee in a seminar included representatives of all concerned ministries and stakeholders for its approval to be adopted as a national framework guiding the implementation of the cleaner production strategy in the Egyptian industries.

List of Abbreviations

CDM	Clean Development Mechanism
CP	Cleaner Production
DANIDA	Danish International Development Agency
ECO	Environmental Compliance Office
EEAA	Egyptian Environmental Affairs Agency
EMS	Environmental Management System
EOP	End-of-Pipe
EPAP	Egyptian Pollution Abatement Project
EPF	Environmental Protection Fund
ESCO	Energy Services Companies
FEI	Federation of Egyptian Industry
GDP	Gross Domestic Product
GEF	Global Environment Facility
IMC	Industry Modernization Centre
MIT	Ministry of Industry and Technological Development
MOI	Ministry of the Industry
NCPC	National Cleaner Production Centre
NEAP	National Environmental Action Plan
NREA	New and Renewable Energy Authority
POPs	Persistent Organic Pollutants
SEAM	Support for Environmental Assessment and Management
SFD	Social Fund For Development
SMEs	Small and Medium Enterprises
UNEP	United Nation Environmental Program
UNIDO	United Nations Industrial Development Organization

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1. Introduction

1.1 Objectives of this Document

The main role of this document is to develop integrated procedures for CP for the Egyptian industry within an agreed national policy. In this regard, the objectives of this document are:

- To define cleaner production and contrast it to other measures for achieving environmental compliance, such as end of pipe treatment
- To clarify the advantages of cleaner production to the Egyptian industry and other stakeholders
- To identify the barriers which may hinder the wide application of cleaner production in the Egyptian industry

And accordingly the document:

- Draws a strategy for encouraging the adoption and implementation of cleaner production in the Egyptian industry
- Presents the necessary action items that the Egyptian Government should take to facilitate the uptake of cleaner production in the Egyptian industry
- Prioritizes these action items based on a set of pre-determined criteria
- Identifies prerequisites, time frame and required resources for each immediate term action item.

1.2 What is Cleaner Production?

The United Nations Environment Program (UNEP) definition of cleaner production is:
Cleaner Production means the continuous application of an integrated preventative environmental strategy to processes, products and services to increase efficiency and reduce risks to humans and the environment.

Cleaner production is a *continuous application* process to the manufacturing process, and covers a wide range of activities, such as good housekeeping practices, process modifications, process redesign, materials substitution, and changes in technology. Cleaner production is an *integrated preventive environmental strategy* as it stresses the prevention of pollution at the source, instead of treatment of the ensuing emissions and discharges.

The *increased efficiency* resulting from cleaner production results from efficiency of raw material utilization, conservation of energy, and conservation of water. Cleaner production *reduces risks to humans and the environment*, as it entails the elimination/reduction of hazardous material utilization through

material substitution, reduction of emissions to environmental media, and reduction of waste generation at source.

Within this context, cleaner production requires changing attitudes, exercising responsible environmental management and promoting technology changes.

1.3 CP compared with End-of-pipe Methods?

Cleaner production is contrasted to other, reactive methods, such as end-of-pipe methods. End-of-pipe methods include the use of a variety of technologies and products to treat liquid and gaseous effluents. In general, end–of–pipe methods transform the pollution from one medium into another (e.g. air emissions are transformed into wastewater, water discharged is transformed into solid waste, etc.) End-of-pipe methods cater to the current standards, which are more focused on regulating effluent *concentration*, rather than *load*. Table 1 presents a comparison between end-of-pipe and cleaner production approaches.

Table 1. Contrasting Cleaner Production to End-of-Pipe Approaches

Criterion	End-of-pipe	Cleaner Production
Methodology	Reactive	Proactive
Scope	Piece-wise	Integrated
Approach	Traditional	Modernization of the industry
Economic	Add-on cost	Cost savings

In this regard it should be mentioned that this document focuses on CP as an effective method for improving the efficiency of industrial processes, resources conservation and reducing adverse environmental impacts through minimizing the generated waste. Thus the document aims at developing an integrated strategy for CP implementation in the industrial sector. In this respect, it should be clarified that the document does not disregard the role of end-of-pipe methods as mean for achieving compliance to the legal requirements and as a last resort for reducing the environmental impacts of the industrial establishments. The two volumes of the first CP document includes general background of the CP concept as well as examples for implementation from national and international experiences.

1.4 Facts about Cleaner Production

The lack of awareness regarding CP affects the attitude of industries towards its acceptance and implementations. Therefore introducing the concept of CP to industries is a key requirement.

1.4.1 Cleaner Production Does Not Necessarily Have to be Prohibitively Expensive

The level of complexity of the approach varies, and could include simple measures such as good housekeeping and process improvement, to more complex measures such as product life cycle management.

Whether to implement the low cost or the higher cost interventions depends on the specifics of the individual establishment. However, the reward may be greater for larger investments. While good management practices would focus on bringing the production process performance to the level designed, small investments may improve on the design performance while larger investments may involve the redesign of the process.

1.4.2 Cleaner Production is Applicable To All Firm Sizes

Cleaner production is just as applicable, and useful, to small and medium enterprises (SMEs) as it is to large enterprises.

Again, large cleaner production investments concerning changing production *technology*, may be out of reach for smaller firms. However, it was established in the previous point that various lower cost measures are available for these firms to implement.

1.4.3 Cleaner Production is Applicable to Developing Countries

Cleaner production is *not* a luxury that only developed countries can afford. In fact, developing countries, such as Egypt, not only *can* apply cleaner production measures, but they *must* do so, in order to compete on the international markets. The reward of cleaner production implementation in Egypt will be far reaching, including improved production efficiency and increased export opportunities.

Two major factors represent advantages to developing countries, such as Egypt. First, much of the industrial stock may be obsolete and its replacement/modernization represent an opportunity to adopt CP technologies. Moreover, this process takes place at a time when substantial steps in CP concepts and design practices are already taken in more developed countries.

1.4.4 ISO 14001 Certification is not a Substitute for Cleaner Production

Although the ISO 14001 certification for the Egyptian industry is encouraged to show environmental concern, it is not a substitute for cleaner production. This is especially true, as the standard itself does not necessarily require cleaner production. However, ISO 14001 requires continuous improvement, which can be a driving force for cleaner production. Accordingly, it would be wise to adequately utilize the opportunity that the current drive in Egyptian industry to acquire ISO 14001 certification represents to include cleaner production considerations as a cost effective option to environmental improvements , e.g in the training and awareness processes of ISO 14001. This linkage will also prove useful with TQM and ISO 18000 series.

1.5 Benefits of Cleaner Production to the Egyptian Industry

Cleaner production is a must if the Egyptian industry were to remain competitive in external markets in the face of increasing pressures of globalization. Implementation of cleaner production in Egyptian manufacturing process will result in products that are better, cheaper, and less polluting. This will help open more of the world markets for Egyptian products, and give Egyptian products a much-needed competitive edge. The Egyptian industry will also be able to claim environmentally-friendly products. Annex (A) presents the benefits that the Egyptian Industries can reap from utilizing cleaner production principles and methods, which could be summarized in increasing productivity and achieving cost effectiveness, encouraging improvement in the production process, increasing export opportunities, coping with globalization movement by improved competitiveness and improving the work environment.

1.6 Barriers to Widespread Implementation of CP in the Egyptian Industry

Many of the barriers against cleaner production identified in other countries are applicable to Egypt. Annex (B) describes in detail the most important barriers facing the implementation of CP in Egypt, and the measures that can be implemented to overcome these barriers as well as to capitalize on available opportunities.

The main barriers are summarized in the following: information barriers (eg. limited available information, limited corporate awareness, limited public and governmental awareness), attitude barriers (such as lack of clear goals, poor transparency of the industry and weak enforcement), financial obstacles (such as limited ability to raise internal and external funds, perverse economic incentives and inadequate accounting system), and the technical barriers resulting from lack of technical know-how necessary to assess the shortcomings of the facilities to identify wasteful practices, and rooms for improvement.

1.7 Existing Activities

A number of national documents on the environment have been developed over the past few years in Egypt, the most notable of which include:

- the Ministry of Petroleum is currently developing a “Strategic Plan to accelerate Natural Gas use in the industrial and commercial sector” (2004)
- The National Environmental Action Plan, NEAP (2003)
- Energy/Environmental Review in Egypt, World Bank, (2003)
- The National Environmental Disasters Response Plan (Draft,2002)
- Draft Egypt’s Strategy on the Clean Development Mechanism, (2001)
- The Framework for the Egyptian National Energy Efficiency Strategy, (2001)

- Implementation of Renewable Energy Technologies Projects, UNEP / NREA (2000)
- The National Strategy for Municipal Solid Waste Management (1999)
- The National Action Plan on Climate Change (1999)

The current document does not intend to replicate any of these documents, and in principle does not contradict with their directives. In fact, these documents share a number of premises with the current document, including the economic pricing of inputs and services, the polluter pays principle, and most importantly they provide the necessary strategic clarity to achieve the environment improvements sought by the political leadership. The cleaner production strategy and action has a specific focus and therefore intersects with a number of specialized documents (e.g. those energy related) and elaborate on the principles expressed in the more general ones (e.g. NEAP).

Cleaner production concepts are not new to Egypt. In fact, a number of CP projects are either being considered, or have been implemented in Egypt. Furthermore, CP constitutes an integral element in the activities of a number of ministries in Egypt. Examples include the activities carried out by the Ministry of Petroleum to reduce air pollution resulting from energy production. The Ministry of Industry is currently establishing The National Cleaner Production Centre (NCPC) in cooperation with the United Nation Industrial Development Organization (UNIDO). In addition, the Military of Foreign Trade is developing plans and policies to provide support to producers and exporters in international trade fairs. The Ministry of Electricity is taken various initiatives to promote CP including energy conservation, new and renewable energy activities through its strategy in this field. This is shown in Annex (C).

Moreover, a number of institutional arrangements were recently established, or are currently being considered in Egypt, which bear a strong relation with CP policies and activities. These include the Industrial Modernization Center (IMC) and the National Cleaner Production Center (NCPC) both under the auspices of the Ministry of Industry and Technological Development (MIT). While the first is part of the Egyptian Industrial Modernization Program (IMP) supported by the EU, the second is part of an international network of such centers established with UNIDO's support. On the other hand, an Environmental Compliance Office (ECO), is established in the Federation of Egyptian Industries (FEI) with Danish support. Finally, the Egyptian Environmental Affairs Agency (EEAA) is establishing an Industrial Unit to orchestrate its approach, including support, to industry. EEAA also includes the Egyptian Council for Clean Development Mechanism (EC4CDM) and the Egyptian Bureau for Clean Development Mechanism (EB4CDM)

These institutions represent a wealth of experience and capabilities which should be utilized in the formulation and implementation of the CP strategy. However, as detailed in Annex (D), only the Industrial Unit of EEAA has clearly expressed its intent to work on an environmental policy framework,

including the CP strategy, which reflects EEAA legal mandate. Other environmentally oriented organizations, namely ECO and NCPC, will play important roles in awareness raising, information dissemination, training and demonstration projects. However, their foreseen contribution to relevant policies is peripheral, as potential influence rather than direct involvement. Moreover, they are geared towards financially sustainable service provision. Finally, the IMP can complements this institutional structure if it adequately addresses the associated environmental aspects.

1.8 Target Organizations

The primary target organizations are the different governmental agencies, since the strategy and action plan focus on the role of the Egyptian Government, and the initiatives and policy instruments which the Government should take to promote the implementation of cleaner production in the Egyptian industry.

This naturally implies in general a pivotal role for the Ministry of Industry and Technology (MIT), and the Egyptian Environmental Affairs Agency (EEAA). There are however important roles to be played by other concerned governmental and non-governmental parties. A preliminary identification is made of whether an organization plays a primary or support role when addressing specific action items.

Although the role of individual companies is not listed separately, the success of the implementation of this strategy and action plan is only possible when the Egyptian industries are full partners in the process, since they are the actual implementers of the measures that this strategy aims to influence. Government policies only set the framework within which decisions will be made. Although, the strategy targets the governmental bodies, it does not disregard the key role of the Federation of Egyptian Industries (FEI) which presents the institutional umbrella of the Egyptian industries[1].

Other parties that should influence and be influenced in the process are service providers to industry, including financial, research and development, as well as technical services institutions. It should be stressed that the role of the government in this regard is facilitating and initiating since there is a need to set the system in motion and encourage the services providers – especially the private sector- to provide support to the industrial establishments. The role of the government is expected to decrease as more establishments are realizing the benefits of CP. The governmental role would then be limited to ensuring a suitable framework for implementation.

The strategy and action plan do not exclusively focus on large industrial establishments, as many of the action items proposed are equally applicable to small and medium enterprises (SMEs). Admittedly, however, the ease of implementation (from a technical know-how, and financial means) may be

[1] For the purpose of this document the industrial establishments to be considered for CP implementation are all establishments represented by the different Chambers in the FEI.

greater for larger enterprises. Some actions, therefore, specifically target SMEs to support them in overcoming the higher barriers they face. This is especially critical since establishments having less that 50 employees represent more that 99% of industrial establishments in Egypt.

2. Strategic Framework

2.1 Scope of the Strategy and Action Plan

- ***Industry (Manufacturing)***
  The main focus of this cleaner production strategy and action plan is the industrial production process and production life cycle. The industrial sector in Egypt contributes to about 20% of the Egyptian GDP and employs approximately 15% of the workforce. Moreover, it results in considerable environmental impacts. Therefore, reducing industry generated discharges to the environment will have strong impacts on reducing environmental degradation.
  Excluded from this strategy and action plan is cleaner production as it applies to the service sector (e.g. tourism), the agricultural activities such as the organic farming, and the exploration and production in the mining and petroleum sectors. However, the framework provided should allow consideration of these issues in future strategy revisions.

- ***Focus on Production Processes***
  The main focus of the document is on the production processes, including the manufacturing processes and the internal activities for recycling and reuse of the waste.

- ***Recycling and CP***

  Product recyclability is an integral part of cleaner production. In terms of industrial processes, this strategy's primary focus is on waste prevention. Therefore, internal recycling (on-site recycling) is part of its CP definition. On the other hand, although external recycling of generated waste (off-site recycling) addresses an important environmental problem, it requires conducting various studies for recollection, developing relevant legislations and incentives, recycling technologies as well as specifications for the recycling goods and their markets. Therefore, recycling industry and products manufactured from discarded material are not included in the scope of this document.

- ***Products and production processes***
  The production processes and their products (outputs) cannot be easily separated. This is especially true in cases were:

  - Products which production currently uses hazardous chemicals, which could partially be embodied in the product (e.g. cadmium

in textile dyes), or which could be harmful to the environment (e.g ozone depleting substances); and

- Products which design promote conservation of input materials. In some other cases the production of environmentally performing products is totally separate from environmentally sensible manufacturing processes and the opposite may also be true. Examples are energy efficient appliances /equipment (e.g. refrigerators) which production process does not take cleaner production into account.

- Products which design facilitates their future recycling at their end-of-life thus reducing the product's environmental impacts.

Therefore, because of the need for a clear focus, the document addresses only a part – which is related to production and the manufacturing process- of what the Earth Summit 2002 labeled as "Sustainable Production and Consumption" Given this document's focus, the first category is included in its scope where clean products are fully integrated with the manufacturing processes, while the second, and the third, clearly as important, should be the subject of complementary but separate documents. Since the second is concerned with the environmental impacts of product use in terms of resource consumption, which is not necessarily integrated with the manufacturing product. The third is related to the end—of life of the product after production and use.

- ***Working definition of Cleaner Production***

Cleaner production is a relative, dynamic, concept. It is expressive of this characteristic that the term originally used was "clean production", later realized not to express reality both because such production does not really exist and because there should be a continuous drive for improvement. The concept thus expressed has a strong reference to the actual state of industry from which improvement starts. The important operational result of this characteristic is that what is CP today might not be so in the future, assuming that the Egyptian industry is progressing in the desired direction. For the purpose of policy development and the application of tools to the appropriate cases, this dynamic feature needs to be taken into account.

Cleaner Production will be therefore defined as that which environmental performance is reasonably superior to the current performance of the Egyptian industry, sector or process as the case might be. The development of operational definitions in this respect,

as well as the continuous updating of the industry's status, are therefore essential pre-requisites of policy implementation.

- ***Application of the document***
  A number of CP activities have elected a sectorial focus, reflecting the skewed structure of the Egyptian industry, where the manufacturing capacity is concentrated on relatively few industrial sectors.

  There are seven main industrial sectors in Egypt, the largest of which are food and beverages, textiles and chemicals, which are the oldest industries established in Egypt. These are followed by non-metallic minerals, metal production and basic metals. Establishments manufacturing furniture, ceramics, and pharmaceuticals are gradually increasing their market share. The focus on the largest sectors is more effective in terms of increasing the scope of demonstration projects. However, policy interventions targeting isolated sectors are not always possible, desirable or politically acceptable. It is therefore practical to preserve the generality of this document and consider possible targets on operational or geographic level.

  This concept is in accordance with the industry modernization policy addressed in the Green Paper of the Industry Modernization Programme where it is suggested to focus on the promising establishments of different sizes in all sectors that have favorable conditions and are interested in carrying the changes required for CP implementation.

- ***The Organizational and Financial status of establishments***
  The financial status of many of establishments of the public enterprise comprises a major barrier facing the implementation of the different projects. Thus CP implementation would be affected as a result of that. Moreover, a number of industrial sectors are facing chronic financial crises hindering their modernization and improvement. In both cases, policies need to be developed and strategic interventions need to be carried out regarding options for improving the financial status of such establishments. This is not within the scope of this strategy that is primarily aiming at encouraging and promoting the concept of CP and its implementation in the industries to which the industries respond according their financial and economic capabilities. In addition, this document does not address unregistered SMEs to which CP concepts would be applicable. This is mainly because determining the number of such industries as well as their performance status requires developing long term polices and methodologies as well as enormous financial and human recourses.

2.2 Vision and Goal

Cleaner production contributes significantly to realizing two main national visions corresponding to the aims of the political leadership in improving the

quality of life with the industry being the vehicle towards that end and achieving a healthy environment for the current and future generations.
The first national vision is concerned with modernization of Egyptian industry, and the second involves sustainable development. The former states that:

> " By the year 2022, Egypt is to become a leading industrialized country in the MENA Region (Middle East and North Africa) being an investment magnet in the region and is positively integrated in the world economy." **(Green Paper of Industrial Policy in Egypt, 2003)**

While the national vision on sustainable development states that:

> " Egypt is also to balance between its economic and industrial development needs and at the same time strive to overcome the environmental challenges resulting from such developments. This is to be carried out within the implementation framework of the Egyptian Agenda 21" **(NEAP, 2002)**

President Hosny Mubarak, in 1997, has made a powerful indicative statement stressing Egypt's commitment to the environment and indicated that environmental problems should be dealt with seriously without reluctance or hesitation. Furthermore, the President indicated on 28th May, 2002 that the environment is not a luxury as it related to the protection of our natural resources for our generation and the generations to come. He reaffirmed the importance of the integration of the national efforts to modernize the agriculture, industry and services sectors. He said that the environmental dimension should be integrated with this modernization process. Finally, President Mubarak specified that the environmental dimension should be a part of the feasibility study of any project to avoid negative aspects of such project on the environment. This political attitude confronts the environmental degradation that accompanied the accelerated developmental activities over the last decades.

The commitment of the Egyptian government towards industry modernization is manifested by the establishment of the Industry Modernization Program (IMP), which is a long term program financially supported by the EU as well as the technological centers established within the different industrial chambers. Furthermore, activities and arrangements are carried out by the Ministry of Foreign Trade within its internal strategy for supporting exporters through participation in international trade fairs.

CP is one of the tools for achieving the vision related to environmental improvement and sustainable development aiming at resource efficiency and conservation and minimization of waste generation, addition to the direct link between CP and sustainable development, there are other integrated links between the different applications that achieve the required visions. On one hand, the industry modernization initiatives taken by the government for the purpose of improving the industrial performance and material efficiency promote the implementation of CP, similarly CP contributes significantly to modernizing the industrial stocks as well as improving the productivity. On

the other hand, integrating CP in the manufacturing processes results in production of goods meeting one of the main requirements for acessing the international markets, thus opening the way to the Egyptian exports. This would encourage the industries to adopt CP in their manufacturing processes.

Within this context the **Goal** of the CP strategy is:

"The performance of Egyptian industries is improved to become in line with current international developments through the wide and accelerated adoption of CP in the Egyptian industries". This contributes directly to realizing the two visions related to industry modernization and sustainable development.

2.3 Policy Statement

At present, there is no Egyptian policy on cleaner production. Previous experience shows that declarations of commitment from top officials in Egypt, on similar high profile concepts, have been effective in bringing the issues of interest to the forefront of the community interest, on a public, private, and media fronts.

This can be accomplished effectively through the signature of the International Declaration on Cleaner Production by the Egyptian Prime Minister. The declaration is a voluntary but public statement of commitment to adoption and practice of Cleaner Production, thus there is no legal commitment on Egypt for signing it but rather an ethical commitment. The declaration text is included in figure (1).

The Declaration was launched in October 1998 at Phoenix Park, South Korea, with 67 inaugural signatories. Signing ceremonies at other national and international venues are continually adding more Declaration partners to the Signatory List. Currently, the total regional and national signatories amounts at upward of 1700. They represent national, provincial, state, and local governments; companies, business associations, industry and professional bodies, consultants; NGOs and community groups; Academia, societies, cleaner production centers, working groups, and productivity councils; and International agencies and inter-governmental organizations. Accordingly, signing the declaration can be carried out by all interested entities or organization, whether governmental or not.

The policy statement paves the way for implementing the strategy for which the framework is presented in this document according to the approach outlined in figure (2). However, it is not an essential prerequisite for implementation.

UNEP

INTERNATIONAL DECLARATION ON CLEANER PRODUCTION

We recognize that achieving sustainable development is a collective responsibility. Action to protect the global environment must include the adoption of improved sustainable production and consumption practices.

We believe that Cleaner Production and other preventive strategies such as Eco-efficiency, Green Productivity and Pollution Prevention **are preferred options**. They require the development, support and implementation of appropriate measures.

We understand Cleaner Production to be the continuous application of an integrated, preventive strategy applied to processes, products and services in pursuit of economic, social, health, safety and environmental benefits.

To this end we are committed to:

LEADERSHIP — ***using our influence***

- to encourage the adoption of sustainable production and consumption practices through our relationships with stakeholders.

AWARENESS, EDUCATION AND TRAINING — ***building capacity***

- by developing and conducting awareness, education and training programmes within our organization;
- by encouraging the inclusion of the concepts and principles into educational curricula at all levels.

INTEGRATION — ***encouraging the integration of preventive strategies***

- into all levels of our organization;
- within environmental management systems;
- by using tools such as environmental performance evaluation, environmental accounting, and environmental impact, life cycle, and cleaner production assessments.

RESEARCH AND DEVELOPMENT — ***creating innovative solutions***

- by promoting a shift of priority from end-of-pipe to preventive strategies in our research and development policies and activities;
- by supporting the development of products and services which are environmentally efficient and meet consumer needs.

COMMUNICATION — ***sharing our experience***

- by fostering dialogue on the implementation of preventive strategies and informing external stakeholders about their benefits.

IMPLEMENTATION — ***taking action to adopt Cleaner Production***

- by setting challenging goals and regularly reporting progress through established management systems;
- by encouraging new and additional finance and investment in preventive technology options, and promoting environmentally-sound technology cooperation and transfer between countries;
- through cooperation with UNEP and other partners and stakeholders in supporting this declaration and reviewing the success of its implementation.

Figure 1: International Declaration on Cleaner Production

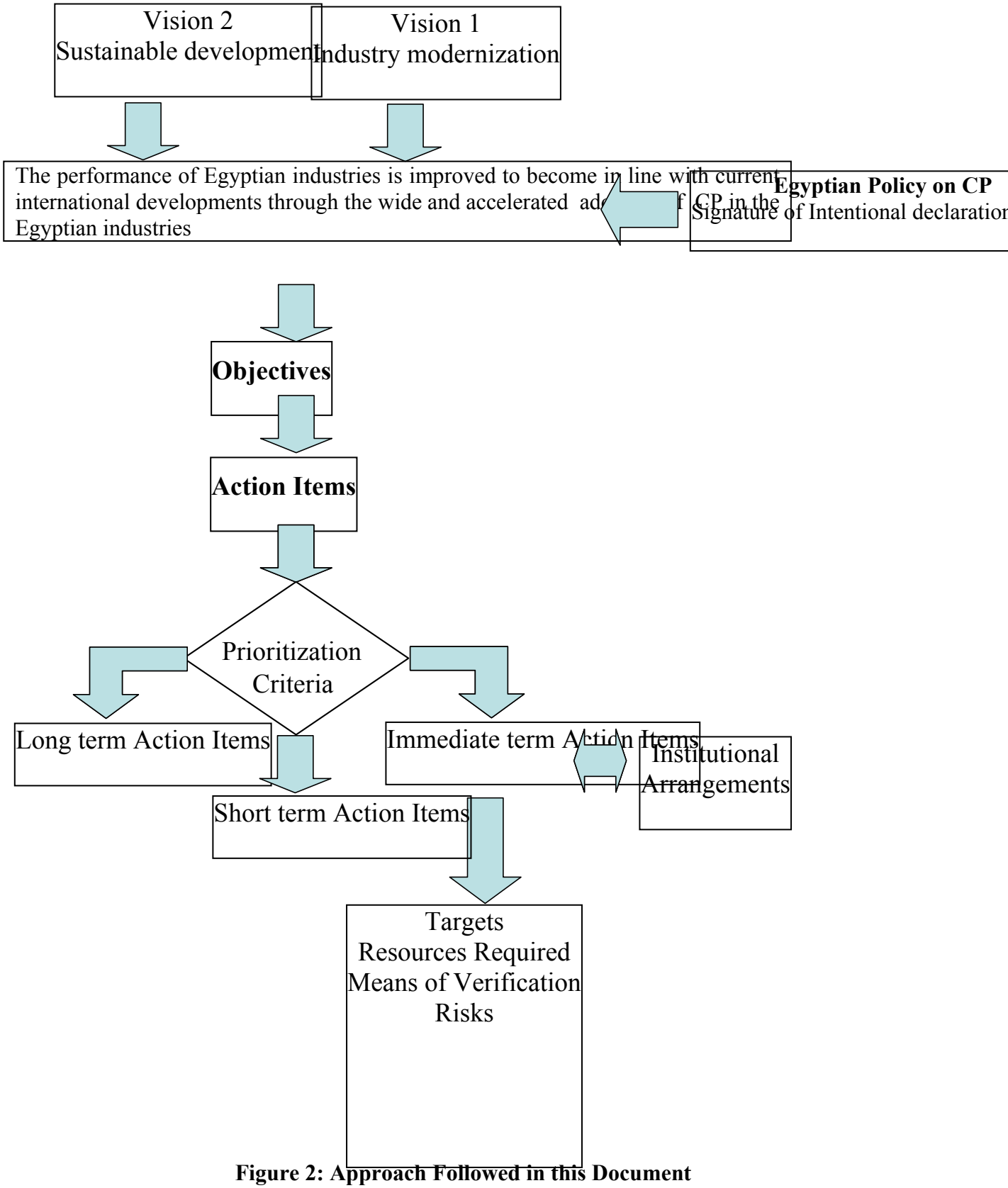

Figure 2: Approach Followed in this Document

2.4 Goal Indicators

The main challenge facing this strategy is to introduce the cleaner production methodology at the core of the investment decision making process. Hence, this strategy should achieve the cultural and managerial changes leading to sustain the self motivation to improve productivity and control environmental impacts.

Accordingly, the main criterion to measure success is the continuous increase in material productivity (i.e to minimize the specific consumption per product of energy, water and raw materials, especially hazardous materials), together with minimizing discharges and emissions per product to the environment in terms of quantity and hazard. As this change in industry attitude towards the CP from hesitation to acceptance, to active search for application possibilities, and then to support and advocate the leading policies, would be very important indicator for success.

In order to determine the performance improvement of the Egyptian industry and set, quantitative targets of improvement, it is essential to identify the current performance of the industry. Accordingly, necessary interventions to improve this performance could be identified. Hence, it is essential to identify the current Egyptian performance standards[2] and compare it with the international performance to enable identifying the extent of improvement.

The initial determination, and the continuous updating of performance rates requires periodical examination of representative samples for the different industrial sectors. However, this needs in addition to the required large resources, a number of mechanisms such as self monitoring mechanisms in the Egyptian industry, and a reporting system in Egyptian companies. On one hand, self monitoring helps in identifying the consumption pattern in industries, and consequently determining the efficiency of input material and points of weakness and potentialities to achieve savings. On the other hand, the availability of data regarding material consumption, input and waste generation, and its accessibility to the concerned agencies, would help decrease the recourses targeted and directed to determine the indicators, and consequently expedite the process of their determination and updating. The establishment of the Environmental Register, stipulated in the Environmental law no 4/1994 is a good starting point for such mechanisms. This necessitates first, specifying establishments for which it is required to maintain the register as stated in the law 4/1994 according to a priority criteria in terms of size/sector/location, so as to avoid system overburden. An endorsement system need to be developed to approve the monitoring plan with the regulatory agency. In addition, including a penalty in the ER of law 4/94 for not maintaining an environmental register and/or falsification of data is a main factor enhancing self monitoring.

[2] Egyptian performance standards indicate the average material consumption and generation of wastes per product unit in each industrial sector

Developing an obligatory reporting system for a number of industrial establishments require the establishments to make data available on a regular basis to the concerned authorities regarding generation of waste which could be harmful to the environment. It is expected that this would ensure the sustainability of the release inventories (such processes were initiated by the Egyptian Pollution Abatement Project in EEAA in 2001/03). This would also help reviewing the standards upon which the current revision of the Executive Regulations of the law 4/1994 depends in terms of setting limits for the pollution loads.

2.5 Indicators for achieving the Goal

Based on the comparison drawn between Egyptian and international norms, quantitative targets for industrial performance improvement could be determined. The (relative or absolute) change in the Egyptian benchmarks, whether positive or negative, would represent performance indicator. Annual decrease in such benchmarks, would indicate an increase in the product efficiency and a decrease in material consumption as well as the generated waste. Indicators calculated per unit product depend upon the annual production of industrial establishments. These indicators would be calculated first for each establishment. Then a statistical distribution for the results including the average and standard deviation is developed. Table (2) presents the proposed quantitative indicators to determine the progress towards achieving the goal for each industrial sector.

In principle, indicators are to be calculated for each sector based on the inputs and waste characterizing this sector, with particular focus on priority areas which are mainly related to scarcity of resource and/or the degree of hazard of the generated waste. Taking into account the wide range and various characteristics of the different industries, it becomes clear that one overall indicator can not be developed for the Egyptian industry sector as a whole. For example, the average consumption is calculated for the main hazardous raw materials of each sector including priority hazardous materials which are determined according to their hazard and its amount of local consumption. Similarly, the average generation of characteristic hazardous waste generated form each sector is to be determined. It is thus concluded that it is difficult to establish a single indicator for the industry as a whole due to the variation of the inputs and pollutants of each sector.

Therefore, what is applicable to air pollutants from various production processes, due to the variation in types and sources of pollution according to the input and technology used, is not applicable to pollution form fuel combustion, which is homogenous across all the various industrial sectors.

Table (2) Performance Indicators for each Industrial Sector

Indicator	Means of Verification	Comments
Utilities consumption indicator	Based on identified representative sample. Information depends partly on inspection results and industrial self monitoring as well as the Electricity, Water and Gas companies. Sample Information completed through site visits	
Average energy consumption per unit product in ton of oil equivalent		Energy consumption includes consumption of fuel, electricity and renewable energy resources.
Average water consumption per unit product		Encompasses consumption for different purposes.
Raw material consumption indicator	Based on identified representative sample. Information depends partly on inspection results and industrial self monitoring as well as the Electricity, Water and Gas companies. Sample Information completed through site visits	Including only raw materials characterizing the industry
Average consumption of the different raw materials per unit product		The indicator is calculated for the main raw materials according to the industrial sector
Average consumption for the different types of hazardous substances (containing hazardous components) per unit product		
Indicator for gaseous pollutants	Based on identified representative sample. Information depends partly on inspection results and industrial self monitoring as well as the Electricity, Water and Gas companies. Sample Information completed through site visits	
Average CO emissions from energy consumption per unit product		
Average SO_x emissions from energy consumption per unit product		
Average NO_x emissions from energy consumption per unit product		
Average SO_x emissions from energy consumption per unit product		
Average NO_x emissions from energy consumption per unit product		
Average PM_{10} emissions from energy consumption per unit product		
Average emissions of air pollutants per unit product depending on the type of industry		Including only the main air emissions characterizing the industry
Waste indicators	Based on identified representative sample. Information depends partly on inspection results and industrial self monitoring as well as the Electricity, Water and Gas companies. Sample Information completed through site visits	Including only the main waste types characterizing the industry. It does not include waste recycled on-site
Average of solid waste generated per unit product		
Average quantity of hazardous waste generated per unit product		
Wastewater indicators	Based on identified representative sample. Information depends partly on inspection results and industrial self monitoring as well as the Electricity, Water and Gas companies. Sample Information completed through site visits	Including only the main pollutants characterizing the industry. It does not recycling on-site
Average quantity of wastewater generated per unit product		
Average generation of the different types of pollutant in the wastewater depending on the type of industry		
Indicators related to Environmental Management		
Number of establishments having ISO 14001 certificate	Records of the National Accreditation Council	

Table (2) shows the difference in nature between the indicator related to environmental management systems EMS and the other indicators. The importance of such an indicator is due to the fact that EMS are of factors that would ensure the sustainability and continuity of adopting CP principle in industry. This is because the majority of EMS requires that establishments are to set internal plans and policies that would ensure the sustainability of the implementation of proper environmental management activities, pollutant abatement in addition to continuous auditing and updating for these plans. The EMS (ISO 14001) was selected not only because its contribution to the continuous implementation of proper environmental activities, as some establishments could implement other systems, but mainly because it is accredited. Hence, information required for calculating the indicator is easily accessible. In this respect, it is expected that the number of establishments that are ISO 14001 certified will be proportional to the number of establishments implementing environmental management systems, and accordingly CP.

It is proposed to update the national benchmarks on a regular basis (e.g every 3 years) upon an examination of a representative sample. Annex (E) presents the parameters to be considered in selecting the samples.

2.6 The Strategy

Achieving the objectives of the strategy depends on various tools that contribute to overcoming the different barriers facing the implementation of CP in the Egyptian industry sector and provide economic incentive. The use of the legislative, financial and the awareness tools correlates with certain issues the most important of which is the difference in nature and status between the existing and the new industrial establishments. In this regard, objectives are identified to be achieved using a number of various and integrated tools and procedures discussed in details in the next chapter.

There are number of requirements that are essential for the operationalization of the objectives realizing the goal. These include improving the efficiency and effectiveness of enforcement activities, which would ensure compliance with the legal requirements, as the current inefficient enforcement deters the establishments from investigating alternatives to improve their environmental performance. Progress in this area could be realized through a number of tools the most important of which deals with the gaps in infrastructure necessary for enforcement. The hazardous waste management system is a good example. Currently, legal requirements are not enforced mainly because the system components are not operational or officially adopted yet such as the permitting system, or guiding documents and the deficiency of disposal and treatment methods.

On the other hand, improving public disclosure of pollution information could be considered. This would require polluting establishments to provide information about their activities to the public, keeping a register and making it available to the public including information about the generated waste which might be hazardous. This would ensure the availability of the necessary information on a regular basis to the management of the establishment. It

would also contribute to the efforts exerted by the establishment to improve its corporate image.

In addition, improving enforcement to industry on the long term is also an important tool. This could be achieved through various approaches including the operationalization of the relevant article of Law 4/1994 regarding the public right to be compensated for environmental harm. This will not only set the required precedents, but will also increase the risk of public litigation. This would be achieved through information provision and establishment of credible scientific references, and entities, to asses causation, attribution and damages. The liability could be extended to site contamination and remediation, the probability of assuming this liability in the future under a potentially stronger enforcement system should be internalized in current decisions.

It should be mentioned that these requirements are applicable for new as well as existing establishments. However, the main difference between both types of establishments lies in the integration of CP in the existing regulations. Whereas the new establishments are required to comply with the relevant regulations during the early phases of the project developments (during design and EIA preparation), therefore does not need financial support, in addition the top management is not in need for awareness raising. On the other hand, existing ones will need certain legislative transition arrangements and financial support to be able to carry out changes.

Therefore, the delay in reaching the legislative stage is expected to result in dealing with all types of establishments following the suggested approach for existing ones. This has the main disadvantages of having a slow changing rate and requiring intensive resources in order to move the industries in its direction.
In this respect, this strategy attempt to deal with the two types of establishments correspondingly. As it is expected that currently existing industries form the major bulk of Egyptian industries in the foreseeable future. In addition, new industries are not always based on approaches. For example such establishments might depend upon importing used production lines especially from Eastern Europe.

Within this context, the strategic approach for CP is summarized as follows:

- Addressing the attitude of industries towards compliance and overcoming the technical and informational barriers
- Relying on positive incentives as a first stage
- Turning to disincentives as second stage
- Use of the legislative approach to differentiate between new and existing establishments and conserve the required resources in order to encourage industries to adopt CP.
- The evolving legislation will become the pivotal action for the CP activities, in the sense that it should be preceded by certain activities to prepare for its adoption and followed by others that facilitate its implementation. This would achieve the correlation between the continuous improvement of the legislative

requirements and the industrial performance such that it accelerates the improvement process through the other tools but should not precede them.

The action plan should be periodically updated taking into consideration the above mentioned strategic principles. It is expected that the improvement of the Egyptian industry is accompanied by similar improvement in the planning methodologies. In the future, the nation benchmarking of the industries could be identified and accordingly reflect the targets to be achieved in the relevant legislations. With accumulating and documenting the implementation experiences focus could be put on a number of tools which proved to be more effective in achieving the goal.

2.7 Objectives

2.7.1 The Performance of New Industrial Establishments exceeds National Average Performance

New establishments are targeted as they can easily adopt the CP principle in design and construction phases. Within this framework, these establishments should provide in their EIA study submitted to EEAA information about CP options they intend to implement. This is considered as an introduction to develop the abiding legislative provisions.
Such targets are updated for each industrial sector according to available practical alternatives.

2.7.2 Existing Industrial Establishments Progress towards Cleaner Production within a specified timeframe

The majority of existing industrial establishments lack the necessary financial and technical capability to abide by legislation upon issuance. Hence, there is a necessity that the legislation take into consideration to set certain transition periods for the different sectors to enable compliance. Such transition periods are to be based on prior studies on the nature, economic and technical status and performance of each sector. This is to be carried out in cooperation between the different chambers in Federation of Egyptian Industries, to set appropriate transition periods for most of establishments to enable them to meet the legal requirements. Indicator for realizing this objective is expressed in determining the percentage of non-complying establishments in each industrial sector at the end of the transition period.

2.7.3 The Share of Clean Products Increase Continuously on The Local Market

Local market in Egypt is the main recipient of the local industrial production. Currently, the local demand does not differentiate between products according to CP implementation in the manufacturing process[3] except in limited instances. In this context, encouraging clean products and increasing the size of their market of the total local market reflects the desired improvement of the industrial performance and the progress towards implementing CP options. in the manufacturing processes. At the same time, continuous increase of clean products from each industrial sector in the local market is an indicator for the relative increase in the implementation of CP and consequently for the improvement of performance of the different sectors. This improvement feeds directly in widening the range and increasing opportunities for exports of Egyptian products to international markets, which consider cleaner technology as a requirement for accessibility.

2.7.4 Industrial establishments bear increasing percentage of actual costs of input material and services

The currently prevailing non-economic pricing is considered as a disincentive for the proper use of economic resources available for industry, it reduces their perception towards the potential profitability of savings as result of rationalizing the consumption of materials and minimization of waste generation. Removing subsidies is politically difficult on the short term. It is also economically inappropriate, as there should be a grace period to adapt with the change in prices, especially relative prices. Hence, this framework needs to be selective such that it targets a comprehensive economic pricing on the long term.

2.7.5 Availability of the Necessary Knowledge

The availability of necessary knowledge at the different bodies concerned with CP including industrial establishments, regulatory bodies and service providers is one of the important prerequisites to achieve the goals.
The government plays a main role in this regard in co-operation with the different parties concerned with collection and dissemination of information, which may include state-affiliated public research organizations, such as public universities and research centers in addition to private research organizations. In this respect, it is assumed that the desire to improve the performance is already accomplished through the other frameworks, and is facilitated through the availability of accessible sources of information. The availability of knowledge within industrial establishments can be measured by determining the knowledge needs of the various bodies, which have not been

[3] For the purpose of this strategy and action plan, clean products are referred to as products manufactured from an industrial processes conserving the consumption of raw materials, especially hazardous ones, and minimizing the generation of environmental pollutants as discussed in 2.1 above

met. This can be verified through submission of comments or complaints – by establishments or individuals- to the information/ knowledge providers

2.7.6 The Availability of the required Technical Capacities

The implementation of the CP depends upon the availability of the required technical capabilities on all levels, including knowledgeable management, skilled labor and technical service providers. Lack of such capabilities is a barrier to the accomplishment of establishments' goals, which were already interested in the implementing CP.

On the long term, it is required to develop training courses aiming at preparing such technical capabilities on basis of market demand. This is to be followed by updating the knowledge of training providers on the availability of technical capabilities required by the industrial establishments.
Table (3) presents a summary for the targets, indicators means of verification, and resources required.

Table (3) Preliminary Logical Framework of Objectives

Objectives	Performance Indicators	Means of Verification	Assumptions
1. The performance of new establishments exceeds the national average performance	Performance of new establishments compared to the average national performance for the different sectors	- EIA prepared by new establishments - Inspection results, self monitoring and field surveys - Environmental register of establishments	Improving efficiency and effectiveness of enforcement including operationalization of HW management system and increase perceived enforcement likelihood to industry on the long term
2. Existing establishments progressing towards CP within specified time frame	Percentage of non-complying establishments per industrial sector at the end of the set time frame	- Inspection results, self monitoring - Environmental register of establishments - Information completed through field surveys for representative sample	- Industrial chambers at the FEI coordinate with the concerned legislative bodies to determine the required time frame - The concerned legislation takes into account the current status of the existing establishments and the performance of each sector
3. The share of clean products increase continuously on the local markets	Percentage of clean products of the total size of the local market (per sector or product)	- Market surveys	- Availability of local eco-label

4. Industrial establishments bear increasing percentage of actual costs of input material and services	Percentage decrease of total subsidies of inputs and services provided to industries Harmonization of relative subsidies for inputs and services with the environmental goals	- Economic studies	

Objectives	Performance Indicators	Means of Verification	Assumptions
5. Availability of the necessary knowledge	Percentage of knowledge unfulfilled expressed in number of comments or complaints received	- CP clearinghouse database	- The desire for knowledge is realized through the different tools. It is measured by size of and demand on informational services - Services of complaints receipt in clearing house is established
6. Availability of the required technical capacities	Required technical capacities are not available upon demand	- Records and data base of training providers	- The training providers conduct needs assessment studies before developing training the programmes.

3. Action Items

For each objective, action items proposed to achieve it are listed and described as well as the lead agencies – that would be responsible for developing policies and plans for implementation of CP – and the supporting agencies – that are concerned with the actual implementation of CP activities and/or coordinate with the leading agencies in implementing such activities within their scope of competence – and other main stakeholders – that are entities influencing or are influenced by the implementation of the different action items and at the same time can provide technical, financial or moral support to the lead and/or the supporting agencies.

The action plan presented in this document is divided into two phases. The time frame of the first phase is assumed to be 3 to 5 years. Action items proposed for this period are those that have existing organizational context for implementation, or ongoing activities related thereto or expressed interest of certain bodies in implementation and existing other favorable conditions.

During this first phase, preparation for the long term action items, especially those requiring long period for implementation, should be carried out.

Table (4) summarizes action items and the agencies concerned with implementation. Table (5) presents the contribution of each action item to overcome the barriers discussed in chapter1.

It should be emphasized that, while the action items are divided into different phases, the goal and objectives are assumed to remain valid for both. It should also be stressed that long-term actions are not binding. These could be reconsidered during the updates of the document according to relevant developments in the context in which implementation takes places, and the threats and opportunities with which planned actions should interact.

There are various sources of uncertainty pertaining to any of the long-term action items which preclude the detailed treatment of these action items at present. For instance, in 5 years the national and international conditions may be very different, in a way to affect implementation either favorably or unfavorably. Among international conditions are the international trade agreements, social and environmental pre-requisites of eco-labels, etc. National conditions include, for example, the advancements in the state of the Egyptian industry, energy and materials policies, political acceptability of a given action item and the availability of lack of its support.

Implementing the CP action plan is, therefore, highly demanding in terms of "navigation" in light of the continuous changes to accomplish the balance between the objectives and the methodologies adopted. Therefore, the process should be based on a flexible planning process which involves monitoring on variables and events, assumptions and performance / impact expectations. These are carried out through regular updating of document to preserve the direction towards the desired goal.

Accordingly future updates to the document may involve moving action items from the long-term to the short-term, removing some action items or substantially or marginally modifying them. Moreover, new action items could be added. It is proposed that the following criteria may then be used to make a decision regarding whether to implement a specific action item:

- Persistence of the addressed problem and its priority
- Economic benefit
- Environmental benefit
- Implementation cost
- Sustainability

Hence it is important to consider the proposed institutional arrangements (chapter 4) for managing these continuous processes as an integral part of this strategy.

Table (4) Lead and Support Agencies for Implementation of Action Items

(• denotes a lead agency, while o denotes a support agency)

	Action Items	Entities Involved in the Implementation of the Action Items										
		EEAA	Ministry of Electricity	Ministry of Industry	Ministry of Finance	Ministry of Petroleum	Ministry of Foreign Trade	FEI	Ministry of Scientific Research	Ministry of Planning	Cabinet of Ministers	Other major stakeholders
Immediate term	**1. The Performance of New Industrial Establishments exceeds the National Average Performance**											
	1.1Establishing Public Recognition Schemes	•		o			o	o				NGOs
	1.2 Modifying EIA Guidelines to Include CP Practices	•										Local Administration/ Technical service providers
Short term	1.3Adoption of CP Practices in Applicable Regulations	•		o		o		o				Other regulators
	2. Existing establishments progressing towards CP within specified time frame											
Immediate term	2.1Increase Awareness of Upper Industrial Management concerning CP practices	o		•		o		•				Training providers
	2.2 Establishing Public Recognition Schemes	•		•				o				NGOS
	2.3 Facilitating Access to Available Funds	•						o				
	2.4 Capitalizing on International Agreements	•		•		o		o				Ministry of Foreign Affairs
Short term	2.5 Negotiate Transitions with Industrial Sectors	•		•				•				Other regulators
	2.6 Supporting CP Technical Studies and Audits	o		•								Service providers/ Banking sector
	2.7 Compliance Agreements to Encourage Facilities to Adopt CP	•						o				Other regulators
Long term	2.8 Fiscal Incentives for Technology upgrading in Egyptian industry			o	•			o				Central Auditing Agency/ General Authority for Investment
	3. The Share of Clean Product Increases Continuously on The Local Markets											
Immediate term	3.1 Raising Public Awareness about Benefits of Clean Products	o		•				o				NGOs
Short term	3.2Establishing a Local "Eco-label" Scheme	o		•			o	o				NGOs
	3.3 Developing National Environmental Standards			•			o	o				
Long term	3.4 Government procurement policy			o	•			o				
	4. Industrial Establishments Bear Increasing Percentage of Actual Costs of Input Material and Services											
Short term	4.1 Use Economic Instruments	•	o	o	•	o		o		•	•	Ministry of Labor
Long term	4.2 Economic Pricing of Inputs		o	o	o	o		o		•	•	Ministry of Housing
	4.3 Recovering Full Costs of Services			o	o			o		•	•	Other regulators/ Ministry of Housing
	5. Availability of the Necessary Knowledge											
Immediate term	5.1 Establishing a CP Clearinghouse	o		•		o		•	o			Technical service providers
	5.2 Implementing Selected Demonstration Projects	•		•				•				Local Administration/ SFD
	5.3 Knowledge dissemination	•		•				•				
Short term	5.4 Encouraging Local Targeted Research	•		•				o	o			
	5.5 Extension Services for SMEs	o		•				•				Local Administration/ SFD/ Technical service providers
	6. Availability of the Required Technical Capacities											
Immediate term	6.1 Establishing CP Training Facilities	o		•				o				Training Centres
Short term	6.2 Integrating of CP Concepts in Higher Education Curricula	o		o								Ministry of Higher Education/ Private Universities
Long term	6.3 Increasing The Availability of Skilled Technical Labor to Implement CP Practices			•								Ministry of Labor (Labor University/ Ministry of Education (technical education institutes)

Table (5) Contribution of Action Items to Overcoming Barriers

	Action Items	Barriers			
		Informational	**Attitude**	**Financial**	**Technical**
Immediate term	**1. The Performance of New Industrial Establishments exceeds the National Average Performance**				
	1.1 Establishing Public Recognition Schemes		✓		
	1.2 Modifying EIA Guidelines to Include CP Practices		✓		
Short term	1.3 Adoption of CP Practices in Applicable Regulations		✓		
	2. Existing establishments progressing towards CP within specified time frame				
Immediate term	2.1Increase Awareness of Upper Industrial Management concerning CP practices	✓	✓		
	2.2 Establishing Public Recognition Schemes		✓		
	2.3 Facilitating Access to Available Funds			✓	
	2.4 Capitalizing on International Agreements	✓	✓	✓	✓
Short term	2.5 Negotiate Transitions with Industrial Sectors	✓	✓		
	2.6 Supporting CP Technical Studies and Audits		✓	✓	✓
	2.7 Compliance Agreements to Encourage Facilities to Adopt CP		✓		
Long term	2.8 Fiscal Incentives for Technology upgrading in Egyptian industry			✓	
	3. The Share of Clean Product Increases Continuously on The Local Markets				
Immediate term	3.1 Raising Public Awareness about Benefits of Clean Products	✓	✓		
Short term	3.2 Establishing a Local "Eco-label" Scheme		✓		
	3.3 Developing National Environmental Standards		✓		
Long term	3.4 Government procurement policy		✓		
	4. Industrial Establishments Bear Increasing Percentage of Actual Costs of Input Material and Services				
Short term	4.1 Use Economic Instruments		✓		
Long term	4.2 Economic Pricing of Inputs		✓		
	4.3 Recovering Full Costs of Services		✓		
	5. Availability of the Necessary Knowledge				
Immediate term	5.1 Establishing a CP Clearinghouse	✓			✓
	5.2 Implementing Selected Demonstration Projects	✓	✓		✓
	5.3 Knowledge dissemination	✓	✓		
Short term	5.4 Encouraging Local Targeted Research	✓	✓		✓
	5.5 Extension Services for SMEs	✓	✓	✓	✓
	6. Availability of the Required Technical Capacities				
Immediate term	6.1 Establishing CP Training Facilities	✓			✓
Short term	6.2 Integrating of CP Concepts in Higher Education Curricula	✓	✓		✓
Long term	6.3 Increasing The Availability of Skilled Technical Labor to Implement CP Practices		✓		✓

3.1 The Performance of New Industrial Establishments exceeds the National Average Performance

As discussed in the previous chapter, the most important requirement for the verification of achieving the goal is to determine national industrial benchmarks to measure the progress of performance improvements. In addition there is a number of prerequisites contributing to achieving the goal, most important of which is improving the efficiency and effectiveness of enforcement (as discussed in chapter 3).

Actions to be initiated on the Immediate Term

3.1.1 Establishing Public Recognition Schemes

Public recognition schemes aim at encouraging establishments to pursue the implementation of activities that can improve performance and would also encourage other establishments to follow the same trend. The concerned party does not necessarily have to bear high cost for such incentives (it can be in the form of a certificate of appreciation or a public recognition in the media etc.). The Ministry of information can play a significant role in this regard. It can contribute to the promoting publicity of the establishments implementing CP, success achieved and the benefits gained. This would encourage other establishments to apply CP methodologies.
Such a scheme also contributes to creating a public awareness of the benefits of CP, while stressing the government's interest in CP which was expressed in the country's declared policies (chapter1 item 2- 3).

It would also contributes to the improvement of the corporate image to the public and funding agencies. Furthermore, it ensures compliance with what the developer is committed to in the EIA. Moreover, public recognition schemes for performing facilities would also support developing the information systems essential for industry development, according to item 3.5.

It is thus suggested to direct these incentives to establishments which introduced innovative solutions and appropriate technologies to control their environmental impacts, according to criteria which limit it to truly distinct category of projects. It is important to publicize this system to encourage establishments to highlight their strong points.
This scheme is accompanied with a parallel scheme of incentives for existing establishments (item 3.2.2).

- ***Lead Agency***
  - Egyptian Environment Affairs Agency
  - Ministry of Industry and Technological Development

- ***Supporting Agencies***
  - Federation for Egyptian Industries
  - Ministry of Foreign Trade

- ***Other stakeholders***
  - Non Governmental Organizations

3.1.2 Modifying EIA Guidelines to Include CP Practices

The integration of CP in the EIA requirements would represent an effective tool to guide industrial investment decisions and to raise the interest of industrial developers to search for available alternatives. In principle, the EIA process is based on a consideration of alternatives, which are currently focusing on assessing potential pollution and specifically complying with regulatory limits. It is proposed to extend the scope to include material consumption and other relevant CP issues.

Within this context, the developer will be required to provide adequate information related to considerations given to Best Available Cleaner Production Technology and Practices based on a comparison of alternatives throughout the project phases. This would also be applicable to new expansions in existing facilities taking into account the technological constraints. This is considered a control measure for importing used production lines, to ensure that the applied technology is not polluting.
Accordingly, the EIA guidelines need to be modified as well as the EIA review procedures, and will require enough resources and trained staff. It is proposed to initiate this modification with the C-category EIAs. Modification of legislation should be precedes by modification of the EIA process. (item 3.1.3).

- ***Lead Agency***
  - EEAA

- ***Supporting Agencies***
  - Federation for Egyptian Industries
  - Local Administration

- ***Other stakeholders***
  - Technical service providers

Actions to be initiated on the Short Term

3.1.3 Adoption of CP Practices in Applicable Regulations

The executive regulations of law 4/1994 and a number of other laws include provisions addressing pollution prevention and hazardous material substitution. However, Egyptian environmental legislations are usually medium oriented focusing on concentration of pollutants, and relating performance to a static set of parameters. The revision of the regulatory

criteria is a recognized progress. In fact law 4/1994 stipulated that the legal limits and criteria should be revised periodically (every 5 years).

The revision of the criteria and limits proposed in this document differs in that it gives priority to CP activities rather than end-of-pipe treatments, which should be implemented as a last resort. In this regard, one of the features/ requirements for adoption CP in the relevant legislations is to amend Egyptian criteria in relation to the environmental performance, by setting pollution load limits per production unit, in addition to pollutant concentration. The current revision made by the EEAA for the items of the law 4/1994 Executive regulation is a useful precedent to re-examine the legislative perspective of pollution abatement and is considered to complement the proposed development.

It is also proposed, to introduce dynamic factors that link performance criteria to the best domestically available technology techniques. It is also proposed to develop the national criteria in such a way to push the acceptable limits for more improvement in performance, with reference to:

- Hazardous wastes, for which the legal basis exist (law 4/1994, Executive Regulation Article 27).
- Need to develop specific technological systems.
- National commitments resulting from international agreements and their target dates.
- Priority hazardous substances, that are selected based on their hazard, the amount of local consumption and availability of less hazardous alternatives. The application of such methodology in Egypt would benefit from the accumulated international and local experience in replacing ozone depleting substances. It could find its first applications in cases such as asbestos phase-out and the substitution of sodium cyanide in the metal finishing industry. This can be preceded by reconsidering the pricing of such substances as shown in item (3.4.2).

  For all cases, the ability of existing establishments to comply within an acceptable transition period should be considered before issuing the legislation.

It might be appropriate to integrate pollution control in a single legal requirement, and accordingly an integrated environmental permit over the long term. As it is a politically sensitive undertaking, since it involves the consideration of the current distribution of authority among various agencies.

- ***Lead Agency***
  - EEAA

- ***Supporting Agencies***
  - Ministry of Industry and Technological Development
  - FEI
  - Ministry of Petroleum
  - Ministries enforcing other laws

- ***Other stakeholders***
  - None

3.2 Existing Establishments Progressing towards CP within specified time frames

Actions to be initiated on the Immediate Term

3.2.1 Increasing Awareness of Upper Industrial Management concerning CP Practices

The support and commitment of the upper management is a key factor contributing to the implementation of successful CP practices in the industrial sector. It contributes towards directing the decision making process in industry. This entails providing the top and middle management with the necessary information related to CP for a better process control (including EIA, public recognition and economic instruments). This is in addition to the requirements they should meet upon issuance of the relevant legislations. This could be carried out through a number of activities addressing knowledge dissemination (item 3.5.3) or tailored programs outlining the different CP techniques that could be implemented by industries and highlighting their economic and environmental benefits, the organizational and human resources required to implement them, as well as providing adequate knowledge of the nature of services that would need to be out-sourced.

Providing the industrial establishments with information regarding the various management systems, such as ISO 14001, and encouraging them to adopt such systems is an effective tool to promote CP, since EMS are expected to contribute towards the realization of the importance of CP and its benefits to the establishment.

Currently, the existing programmes in EEAA and the FEI as well as the Ministry of Industry and Technological Development contribute significantly in this regard. A focus on selected sectors and efficient segments of industry supported by the industry modernization programme (IMP) could prove to be very effective based on the a number of factors including, inter-alia, pressure faced by the sector, e.g. by importers, and its financial situation.

- ***Lead Agency***
  - FEI
  - Ministry of Industry and Technological Development

- ***Supporting Agencies***
  - EEAA
  - Ministry of Petroleum

- ***Other stakeholders***

- Training providers

3.2.2 Establishing Public Recognition Schemes

Parallel to the public recognition schemes addressing new establishments (3.1.1), it is proposed to include similar incentives for the existing establishments aiming at achieving the same goals and objectives, albeit different in the method of implementation.

Operationalizing the public recognition schemes of existing establishment should ensure the participation of industrial establishments to gain desired results. While the required information is available for new establishments through the EIA studies, it is expected that for the existing establishments they can apply for the same public recognition. As it is provided that existing establishments should be distinguished in carrying out CP techniques which led to a better environmental performance, based upon agreed on accurate criteria, through a system for assessing the establishment's performance. Consequently, it is expected that the cost for public recognition directed to existing establishments would be higher than new establishments. Similarly as in (item 3.1.1) the Ministry of Information can play a role in the public recognition of these establishment.

- ***Lead Agency***
  - EEAA
  - Ministry of Industry and Technological Development

- ***Supporting Agencies***
  - FEI

- ***Other stakeholders***
  - NGOs

3.2.3 Facilitating Access to Available Funds

Local experience of the past decade has shown that communication with industry concerning available finance packages is deficient as evidenced by the number of existing funds not effectively used. It is therefore proposed to establish a one stop service center to market the available packages and provide technical assistance services in the application procedures.

There are various sources for financial support that already exists such as Environment Protection Fund (EPF), where support can be provided from the fund for CP projects according to specific criteria. This should encourage establishments to discover the opportunities for applying CP options and using to end-of-pipe treatment only as a final resort. However, the limited support available at the fund limits its ability to be an effective player in this system.
Hence, it is necessary to ensure funding of the EPF through donor projects or through a percentage of the violation fines collected from industry to be used in supporting CP initiatives. The scope of existing agreements between the

EPF and the group of commercial banks to support loans interest, should be expanded to include CP projects, through clear and publicized criteria.

Industrial modernization programme is one of the largest locally available financing schemes. Other sources also exist, such as Social Fund for Development (SFD) for providing support to SMEs to help them comply with the laws.

Simple financing programs can also be provided through the plan of Ministry of Petroleum to industries that switch to natural gas, or that use renewable energy sources. The Clean Development Mechanism (CDM) can also provide international financing sources to support such programs. While the CDM ensures a higher financial revenue from energy conservation projects, switching to natural gas and renewable energy, such financial contribution can be mobilized to funding the preparation of such projects through the Global Environment Facility (GEF).
In addition, there are international sources that can be made available within the framework of international agreements such as Stockholm Agreement on Persistent Organic Pollutants (POPs) to deal with their main source from industry in Egypt, namely the unintentional generation of dioxins and furans in industrial processes including chlorinated organic compounds and high temperatures.

In this context, the Egyptian government should seize the opportunity of such international agreements to prepare a national program reflecting its commitment and to use the available financing sources for implementation. Local experience in Montreal protocol and CDM prepared by El-Tebbeen Institute for Metallurgical Studies in cooperation with UNEP is a good starting point.

- ***Lead Agency***
  - EEAA

- ***Supporting Agencies***
  - FEI

- ***Other Stakeholders***
  - None

3.2.4 Capitalizing on International Agreements

Local legislations reflect international agreements to which Egypt is committed. However, these international agreements have the advantage of clearer targets and time commitments which is more readily usable for environmental improvement programs. It has also the advantage of the possibility of attracting international funding (governmental or non-governmental) to support meeting such commitments.

The successful Egyptian experience in the implementation of the Montreal Protocol concerning Ozone Depleting Substances indicates that a national program coordinated by dedicated personnel and supported by adequate funds resulted in substantial changes in the technological configuration of industry. Although it is unlikely that similar international funds would be made available for the implementation of other agreements, a number of those have their specific financial mechanism. These would include:

- The Kyoto Protocol concerning climate change;
- The Barcelona convention concerning the protection of the Mediterranean sea from land-based sources;
- The Stockholm convention on Persistent Organic Pollutants (POPs)

- ***Lead Agency***
  - EEAA
  - Ministry of Industry and Technological Development

- ***Supporting Agencies***
  - FEI
  - Ministry of Foreign Affairs
  - Ministry of Petroleum

- ***Other stakeholders***
  - None

Actions to be initiated on the Short Term

3.2.5 Negotiate Transition Periods with Industrial Sectors

Modification concerning legislation (3.1.3) affects the existing industries or specific sectors. Therefore, the feasibility for application should be investigated before issuance. In addition, the required period and transition procedures should be discussed within the framework of cooperation with concerned industries. Such agreements are preferred to be voluntary, and the regulatory agency should undertake the task of developing objectives, while industry is to select the appropriate method to achieve such objectives. Time frame for implementation should be agreed upon, taking into consideration environmental objectives and applicability. In case of non-compliance with such agreements, objective can be turned to legislative requirements.

- ***Lead Agency***
  - EEAA
  - Ministry of Industry and Technological Development
  - FEI

- ***Supporting Agencies***
  - Other regulatory agencies

- ***Other stakeholders***
  - None

3.2.6 Supporting CP Technical Studies and Audits

A number of projects, whether on-going or being considered, are set to provide these audits at no or subsidized fees. However, this approach is not sustainable on the long term as the costs should reflect the market economics.

ESCOs (Energy Service Companies) developed in the field of energy conservation can provide an examples of a more sustainable approach to this issue. In general, an ESCO covers auditing costs and required investment services which are recovered through realized savings according to performance based contracts. The idea, which was successful in many parts of the world, is based on confidence of company rather than the establishment for achieving savings. This results in reluctance of the establishments to take risks, which is the situation applied to Egypt concerning adoption of CP.

ESCOs exist in Egypt, face a number of institutional constraints to which they adapted by only providing the audit services while investments are provided by a third party, usually a bank. This has made the implementation mechanism more complicated but simplified the monitoring mechanism through avoiding the need to allocate savings to specific measures. Accordingly, the ESCOs risk is limited to the costs it bears to a develop a project rather then investing in it. The establishments do not bear costs of such development.

There is a need for policy and institutional interventions to attract the private sector to a wider application of the ESCO concept to savings of other inputs, would be identified based on a detailed analysis of the accumulated local experience of the concept as it currently evolved in Egypt. This could be through developing a system to be used by financial organizations interested in finding investment opportunities in the energy service companies in a more effective way.

- ***Lead Agency***
  - Ministry of Industry and Technological Development

- ***Supporting Agencies***
  - EEAA
  - Service providers
  - Banking sector
  -
- ***Other stakeholders***
  - None

3.2.7 Compliance Agreements to Encourage Facilities to Adopt CP

The implementation of CP action plans, especially those related to process modifications, require longer periods of time as compared to end-of-pipe compliance options. However, it achieves more benefits for establishments and Egyptian economy as a whole. Negotiated agreements with facilities would be related to provision of longer periods allowed for compliance in return for the implementation of CP measures, and a substantial improvement of specific resource consumption and specific waste generation. The Egyptian Pollution Abatement Project (EPAP) in EEAA is currently developing the basis for negotiation in the regard. it should be mentioned that appreciable pressure on the industrial facilities for compliance will undoubtedly facilitate this process. It should be noted that the using such tool is not only limited to cases of absence of binding legislation, since the requirements of such agreements can sometimes go even beyond compliance.

- ***Lead Agency***
  - EEAA
  - Other regulatory bodies

- ***Supporting Agency***
  - FEI

- ***Other stakeholders***
  - None

Activities to be initiated on the Long Term

3.2.8 Fiscal Incentives for Technology upgrading in Egyptian industry

As current and expected tax reductions and successive decrease[4] makes it is futile[(5)] to encourage industry through tax relieves or duty decrease, it is proposed to develop other mechanisms for fiscal incentives.

It is expected that the use of effective accounting systems for accelerated equipment depreciation and industrial stocks in the existing establishments, and tax reductions on the revenues of sale of replaced equipment, would create a great incentive to improve the used industrial technologies. The item (3.2.5) assists the legislative amendments to put such incentives into action.

It is proposed to limit such incentives to industrial equipment, while investigating whether to provide the end-of-pipe equipment the same incentives.

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[4] The presidential decree 35/2004 regarding amendments of the customs tariffs of various production necessities and capital goods would encourage many industrial sectors to modernize their equipment to include CP equipment especially those having favorable condition to carry out these changes.

[5] limiting fiscal incentives to new distinguished projects only may be considered.

The incentives for recycling equipment should be based on a comprehensive vision for the incentive system, in the way that it ensures preserving greater incentive for pollution prevention.

- ***Lead Agency***
  - Ministry of Finance
  - Central Auditing Agency
  - Investment Authority

- ***Supporting Agencies***
  - Ministry of Industry and Technological Development
  - FEI

- ***Other stakeholders***
  - None

3.3 The Share of Clean Products Increases Continuously on the Local Market

Activities to be initiated on the Immediate Term

3.3.1 Raising Public Awareness about Benefits of Clean Products

There are many products on the local market with environmental specifications exceeding the local requirements (for example, there are some textile products that are free of any traces of pesticides or harmful dyes). However, it is well known that local market for these products is limited due two main reasons:

- Lack of the consumers awareness regarding the existence of these products, and of the harms that could be avoid by using them.
- The high price of these products, compared to similar products.

Raising the consumers awareness is necessary for increasing the local demand for these products; a matter which, in turn, helps reach economies of scale required for decreasing production cost[6] .

Raising the awareness will bring about a lot of benefits for the consumer, the producer and the environment in general. In this regard, the Ministry of Information plays a vital role in raising the public awareness through intensive media campaigns that can be launched by the Ministry to disseminate the necessary information on the direct advantages and benefits of the clean products for the consumer. These campaigns should also highlight the harms

[6] Of the reasons for the high prices of these products are ones not related to production cost, such as that the current market for such goods is concentrated among the privileged classes (and their lack of price elasticity of demand); hence, decreasing the price will not be profitable for the producer.

of the 'unclean' products, which directly affect the public health and environment.

It is worth mentioning that improving the local market contributes to maximizing the export opportunities of Egyptian goods to foreign markets, which constitutes one of the Egyptian government's visions. This is because the local market is the main market for Egyptian industries; and this inevitably reflects on the industrial performance and, consequently, on the quality of the produced goods including those directed to export.

- ***Lead Agency***
  - Ministry of Industry and Technological Development

- ***Supporting Agencies***
  - EEAA
  - Consumer organizations
  - FEI

- ***Other stakeholders***
  - Manufacturers of clean products

Activities to be initiated on the Short Term

3.3.2 Establishing a Local "Eco-label" Scheme

The environmental standards of products are increasingly becoming an essential factor for the integration in global markets. Egyptian exporters are aware of this development and are bound to comply with the demands of their target markets. A number of those have already acquired relevant international "eco-labels". Products sold on the local market do not abide by the same rules as they mainly reflect banned substances (of optional specifications).

As it may be difficult for the Egyptian industry with all of its different technical and technological levels to comply with obligatory eco-specifications in the short term, it is therefore suggested to begin by developing a local system for (optional) eco-labels. It is also recommended to concentrate on key export goods and do the best to make them compatible with specification of major targeted markets. The establishment of a local "eco-label" scheme will have a number of advantages. First, it will avoid the creation of a dual system for production requirements which ultimately raises the cost of production for exporters often missing their economies of scale. This suggested system will also provide the local market with the same environmental advantages provided to the international market.

In addition, seeking to obtain an international recognition of the local system (in the form of mutual recognition) will represent a drive to upgrade management systems, including the potentialities of laboratory analysis; a matter which will eventually lead to decreasing the costs of getting the necessary eco-labels for exportation.

Finally, the presence of these eco-labels and the observation of them by a critical mass of Egyptian industry are considered to be a necessary step to its subsequent introduction in the form of obligatory specifications (item 3- 3- 3).

The institutional umbrella for this action item exists in the "National Accreditation Council" established by Presidential decree - and the General Authority for Standardization, affiliated to the Ministry of Industry and Technological Development.

- ***Lead Agency***
  - Ministry of Industry and Technological Development

- ***Supporting Agencies***
  - EEAA
  - Ministry of Foreign Trade
  - FEI

- ***Other stakeholders***
  - Consumer organizations

3.3.3 Developing National Environmental Standards

Prior to issuing obligatory environmental specifications that industries can comply with, two steps should be taken. First, issuing an optional eco-label. Second, forming a critical mass of industries which comply with the requirements of eco-label. This can be achieved though increasing public awareness of the product having such labels and their environmental distinction Then, these products should be given priority in the government procurement policy. Issuing the specification comes as a final step which reflects the success of the previous steps. However, before issuing such a specification, there should be an examination of the difficulties that may confront some producers to comply with it. The application of this specification should also be preceded by a proper period to allow the producers to comply with it. Upon issuing the eco-label it is deemed suitable to inform the manufacturers of the consequent steps, which would lead to issuing the specifications, in order encourage them to achieve quick adoptability with its requirements.

- ***Lead Agency***
  - Ministry of Industry and Technological Development

- ***Supporting Agencies***
  - FEI
  - Ministry of Foreign Trade

- ***Other Stakeholders***
  - None

Activities to be initiated on The Long Term

3.3.4 Government Procurement Policy

Public procurement law 89/98 could be adapted to give an extra weight in competitive bidding to firms that can demonstrate their acceptable, and eventually superior, environmental performance. Compliance records could provide an adequate reference. However, given the size of public procurement, this might provide a high incentive for inspection related corruption.

A more direct application of this approach is one related to the obligatory environmental specifications of products when issued. In this regard, the government procurement policy is expected to create the critical mass of industries complying with the voluntary eco-label. It is advisable, however, to consider the application of this procurement policy after a critical mass of "green" products are produced locally, lest this government procurement policy would privilege foreign firms at the expense of local firms.

- ***Lead Agency***
  - Ministry of Finance

- ***Supporting Agencies***
  - Ministry of Industry and Technological Development
  - FEI

- ***Other stakeholders***
  - None

3.4 Industrial Establishments Bear Increasing Percentage of Actual Costs of Input Material and Services

Activities to be initiated on the Short Term

3.4.1 Use of Economic Instruments

Economic instruments have been in use in Egypt for a long time. Many of the environmental laws and legislations have dealt with economic incentives and laid down the necessary general framework for their application. Article 17 of law 4/1994 is considered one of the most important law articles which deal with economic incentives. According to this article the Egyptian Environmental Affairs Agency (EEAA) and the Ministry of Finance set a scheme for incentives that can be provided by the EEAA and the concerned

administrative departments of the authorities and establishments that carry out projects aiming at protecting the environment.
However, this legislative framework has not been fully used. Many local studies have identified the reasons behind this, which include:

- Deficiency of the necessary institutional structure to apply market mechanisms and collect fees
- Weak enforcement
- Expectation of economic and social impacts which may result from using these instruments

Through analyses of the study of the economic instruments activated in Egypt in the field of environment (Environics, February 2003), it appears that these tools have positive impacts on environmental performance, and the barriers obstructing their execution can be overcome by means of the optimal design of the specific instrument. The above-mentioned study stresses that the degree of accepting these instruments is connected with a strong enforcement that would lead to comparing them with costs borne by the establishments in case of failing to comply. The study also underlines that since economic instruments are one of the means of redistributing and directing input material to the targeted activities, the consequences resulting from this redistribution should be borne by some parties. Therefore, the economic instruments should be designed in the framework of a comprehensive system for improving environmental performance. The strategy of CP and the plan of action constitute an available opportunity for achieving this goal, especially when considering the difficulty of the comprehensive application of the economic pricing of inputs in the short run (item 3.4.2) as well as the difficulty of complete recovery of services costs (item 3.4.3).

Hence, in order to increase the possibilities of accepting the economic pricing of inputs in the short run, it should be applied selectively, such as applying it to some priority hazardous substances. This is because using hazardous substances as inputs is one of the key sources of generating hazardous waste; consequently, to reduce the use of hazardous substances will greatly contribute to decreasing the generation of the hazardous waste. This goal can be achieved through pricing a group of priority hazardous substances, this means removing the subsidy and taking its environmental cost into consideration. This group of hazardous substances will be selected according to a number of criteria including the degree of hazard, the size of its local consumption, the national commitment to relevant international agreements and the availability of less hazardous substitutes.

It is also suggested that the application of the systems of economic pricing of inputs would be preferential to link the price with the targeted establishments performance, that is, to make it, for example, in the form of upward pricing for segments of input material consumption (eg. Water and electricity). But this may present injustice to industries that are high consumers of such input material. Therefore, it is initially preferable to revise this system in accordance with national performance indicators of each single sector in such a way that the economic instrument (represented by the increasing segments) precedes the legislations (item 3.1.1). Setting a clear long-term time schedule which

allows efficient compatibility with the increase of input costs would help industry to accept such system.
The use of economic instruments is not necessarily limited to removing subsidy but it can be accompanied by temporary subsidies for some input material and investments to convert the industry to using less subsidized input material than before, such as conversion from using oil fuel to natural gas whose use leads to reducing the pollutants emitted from fossil fuel combustion.

Along these lines, decreasing the subsidy of liquid fuel, specially oil fuel which is considered the most polluting fuel, will reduce the consumption rate in industry. This is suggested to be done according to a clear time schedule which allows the consumer the necessary time to adept to change. To speed up the desired reduction of consumption,[7] it is helpful that this action is accompanied by providing easy funding programs to the industries which, for example, convert to natural gas through the recovery of investment costs with the bills of natural gas consumption. Assessing different prices for the locations where natural gas has not been extend can be also considered[8].

On the other hand, the industrial sector attitude towards using the sources of renewable energy will certainly lead to reduction in the fuel consumption in this sector where the fuel consumption reaches 50% of the gross national consumption, 60% of which is used to generate the necessary thermal energy for the industrial processes. Using solar energy in food, textile and pharmaceutical industries already have been tested under the supervision of the New and Renewable Energy Authority.

Decreasing subsidy of the oil fuel contributes to putting sources of renewable energy in a comparatively better position. But this should be accompanied by a clear policy and the provision of the necessary technical and financial support to develop and implement these projects. The help of the United Nations Environmental Program (UNEP) can be sought in the field of technical support for these projects. This program, in cooperation with the New and Renewable Energy Authority and developed a report on the available opportunities in this field in the year 2000.

Financial contributions to finance these projects can be secured through Global Environmental Facility (GEF); while the Clean Development Mechanism (CDM) can guarantee higher profits from such projects.

As for the services costs, the surcharge duties scheme currently is being applied to sewage networks with regard to total suspended solids and biochemical oxygen demand. The cost is decided according to the quantity and type of waste. This scheme can be expanded through several ways including:

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[7] It is noteworthy that the qualities of Egyptian petroleum and the technology used in refineries lead to the production of quantities of oil fuel. There were plans to extract light products from oil fuel through the processes of hydrogen cracking, but these plans were not carried out due to their high cost. It could be necessary to revive them in conjunction with the conversion to industry from oil fuel (to natural gas).

[8] The Ministry of petroleum's document on 'the strategic plan to speed up the use of natural gas in industrial and commercial sectors addresses in detail the relevant organizing economic instruments.

- Applying it to liquid waste discharged in other media.
- Applying it to a larger scale of pollutants (solid-hazardous waste).
- Expending the range of application to more than the 10% deviation (defined by the Minister of Housing's Decree no. 44 for the year 2000) in proportion to the capacity of the receiving environmental medium.

Therefore, implementation should take place according to comprehensive studies on the promising fields of application.

- ***Lead Agency***
  - The Cabinet of Ministers
  - Ministry of Planning
  - EEAA
  - Ministry of Finance

- ***Supporting Agencies***[9]
  - Ministry of Industry and Technological Development
  - FEI
  - Ministry of Petroleum
  - Ministry of Labour
  - Ministry of Electricity

- ***Other stakeholders***
  - None

Activities to be initiated on The Long Term

3.4.2 Economic Pricing of Inputs

The inefficient pricing of inputs represents one of the main causes performance of inefficiency. From the perspective of the adopted policy of CP economic pricing of inputs should be a basic principle taken into consideration. This would help shed light on the importance of the savings that can be achieved through input material conservation.

Since removing the subsidy is a politically charged issue, it is difficult to fully implement this action item in the short term. So activating the economic instruments (item 3.4.1) is considered the currently proposed approach to selective reduction of subsidy gradually achieving the economic pricing of inputs in the long run.

- ***Lead Agency***
  - The Cabinet of Ministers
  - Ministry of Planning

[9] Depending on the case.

- ***Supporting Agencies***[10]
  - Ministry of industry and Technological Development
  - Ministry of Finance
  - Ministry of Electricity
  - Ministry of Petroleum
  - FEI
  - Ministry of Housing

- ***Other stakeholders***
  - None

3.4.3 Recovering Full Costs of Services

This concept is closely related to the polluter pays principle. It can be put into effect through the application of a number of market mechanisms. Bearing the cost for every pollution unit constitutes a strong incentive to make a notable behavior change, as it will, in principle, drive the industries to find solutions to reduce or recycle their waste. To apply this principle, there should be an effective inspection system so that the establishments' actual performance could reflect on the due cost. In addition, there should be effective enforcements to prevent the industrial establishments from evading this cost by resorting to illegal disposal of waste. The implementation of this principle in the short run is confronted by some technical difficulties such as lack of well-prepared places to receive industrial waste, including hazardous and non-hazardous waste.

Accordingly, despite the true desire to carry out this principle, it is difficult to apply it in the short run. Activating the economic tolls (item 3.4.1) is considered the way in to gradually reach the complete pay back of service costs in the long run.

- ***Lead Agency***
  - The cabinet Ministers
  - Ministry of Planning

- ***Supporting Agency***
  - Ministry of Industry and Technological Development
  - Ministry of Finance
  - FEI
  - Ministry of Housing
  - Ministry of Local Development

- ***Other stakeholders***
  - Other regulatory bodies

3.5 Availability of the Necessary Knowledge

[10] Differs according to the relevant inputs.

Activities to be initiated on the Immediate Term

3.5.1 Establishing a CP Clearinghouse

The presence of an agency which is concerned with providing the necessary information contributes to decreasing the cost of accessing information on available technology. It also helps to present viable alternatives for the purpose of choosing the best techniques for the intended uses.

Providing informational services on CP requires collecting and classifying existing sources to be in the form of a clearinghouse that can be used directly[11] or supplying an integrated service on its basis and as requested by the clients. One of these available sources is the international clearinghouses which may not be known to local user[12]. The suppliers are also considered a key source for information, although they may be biased in presenting the information. Last but not least, there is a great number of CP projects that have been already implemented in Egypt although the dissemination and analysis of the resulting data is lacking.

The substantiality of this clearinghouse is a function of the ability to access it a reasonable cost. Otherwise, the lack of demand as well as the pressure of the concerned users to update and revise the information may lead to the deterioration of information collecting plan. Therefore, thee services should be provided free of charge for users early on. Then a clear price list should be developed to cover the operation costs to guarantee sustainability in the long term. Building a clearinghouse which is based on tested technologies and capable of meeting the local needs and tackling the existing obstacles is an activity that evolves over a long time and requires continuous updating to keep pace with the rapid technology development.

Initially a great deal of information will depend on facilitating communication with the international clearinghouses. Furthermore, signing agreements with international informational agency and authorities such as the UNEP and the Regional Center For Cleaner Production affiliated to the Mediterranean Action Plan from pollution will make the process of continuous updating easier. In the long run the local contribution to CP clearinghouse can be enhanced through a number of activities including public recognition schemes of CP, documenting the local projects applying this scheme and analyzing the current status of industry. The clearinghouse can also include case studies on the best local practices in the field which illustrate the benefits gained by virtue of implementing CP activities in industrial establishments. It is expected that establishments will welcome this step because highlighting their achievements will enhance these establishments' status in local and international markets and boost their competitiveness. So this is considered a tool of public recognition for these establishments (item 3.2.2). Of course the

[11] This is for the establishments or other authorities that are actually interested in the subject of CP. Yet the same information may be useful for many establishments which are still in the phase of developing knowledge of the subject. Item 4. 5.5.

[12] The Egyptian Pollution Abatement Project (EPAP) of EEAA has taken some steps in this arena by setting up an electronic gate for a number of international clearinghouses. This effort is considered as a basis for providing the proposed informational services.

approval of the implementing establishment must be obtained before its case study is published.

The clearinghouse can be designed in such a way that contains specialized sections for every industrial sector. These sections are supposed to include date on CP and its applications as well as the new development in the technology used by every sector.

- ***Lead Agency***
  - Ministry of Industry and Technological Development
  - FEI

- ***Supporting Agencies***
  - EEAA
  - Ministry of Petroleum

- ***Other stakeholders***
  - Technical service providers
  - Ministry of Scientific Research

3.5.2 Implementing Selected Demonstration Projects

Industrial establishments are not likely to accept the idea of change, especially the change accompanied by some uncertainty. Small and Medium enterprises in particular would not accept it as they lack the technical and administrative abilities to analyze and study the change resulting from CP measures.

The CP demonstration projects helps greatly in overcoming this obstacle. Hence they represent one of the basic activities relating to providing extension services for small and medium enterprises (SMEs) (item 3.5.5). It is expected that the more cooperative SMEs in this field are those to be relocated in the industrial zones outside population centers. Consequently, they will be candidates to carry out these demonstration projects.

Although these demonstration projects are not restricted to SMEs, although the nature of the projects will be of different for the larger establishments, ie there will more concentration on technologies that have been internationally tested but may have not been locally tried yet (like the already implemented projects for using new and renewable energy sources in industry).

- ***Lead Agency***
  - EEAA
  - Ministry of Industry and Technological Development
  - FEI

- ***Supporting Agencies***
  - Local Administration

- ***Other stakeholders***
  - Social Fund for Development

3.5.3 Knowledge Dissemination

Knowledge dissemination depends on two basic approaches. First, making the different stakeholders concerned with CP aware of sources, tools and means of accessing and using the available knowledge, including CP clearinghouse (item 3.5.1). The first approach is based on having interested parties use these means themselves to find out the different fields of CP applications and to get the answers to specific questions they may have about this matter. In the second approach, knowledge can be conveyed to the interested parties through regular newsletters or targeted seminars which point out the concept, benefits and applications of CP, as well as the available means that present details on its various topics. The objective is to generate a desire in these parties to get acquire more information on CP and develop self-use of these tools.

Initiatives are currently underway to issue regular newsletter through cooperation of Environmental Compliance Office of the FEI and the SEAM project of the EEAA. These newsletters are based on information gathered from case studies on projects implemented in the field of CP. It is very important that this activity be undertaken by the party responsible for these projects. In other words, the cooperation should be on the level of the EEAA and the FEI. In this case the scope of these newsletters can be expanded to include case studies conducted outside the framework of these projects in order to highlight the successful activities that are going on or were carried out in the field of CP.

EEAA can also make such information, data and studies available on its website on the internet. It is worth mentioning here that under all circumstances the case studies of different agency and authorities should be made available through CP clearinghouse.

EEAA has held a number of seminars on self monitoring for the different industrial chambers in cooperation with the FEI and through EPAP. This was an effective experience in terms of disseminating knowledge and encouraging research in available sources of information.

- ***Lead Agency***
  - EEAA
  - Ministry of Industry and Technological Developments.
  - FEI

- ***Supporting Agencies***
  - None

- ***Other stakeholders***
  - None

Activities to be initiated on the Short Term

3.5.4 Encouraging Local Targeted Research

Research institutions play a major role in collecting information as well as generating and disseminating knowledge. Research can contribute to, at least, two areas;

- Documenting the local industrial practices in the field of CP.
- Tackling certain problems which may need a different approach when they are locally dealt with. An example of such are issues related to the SMEs, transition periods and input substitution.

It is desirable to enhance cooperation with international research agencies which are specialized at this field to initiate this activity. Sources of foreign financing (such the EU) may provide necessary funds for this cooperation. In the long run the point of establishing specialized research scholarships or mobilizing the funds through strengthening the relations with industrial community should be considered. The possibility of offering incentives to private institutions can be also studied, provided that the results of research and development are made available to the public.

This activity brings about greater knowledge benefits through consolidating the relation between it and the CP clearinghouse as well as the informational services referred to in item 3.5.1.

In addition, there is an integrated relation between it and item 3- 6, as most research institutions hold training activities.

- ***Lead Agency***
  - Ministry of Industry and Technological Development
  - EEAA

- ***Supporting Agencies***
  - FEI
  - Ministry of Scientific Research

- ***Other stakeholders***
  - None

3.5.5 Extension Services for SMEs

Although SMEs can access the clearinghouse, mentioned in item 3.5.1, and it related informational services, they are still in need of additional support. This is because most available techniques on commercial scale are usually developed for the large establishments, as such a matter requires greater financial resources and more complicated level of technology than that available for most SMEs in Egypt. Hence it is necessary to provide technical and institutional support to the SMEs to help them improve their economic and environmental performance by means of establishing more sustainable channels of communication with them. Accordingly, existing consulting centers which have permanent units for technical support (some of them are associated with industrial chambers, while some others are associated with the project of industry modernization or other institutions like the social fund for Development) should play a major role in this regard.

These centers should be directed to make use of the current national attitude towards relocating the polluting establishments outside population areas to improve environmental performance of industry and raise the level of industrial assets as the great majority of these industries are considered/classified as SMEs. This may require developing specific and temporary programs in these centers to be targeted to certain establishments that are being relocated or to areas of relocation. Though these establishments meet requirements of Environmental Impact Assessment when they are relocated, compliance with these requirements by every establishment constitutes an over burden on both the establishment and the control authority. Consequently it is necessary to resort to a comprehensive perspective through which certain conditions can be developed, provided that these conditions can be met and applied by small enterprises. This action should be done in cooperation with industrial authorities and services providers.

In this regard the project of relocating tanneries of old Cairo is considered a proper and applicable precedent as it represents an integrated project financed by governmental and foreign funds. Although each polluting industry may be different from the other, the organized and coordinated application of many tools provides enough support for implementation. These tools include the services supplied to the SMEs, extension projects and facilitating the access to the necessary funding.

- ***Lead Agency***
  - Ministry of Industry and Technological Development
  - FEI

- ***Supporting Agencies***
  - EEAA
  - Local Administration

- ***Other stakeholders***
  - Social Fund for Development.
  - Technical services providers

3.6 Availability of the Required Technical Capacities

Activities to be initiated on the Immediate term

3.6.1 Establishing CP Training Facilities

Preparing the human resources that are capable of assessing, planning and implementing strategies of pollution reduction in industrial establishments is considered a governing factor in the conversion to CP. This does not necessitate establishing specialized training centers; it requires enhancing the effective training initiatives in research centers, universities' training centers and the centers affiliated with the Ministry of Industry and Technological Development. It can also be achieved through offering incentives to private training centers and the societies of industrial sectors.

Setting up these programs contributes to preparing skilled cadres of auditors in the long run. The availability of auditors qualified auditing the industrial process, determining the proper options for CP and assessing the implementation of CP practices according to a standard code is a prerequisite for adopting the CP practices. As such, the first group of auditors necessary for activating the system should be trained through a direct, and mostly subsidized, interventions. It should be noted that there is an existing structure of environmental auditors in Egypt which should be considered when selecting candidates for the direct interventions. Some of these environmental auditors received training through projects financed by donor authorities' initiatives in the past decade. Therefore, it is expected that the additional investment required for training this group in CP audits will be limited. Recognizing the available potentialities for this group helps to determine criteria for accrediting the auditors (chapter 4) provided that these criteria are compatible with the available potentialities in the short run and do not constitute an obstacle for the hoped- for growth of services markets in the field of CP.

In the same time the additional benefits that will result from training those who work in training and research centers should not be over looked.

- ***Lead Agency***
  - Ministry of Industry and Technological Development

- ***Supporting Agencies***
  - EEAA.
  - FEI

- ***Other stakeholders***
  - Training centers

Activities to be initiated on the Short Term

3.6.2 Integrating of CP Concepts in Higher Education Curricula

Students of higher education of today are the decision makers of tomorrow, in industry and government. They will also be those providing engineering and financial services for industry. Hence recognizing the CP concepts, information and skills in higher education represents a key factor that will bring about the necessary behavioral changes in the long run.

To achieve this goal, it is necessary to train those responsible for developing curricula, teaching graduate courses, and directing academic research on the optimal utilization of the available tools to maximize CP implementation.

- ***Lead Agency***
  - Ministry of Higher Education

- ***Supporting Agencies***
  - EEAA

- Ministry of Industry and Technological Development

- ***Other stakeholders.***
  - Private universities.

Activities to be initiated on the Long Term

3.6.3 Increasing The Availability of Skilled Technical Labor to Implement CP Practices

The effectiveness of this action item is associated with the management demand for skilled labor, ie if there is no such demand, investment in this item will be useless. Hence it is directly connected with item 3.2.1 which deals with raising the higher management's awareness and the proposed economic and legislative incentives. In this regard, it is suggested to focus on training the supervisors responsible for merging the CP in operation by supplying them with necessary information and skills related to the CP as well as the different field of its application such as conservation of raw materials, water and energy, reducing waste generation, good housekeeping, contingency plans, etc. Where there is an incentive to apply the skills acquired from an attentive management which understands the importance of CP in industry, the acquired experiences and competencies will be transmitted to workers in the workplace.

On the other hand, although the lack of suitable skilled labor will constitute an obstacle to the continuity of demand for it, the deficiency of this labor supply in the short run is considered an advantage as this guarantees it a proper price in labor market. Furthermore, while the participation of the network of professional training centers affiliated to the Ministry of Industry and Technological Development and the technical institutes affiliated to the Ministry of Education is regarded as a necessity, in the long run, for preparing a generation of skilled labor that is qualified for applying the CP practices, the introduction of these centers into the CP market should be gradually accomplished.

- ***Lead Agency***
  - Ministry of Industry and Technological Development.
- ***Supporting Agencies***
  - Ministry of Labor (Labour University).
  - Ministry of Industry and Technological Development (Institute for Vocational training).
  - Ministry of Education (Technical Institutes)

- ***Other stakeholders***
  - None

4. Institutional Arrangements

Central to the successful implementation of this strategy and action plan is the availability of an organization, or a core group of organizations, who would act as a champion for the document. This entails seeing it through to implementation phase, monitoring the implementation progress, and collecting feedback from the industry. Furthermore, this entails also developing policies and relevant tools, whenever needed with the purpose of improving the implementability and effectiveness of the action plan to achieve the required goals.

Given the roles of the main and supporting agencies in implementation of the different action items, it is proposed that such core group is to consist of:

- Ministry of Industry and Technological Development; and
- EEAA, both representing the policy making bodies of industry and environment respectively as well as;
- Federation of Egyptian Industry (FEI), as the umbrella organization of the Egyptian industry, including private and/or investment sector establishments or public sector facilities affiliated to the Public Enterprise Sector, or the Egyptian General Petroleum Corporation and the Ministry of Electricity.

These bodies should be represented by delegated members authorized for taking binding decisions (after consultation if required) clearly, such decisions are not binding to non-members of the committee.

It should be stressed that the necessity of a core group of organizations does not reduce the need to involve all relevant stakeholders in the process. It also does not exclude those that are willing to join the CP cooperation Protocol.

The cooperation mechanism between these core institutions does not have to involve the creation of a new organization. On the contrary, the power of the arrangement will be proportional to the extent to which these entities formally stand behind the CP actions. A separate, and potentially isolated, organization could be counter-productive as it may involve establishing institutional arrangements to develop communication channels with the existing concerned

bodies. It is therefore proposed that a permanent steering committee be established to oversee the implementation of the Cleaner Production Protocol[13] signed between the core entities and to which the relevant sections of this document, namely the strategy and action plan, as agreed with the protocol signatory parties, will be attached.

A joint technical secretariat should be established of the MIT and EEAA located in either organization to develop and follow up on the implementation of the action plan. The secretariat also develops option papers, balancing the mix of tools used to achieve the agreed objectives. Periodical progress reports based on agreed targets, time lines and indicators will also be a part of the secretariat's responsibility together with the periodical updating of the strategy and action plan.

After studying the proposed options, the steering committee adopts them for subsequent implementation for the cases the concerned agencies are represented in the committee, negotiations with other agencies not represented in the committee or quest for ratification by higher authorities, as the case may be. Potential ratification by the Prime Minister or the Cabinet of Ministries would be on a case by case, as needed, basis. These cases are developed by the committee working under the umbrella of a national policy declared through signing the CP declaration by the Prime Minister. This would ensure the flexibility of the action plan such that it could be piloted according to the challenges and limitations it would encounter.

The role of the steering committee is fundamental in attracting resources from donor bodies and channeling them towards implementation of the agreed action plan. Additionally, the committee has a critical role in the development of norms. A healthy market is based on developing norms that are eventually institutionalized. However, the intentional development of a CP market requires a more direct intervention.

In this respect, at least three interrelated standards should be established to avoid confusion and maximize the outcomes of market interaction. These are; a standard CP assessment code, an assessor accreditation standard, and technology CP certification standard.

A standard CP assessment code, i.e. the general procedure for conducting the necessary CP audits, is essential for all action items related to the preferential treatment for industries adopting CP, to ensure an acceptable level of uniformity. This is important to ensure the comparability of information generated which should feed in a large number of activities. Standard procedures for assessment and assessor qualifications have been developed by a number of international organizations. These would form the basis for this action item and could be directly adopted as the national standard.

[13] Reference should be made to an existing cooperation protocol signed in 1999 between EEAA and FEI which stressed that industrial development should take place within a clean environment. The implementation framework of the protocol included CP as an area for cooperation.

The aim of the CP certification standard is to verify that claims about a facility's performance are based on sound scientific information. These schemes are less common than the first two and are usually found in highly developed countries to address specific technologies rather than facilities. California EPA Technology Certification program offers a "seal of approval" for CP technologies tested according to standard protocols by qualified laboratories. Canada also has developed a similar national program. It should be noted that, although the approach has its advantages in terms of ensuring uniform references, it has understandably received a mixed reaction from suppliers. It could actually, especially if undertaken by government in a developing country where resources are limited, restrict very much needed market developments. This is especially true in terms of the dynamic characteristic of the CP concept.

This third standard should therefore be thoroughly studied to balance its advantages and potential disadvantages. International support to such scheme is expected to be necessary.

Because of the close interrelation of these three standards, it is more efficient to group their operation with a single accreditation body. The "National Accreditation Council" provides an adequate umbrella. However, the setting of these standards, although managed by the same body, should be undertaken through a highly participatory process.

Annex A

Benefits of Cleaner Production to the Egyptian Industry

- **Increasing Productivity and Achieving Cost Effectiveness**

  Implementing cleaner production in the Egyptian industry will result in direct economic savings. This was shown by the cleaner production demonstration projects financed by the Egyptian Pollution Abatement Project (EPAP), the demonstration projects coordinated by SEAM (Support for Environmental Assessment and Management) and implemented by the Egyptian Environmental Affairs Agency. Other donor projects have also contributed including the German KfW financed "Environmental Facility for the Public Sector", the "Achieving Compliance in Industry, ACI", of the on-going Danish Financed Environmental Program. Moreover, small financial packages are directed to support SMEs, at a limited scale**.**

  Through the application of viable cleaner production measures, savings are made in the cost of waste treatment, and savings in the consumption of energy, raw materials, etc. At the same time, the optimization of production processes brought about by cleaner production have lead to an increase in business productivity due, for example, to time-saving which can be reinvested in the same process, or to production being increased at the same time.

  It should be noted that the price of some of the raw materials in Egypt, such as water, is relatively low. Therefore, cleaner production is an attractive notion even with the relatively low cost of raw materials, will become even more attractive if the price of water, energy and other natural resources were to increase, to reflect their real economic value.

- **Encouraging Improvement in the Production Process**

  The technology improvements that would be required to achieve cleaner production will be in line with the current initiative by the Egyptian Ministry of the Industry for modernization of the industry. Searching for means to implement cleaner production in the Egyptian industry will, inherently, encourage establishments to search for better technologies. This will not only be beneficial to the industrial sector, but also to the research organizations, the Egyptian scientific community, vocational schools, and local environmental consultants. The expertise of all of these organizations will be called upon to develop these newer (cleaner) technologies, which will create a dynamic work environment and a market for focused, targeted, research and consulting in industrial technology.

- **Increasing Export Opportunities**

  There is a growing public pressure in developed countries to ensure that their products, as well as imported products are "environmentally friendly". Furthermore, the social aspects are starting to play a role in some of the eco-labels. Therefore, by implementing cleaner production, Egyptian products can gain a competitive edge over products from other parts of the world that still use polluting technologies.

  Cleaner production is equally important for the corporate image of the Egyptian companies, which is another factor that helps increase export opportunities. Establishments that adopt and implement cleaner production can reap the benefits of a greener image, in a world that places a heavy emphasis on environmental issues and greener industrial practices.

- **Improving the Work Environment**

  From all the previous discussions, it is evident that implementing cleaner production will result in an improved work place environment. This will help reduce pollution-related ailments suffered by workers, who are the most important assets to an industry.

Annex B

Barriers to Widespread Implementation of CP in the Egyptian Industry

Information Barriers

- **Limited Available Information**

A major hurdle to the widespread adoption of cleaner production is the inaccessibility of appropriate information and expertise. Despite the considerable potential of cleaner production to improve a firm's competitiveness, in many instances it is incapable of exploiting such opportunities because of lack of information. Firms may lack information about specific clean technologies, thus contributing to the perceived risk and uncertainty regarding the adoption of the technology.

Small and medium sized enterprises (SMEs), in particular, suffer from a lack of resources and expertise to devote to implementing best environmental practices. Commonly, SMEs may also have difficulty in understanding the concept and terminology associated with the notion of cleaner production.

- **Limited Corporate Awareness**

There may be limited general awareness at the corporate management or other decision-making levels of the principles of cleaner production and its inherent advantages over strategies based solely in pollution control. In larger enterprises the production manager or plant engineer is sometimes aware of the potential value of cleaner production but is unable to communicate this to senior management. In general, however, awareness and understanding are still low, even among large enterprises, and especially so among SMEs. Moreover, the limited awareness of employees of the benefits of CP comprises a major barrier facing CP implementation. Therefore, internal policies should be developed in the establishment for training and awareness. Environmental management systems such as ISO 14001 are of the effective tools that would encourage development of training policies in the establishments, because continuous training is of the main requisites of such systems.

- **Limited Awareness at Governmental Concerned Bodies**

Similarly, government officials may not be aware of the advantages of cleaner production. Government officials seem to be the most influential pressure groups outside of industry itself, and as such the limited awareness on their part is viewed as an important barrier that needs to be overcome.

Attitude Barriers

- **Attitudinal Constraints**

Some decision-makers and policy-makers may not be accustomed to preventative strategies. This may have resulted from regulatory systems especially technological specifications mainly biased toward end-of-pipe solutions. These sometimes result in pollution being transferred from one medium to another and can actually slow technological improvements in industry. There is simply less incentive to reduce the need for an expensive pollution control device after this device is in place. The nature of regulations also, having a time limit for compliance, limit the support for the strategic and long-term planning approaches needed to achieve cleaner production. Moreover, general uncertainty in the business environment could discourage decision makers from adopting " innovative" approaches.

Constraints also result from the engineering practices use of design rules of thumb, and over specialization preventing the global perception of the whole picture required for a CP approach. Financial analysts trained to expect diminishing returns are also not at ease with CP concepts suggesting that overall reconsideration could have higher rewards than smaller incremental changes.

- **Lack of Clear Goals**

The experience of some countries, where cleaner production has not picked up, is that their national policy makers have failed to articulate clear goals and implementing policies for the achievement of cleaner production. As a result there is no useful frame of reference for industry as to the national importance of achieving cleaner production.

- **Poor Transparency of the Industry**

The industry in Egypt, as with most developing world, is not transparent. There is a tradition of secrecy in business and few firms report publicly on their operations, especially on their environmental performance. Lack of transparency makes it very difficult for communities impacted by an industry to even know the nature of the risk they incur, much less bring pressure for change.

- **Attitude Towards Compliance**

Weak enforcement is a problem in many developing countries, including Egypt. Although the implementation of cleaner production does not necessarily depend on the existence of an extensive regulatory system, given the economic benefits implicit in cleaner production, enforced regulations create an enabling environment for industries compliance and encourage the quest for more efficient means to achieve it.

Regulatory agencies, are generally not organized to promote wide-ranging technological change because their focus is on particular problem areas (air and water pollution, and wastes), not on major industries or economic sectors.

Financial Barriers

- **Limited Ability to Raise Internal Finance**

Despite the potential for cleaner production to generate substantial cost-savings, pollution prevention in firms may be inhibited by several real or perceived internal financial obstacles. Risk and uncertainty in the performance of certain technologies and management practices may result in a reluctance by firms to invest in cleaner production. Internal financial constraints to cleaner production could include the following:

- non-comprehensive cost evaluations and cost-benefit analyses;
- a lack of understanding and difficulty in predicting future liability costs (e.g. waste disposal);
- a focus on short-term profit resulting in low tolerance for investments with longer payback periods.
- a lack of capital investment due to low profit margin;
- economies of scale preventing smaller firms from investing in waste reduction options (e.g. in-plant recovery technologies);
- risk that investment in process modification can be inefficient for older firms;
- firms are financially (and even technically) tied up due to other end-of-pipe investments; and actual cost of current technologies masked in operating costs.

- **Difficulty of Accessing External Finance**

Similarly, investment in cleaner production may be hindered by the lack of access to finance. This problem is specifically more pronounced for small and medium enterprises (SMEs) due to the limited collateral and the absence of appropriate funding mechanisms. However, it also exists for highly financially leveraged large firms.

- **Perverse Economic Incentives**

Economic subsidies for business resource inputs may be a significant disincentive to cleaner production. For example, the price of energy has an important influence on energy conservation. Relatively high unit prices for energy stimulate efficiency for existing technologies as well as efforts to develop and use cleaner, energy efficient technologies. To the extent that governments reduce the price of energy, or the prices of relatively polluting fuels, through subsidies, they may inhibit the financial benefits of cleaner production. Perverse economic incentives not only apply to a range of business inputs, but also to services such as wastewater treatment, where the polluter pays principle is poorly applied. These subsequently filter through the myriad of firm management decisions, and result in technically avoidable inefficiencies.

- **Inadequate Markets for Recycled Goods**

Although, strictly speaking, Cleaner Production, as defined in this, refers to the prevention of waste rather than its recycling or re-use, such activities can form an

important component of an overall environmental management strategy. In this respect, the development of recycling markets for waste material out of its current low quality, low profitability status towards a higher technology and higher quality to compete with production from primary material and sustain the demand for its products on the long term.

- **Inadequate Accounting System**

Financial accounting drives many decisions. Once measured, costs and liabilities are made transparent to decision makers, planners and controllers within an organization. To achieve cleaner production it is essential that both the liability and total cost assessment are integrated into all aspects of an organization's activities. However, most financial accounting systems fail to factor in environmental costs and liabilities, and decision makers within the firm are consequently much less likely to integrate environmental considerations with wider business management issues.

In particular, mainstream accounting systems and project appraisal procedures fail to take adequate account of environmental impacts, risks, liabilities and associated costs, which are not easily quantifiable, and of the longer-term intangible benefits and avoided costs (e.g. costs of non-compliance) that flow from cleaner production. Similarly, payback calculations and discounting procedures can fail to take account of the full range of costs and benefits associated with a project proposal.

Failure to build such factors accurately into accounting and financial appraisal systems means that cleaner production strategies would operate under the burden of obscured profitability, and are slow to be adopted throughout the industry.

Technical Barriers

Companies may lack the technical know-how to assess the shortcomings of their existing facilities to identify wasteful practices, and rooms for improvement. Companies may also not have access to the technology required to implement cleaner production on-site. This problem may be especially pronounced at smaller and medium enterprises, which may lack the financial and technical resources of larger companies.

Annex C

Examples of Current CP Activities

The concept of cleaner production is not new to Egypt. In fact, some variations of cleaner production have been implemented in the Egyptian industry, and are integrated in the planning and operational strategy of a number of Ministries in Egypt. This Annex presents a brief summary of some of the cleaner production activities in Egypt.

Cleaner Production Projects in the Egyptian Industry

A number of cleaner production demonstration projects were carried out in the Egyptian industry. Much of such projects were supported by donors funds since the middle of the 1980's, with the aim of supporting the Egyptian industries in restructuring, reducing environmental impact as well as complying with the environmental laws. Examples include the projects administered by the Egyptian Pollution Abatement Project (EPAP), the Support for Environmental Assessment and Management program (SEAM), the Danish International Development Agency (DANIDA), the United States Agency for International Development (USAID).

These donor-funded cleaner production activities included a mix of cash transfer, technology transfer, technical assistance, capacity building and policy reform element to help improve environmental management and, eventually, to improve environmental conditions.

EPAP's projects focused on large polluters. In this respect, the main goal was to assist industrial establishments to comply with environmental law and improve their environmental performance. The total cost of three of EPAP's cleaner production projects was over 2 million US Dollars, with pay back periods between 3 and 7 years, which is within the normal payback period of industrial investments.

SEAM's demonstration projects have focused on three sectors: textiles, food, and oil & soap. Industrial auditing of 32 factories identified in excess of 300 low cost/no cost pollution prevention measures. Commonly occurring issues were then developed as demonstration projects for each sector whose aims were to show the financial and environmental benefits of the pollution prevention approach. The total cost of SEAM's project was about 1.6 Million Sterling pounds, with pay back periods from few months to few years.

DANIDA's cleaner production was carried out in two consecutive steps. The first step was divided into two parts. The first part involveed a survey carried out by specialist consultants for six industrial sectors (Textile Finishing Processes), Food (Oil & Soap, Dairy Products), Metal Foundries, Leather Tanning, Metal Finishing (Electro-Plating and Surface Painting), and finally Chemicals (Plastic and Paint Manufacturing). A Cleaner Production Sector Report (CPSR) was then prepared for each of these sectors which are considered the most promising sectors in the area of CP implementation.

In the second step of the project six CPT workshops for top and middle management in the mentioned industrial sectors were conducted. Currently demonstration projects are being carried out in a number of establishments within these sectors.

Cleaner Production in the Ministry of Electricity and Energy

The Ministry has various initiatives in this field within its strategy of cleaner production. This document outlines examples of such initiatives as follows:

Renewable energy: The ministry focuses on new and renewable energy sources, especially wind energy.

Energy conservation: The ministry has an active program to improve the energy consumption and to conserve energy.

Manufacturing of electrical parts: The strategy of the ministry aims at reducing cost and improving productivity through the use of non-hazardous and inexpensive raw materials, improvement of the input material conversion, and reduction of pollution at the factories as much as possible.

Cleaner Production in the Ministry of Foreign Trade

The Ministry of Foreign Trade has a strategy related to cleaner production as follows:

- Assessing the possibility of supporting the producers and empowering the export program fund, and giving a competitive advantage to those products that can be labeled as environmentally-friendly.

- Supporting the specialized laboratories in the ministry that can evaluate the level of environmental performance and application of environmentally-safe practices.

- Supporting the manufacturers who implement cleaner production approaches and assist in their advertising at international expos.

- Holding conferences, workshops, and seminars for workers in industrial establishments to disseminate information on cleaner production.

Cleaner Production in the Ministry of Petroleum

The following are examples of specific cleaner production projects implemented or planned in the Egyptian petroleum sector in addition to the on-going substitution of Mazot by Natural Gas.

Installation of On-Line Control at Cairo Petroleum Refinery (Mustord): Samples of the products are collected every 2-3 hours to be analyzed with the purpose of verifying the product specifications.

Phenol Substitution at Al Amerya Refinery: Phenol is currently used for separation processes. In addition to being a hazardous substance, phenol has adverse impacts on the bacterial growth needed for the biological treatment of the industrial wastewater. Studies suggest substitution of phenol with another solvent which is NMP (1-Methyl-2-Pyrrolidinone) that is more environmentally friendly and has higher separation efficiency thus decreases the solvent consumption in the process.

Rehabilitation of Kerosene Hydro-Treatment Unit at Al Amerya Refinery: This unit is used for production of low sulphur kerosene by using hydrogen and a catalyst which contributes to decreasing the sulphur content from 11500 ppm to 500 ppm.

Elimination of Hydrofluoric acid in alkylbenzene manufacture at Al Amerya Refinery: Hydrofluoric acid is a toxic corrosive material. The alkylation technology could be changed to replace the acid with a catalyst. This would increase the productivity by 8%, improves the product quality, decreases the costs for maintenance and decreases the risks of exposure.

Rehabilitation of the distillation plants and Heater for Energy conservation at the Alexandria refinery: This project aims at improving the distillation process, increase productivity, reduction of air emissions and improve energy conservation practices.

Furfural substitution at the Alexandria refinery: Furfural is a hazardous material used as solvent for extraction of aromatic compounds. It is highly volatile therefore is used in large quantities. At elevated temperatures it is transformed into coke resulting in pipeline corrosion and clogging. It could be substituted by NMP.

Establishment of gas oil hydrosulphurization and sulphur recovery unit at the Alexandria refinery: The project aims at production of low sulphur gas oil (solar) and sulphur recovery. This project is expected to contribute to improving the quality of the end product and reducing the air emissions from the refinery.

Cleaner Production in the Ministry of Industry and Technological Development

The Ministry of Industry and Technological Development is establishing the National Center for Cleaner Production (NCPC) in cooperation with the United Nations Industrial Development Organization (UNIDO). The strategy of the ministry also aims at creating training centers on cleaner production, and on developing the necessary laboratory capacity to evaluate environmental performance and carry out environmental testing.

Cleaner Production in the Ministry for Scientific Research

The strategy of the Ministry for Scientific Research addresses environmental aspects, in general, as follows:

- Assessment of the baseline conditions for industrial activities and their waste.

- Analysis of the different waste treatment technologies and identifying the optimal ones.

- Providing technical expertise for industrial establishments requiring assistance to achieve environmental compliance.

- Providing the expertise to raise the awareness of the workers in the Egyptian industry on environmental matters.

These activities can obviously be tailored to favor the cleaner production opportunities instead of end-of-pipe approaches.

Cleaner Production in the Egyptian Ministry of Finance

The Ministry of Finance does not currently address CP directly. However, it can be very useful in providing disincentive to polluting equipment, by either levying excess customs on those, or banning them completely from importation. Furthermore, the ministry can be instrumental in allowing preferential customs for factories importing cleaner technology.

Annex D

Initiatives Relevant to CP Activities

Industrial Modernization Center (IMC)
IMC is established by the Government of Egypt in the Ministry of Industry with the support of the European Union. The center has the objectives to assist eligible privately owned SMEs to modernize and upgrade their manufacturing and management skills and help them gain access to new markets. The IMC will also assist the facilities to implement effective quality assurance schemes.

The center is also related to a number of components; one of which is the Policy Change component which is responsible for the development of an industrial policy, institutional development of Ministry of Industry and develop a Foreign Direct Investment strategy. Other components include the technical assistance component aiming at the development of human resources and achieve comprehensive understanding of the requirements of the foreign customers as well as the Business Resource Centers.

Environmental Compliance Office (ECO)
The ECO was established in the Federation of Egyptian Industries (FEI) in 2002 and serves as a link between the industry, Egyptian technical consultants, EEAA and financial institutions. ECO is established within the activities of the component of Achieving Compliance in Industry of the Danish Environmental Support Programme.

The ECO aims at achieving establishing an increased level of compliance in industry with environmental regulations through awareness activities and mobilization of financial support for the implementation of cleaner production in three sectors (food, textile and engineering with the help of Egyptian technical consultants. ECO also aims at the implementation of environmental management systems (EMS) in about 90 facilities and strengthening of the capacity of Egyptian consultants in that respect. A financial facility is also established and will be institutionalized to provide financial support for cleaner production and end-of-pipe technology investments. A financial ling-term sustainability strategy will also be developed.

National Cleaner Production Center (NCPC)
The center was established with the support of UNIDO and will be housed in the Ministry of Industry. Its objectives are the coordination of cleaner production efforts and promotion of partnership links between public and private institutions at the national and regional levels as well as the enhancement of the capacity building for a more effective market access. The NCPC will establish a business plan to analyze existing CP activities, monitor the viability of its activities and prepare a strategy for its sustainability.

The center is responsible for the dissemination of cleaner production knowledge and the provision of services. Services include training of experts for in-plant assessment, training of facilities in environmental tools, dissemination of information and awareness, assistance in the preparation of investment requests and provision of policy advice on specific matters as well as the provision of consultancy services in

cleaner production, waste recovery and other management schemes. It is expected that the center will contribute to the building of national capacity in cleaner production in at least three sectors and to the formulation of supporting policy measures.

EEAA Industry Unit

The industry unit, currently being considered in EEAA, will have planning functions to formulate EEAA vision and policies for industry-related activities based on an analysis of obstacles and assessment of needs. The unit will be concerned with two types of policies and plans; one related to the activities of the regulatory entities to control and monitor the performance of industry and the other related to the environmental responsibilities of industrial facilities. This policy will be translated into plans and activities by all concerned EEAA departments; each within its own scope of work**.**

The industry unit will adopt different approaches that aim at the compliance of industry and complement the "command and control" tools. This will extend to EMS, cleaner production, economic incentives as well as other tools.

The unit will ensure effective coordination regarding industrial issues within EEAA departments, between EEAA departments and donor-funded projects and between EEAA and other entities regarding industry-related activities. Moreover, the unit will also be responsible for the provision of technical support to industrial entities regarding environmental issues related to industry aiming at the enhancement of the environmental performance of industry. Such support will be in the form of guidelines and fact sheets or the mobilization of direct support to individuals facilities.

Annex E

Calculation of Goal Indicators

- ## Selecting the Sample
  - **For each industrial sector**
    The indicator is calculated for each separate industrial sector. The sector is categorized according to the size of establishments. (Micro-, Small and Medium size establishments). Generally, the micro and small scale establishments are similar in terms of used technologies, product as well as the environmental performance. Whereas large establishments demonstrate different environmental performance resulting from the level of complexity of the production processes.

  - **Separation between new and existing establishments**
    Separation between the existing establishments, that are required to achieve improvement in performance levels and the new established to which other performance standards are applied supported by implementation of new technologies.

- ## Sources of Information

The following information sources covers partially the required sample data:

- **Environmental inspection***:* focuses on non-complying and potentially non-complying establishments. It is thus expected that inspection is a biased sources for data.
- **The environmental register:** Law 4/1994 does not provide specific identification criteria for establishments that are required to keep such register. In addition, inadequate enforcement to keep the register does not make it an exhaustive source of information. Therefore, the proposed self monitoring practices based on agreement between the regulatory body and the establishments makes it a reliable source for data. The establishments required to carry out self monitoring will be determined according to the size of the establishments and their environmental impacts.
- **The hazardous substances register:** is an important source of information for establishments using such substances**.**
- **The hazardous waste register:** for establishments generating hazardous waste.
- **Service providers***:* such as waster, gas and electricity companies which keep records for consumption of these resources**.**

It is expected that the availability of information is limited to part of the sector, particularly the large and medium establishments. The SMEs forms the major part of the different sectors, that are regarded as homogenous in terms of their environmental performance as a result of their small size and similar technology. Therefore, a sample of such establishments would be representative for the environmental performance of SMEs.

- **Cooperation between bodies involved in data collection**
  - The team responsible for indicator calculation identifies the required information of the representative sample as well as the required sources of information. Information is to be completed through field surveys.
  - It is important to agree with other involved bodies, especially those related to inspection, regarding the scope of work of each of them, during the period of data updating. This is the first stage for identifying the size of the required field surveys.
  - In absence of self monitoring and reporting systems, data collection depends to a great extent on field surveys, forming a constraint of the sample size to be investigated. Therefore, it is expected that the precision and accuracy of surveys increases with the development and implementation of self monitoring and reporting systems.

- **Increasing Export Opportunities**

  There is a growing public pressure in developed countries to ensure that their products, as well as imported products are "green". Furthermore, the social aspects are starting to play a role in some of the eco-labels. Therefore, by implementing cleaner production, Egyptian products can gain a competitive edge over products from other parts of the world that still use polluting technologies.

  Cleaner production is equally important for the corporate image of the Egyptian companies, which is another factor that helps increase export opportunities. Companies that adopt and implement cleaner production can reap the benefits of a greener image, in a world that places a heavy emphasis on environmental issues and greener industrial practices.

- **Improving the Work Environment**

  From all the previous discussions, it is evident that implementing cleaner production will result in an improved work place environment. This will help reduce pollution-related ailments suffered by workers, who are the most important assets to an industry.