



INDUSTRIAL POLLUTION CONTROL POLICIES IN EGYPT

Institutional Strengthening of the Egyptian Environmental Affairs Agency to Improve its Environmental Policies Formulation and Environmental Management Capabilities

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EcoConServ
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ABBREVIATIONS

B/C factor	Benefit Cost factor (if > 1 , a measure is economically beneficial)
BOD	Biological Oxygen Demand
CAP	Compliance action plans
CBA	Cost Benefit Analysis
CDM	Clean Development Mechanism
CFU	Carbon Fund Unit
CHP	Combined Heat Power generation
CID	Central Inspection Department (of EEAA)
COD	Chemical Oxygen Demand
CP	Cleaner Production
EEAA	Egyptian Environmental Affairs Agency
EPAP	Egyptian Policy Abatement Project
EPF	Environmental Protection Fund
EU	European Union
GDP	Gross Domestic Product
IEA	International Energy Agency
IFI	International Financial Institutions
IPC	Industrial Pollution Control
LE	Egyptian Pound (national currency) 1 LE \approx 0.18 US\$ 1 LE \approx 0.12 € (rates as of September 2009)
MSEA	Ministry of State for Environmental Affairs (of Egypt)
NO _x	Nitrogen Oxides, an air pollutant that causes acidification of the environment. It is also responsible for the creation of smog (in combination with VOC) and causes damage to health.
NPV	Net Present Value
PM ₁₀	Particle matter with a diameter smaller than 10 micrometer.
PPP	Public Private Partnership
SMEs	Small and Medium sized Enterprises

SO ₂	Sulphur dioxide, an air pollutant that causes acidification of the environment and also causes damage to health
SWOT	Strengths/Weaknesses/Opportunities and Threats
VOC	Volatile Organic Compounds, an air pollutant that is responsible for the creation of smog and as such causes damage to health
UN	United Nations
WB	World Bank

1 INTRODUCTION

1.1 Background

The government of Egypt has implemented an ambitious plan to develop and modernise industry, with the aim to increase the competitiveness to meet the challenges of the globalisation and integration into the global economy. The quality of Egyptian products should be improved to make use of the opportunities offered by open markets and international trade agreements.

In the period 2006-2008, GDP has increased by 7% each year, and it is expected that growth of GDP will continue in the near future. Industry plays an important role in the economy of Egypt, about 40% of GDP is generated in industry and industrial jobs count for about 20% of total employment.

In the World Bank (WB)'s "Cost Assessment of Environmental Degradation in Egypt" sector note, the cost of environmental degradation in Egypt was estimated to be in the order of 4.8% of GDP in 1999, with an add-on damage cost for the global environment in the order of 0.6% of GDP. Although the exact share of industry in overall environmental degradation in Egypt is not documented, it is clear that continuous growth of the industrial production - without additional measures to control pollution - will increase pressure on the environment and thus will lead to increasing costs of environmental degradation.

In order to address these issues, the government of Egypt (GoE) has taken several measures. The problem of industrial pollution was tackled through the Egyptian Pollution Abatement Project (EPAP1) financed through loans by the World Bank and the European Investment Bank as well as through a grant from the Government of Finland. This project was implemented during the period 1997-2005 to test a sustainable mechanism for industrial environmental management.

Considering the promising achievements of EPAP 1, and the continuous growth of the industrial sector in Egypt, the Government of Egypt has sought the support of international donors in order to prepare and finance a follow up project to EPAP1: The Egyptian Pollution Abatement Project - Second Phase (EPAP II). EPAP II will be implemented during the period 2007-2012.

1.2 Objective

The overall objective of EPAP II is decreasing the pollution loads generated by Egyptian industries. Specifically an emission reduction of at least 50% is targeted for companies that benefit from EPAP II.

The specific objective of this technical support document focuses on Industrial Pollution Control (IPC) policy in Egypt. The IPC policy should be implemented by the Egyptian Environmental Affairs Agency (EEAA), with involvement of the

Industry Unit, the Central Inspection Department and the Environmental Impact Assessment (EIA) Department.

This report documents the following issues:

- Review the on-going policies implemented by EEAA regarding IPC with a particular emphasis on the monitoring and enforcement functions;
- Redefine this policy using the SWOT (Strength/Weaknesses/Opportunities and Trends) approach and subsequently provide recommendations for reinforcing the capabilities of the Industrial Unit, the EIA Department and the CID of the EEAA;
- Recommend detailed measures to improve EEAA's capabilities in IPC and policy making. This is carried out by selecting with EEAA a set of 5-7 policy measures and conducting a cost benefit analysis (or cost effectiveness analysis) on the proposed measures.

1.3 Organisation of this report

To achieve the objectives of the technical support on IPC policy making to the EEAA, the following steps have been taken.

First, a brief analysis of the policy-making process in Environmental Policy in Egypt in general, with a focus on IPC, has been made. The results of this brief analysis are presented in Chapter 2, making use of the concept of the "policy cycle".

To understand the context of IPC in Egypt, in Chapter 3 some data and estimates are presented on industry (production, employment, energy inputs, development) and industrial pollution (emission to air, water and industrial waste management, and possible developments) in Egypt. This gives an idea of the magnitude of the problems and challenges the EEAA faces in IPC in the near future.

The legislative and institutional aspects of the way in which IPC policy is implemented in Egypt (by EEAA, other institutions involved and industry) is briefly discussed in Chapter 4. Also the main policies are summarised in this chapter.

In chapter 5 policy actions linked with main policies of EEAA on IPC are discussed and analysed¹. In most cases this also results in one or more recommendations concerning the policy actions (mainly focussing on better implementation and higher effectiveness of policy actions).

In the paragraphs of this chapter the following policies are discussed:

- Enforcement of compliance (including EIA, monitoring, inspection, CAP's);
- Cleaner Production (including GHG reduction, energy saving and cleaner fuels);
- Economic Incentives for IPC (including fines, subsidies, loans and grants);
- Public disclosure (including PROPER and e-government);

¹ By means of a "light" SWOT analysis (depending on the question whether a SWOT analysis is the most adequate tool for analysis) or a more general evaluation.

- Management of “hot spots” and guidance for industrial development;
- Continuous renewal and updating of emission standards, monitoring and inspection procedures.

In chapter 6, the policy recommendations are summarised.

To support the recommendations, for some of the policy measures a Cost Benefit Analysis (CBA) is performed. This is presented in Annex I. As to understand the potential magnitude of benefits of IPC, the results of the “Cost Assessment of Environmental Degradation in Egypt” sector note (WB, 2005) have been updated with a focus on industry². The results of this updated study have been used to assess benefits of certain policy measures discussed in the Annex. Due to a lack of factual and quantitative data on policy measures, the CBA concentrates on assessing the magnitude of the potential benefits of the measures. If possible, some information is also presented on the costs of policy measures. For some of the policy measures, only a qualitative assessment could be made.

In Annex II, an indicative list of IPC projects in Egypt from 1996 - 2015 is presented, indicating that in total at least LE 8 billion is invested in this period.

² As the original study presents data on 1999, whereas this policy document aims to review also the near future of IPC (until 2015).

2 ENVIRONMENTAL POLICY IN INDUSTRY, POLICY CYCLE

2.1 Introduction

To analyse the history and current state of the art of environmental policy towards industry in Egypt, use can be made of the concept of the policy cycle. In the policy cycles various specific steps are determined, giving a framework for policy analysis.

In this chapter a brief analysis will be briefly given for environmental policy in industry in Egypt using the concept of policy cycle.

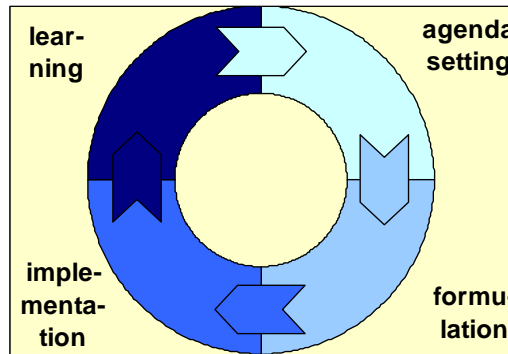
2.2 The Policy Cycle

“Policy” is a widely used term, with various definitions and meanings. Most common elements in such definitions are:

- (Deliberate) plan of action;
- Objectives/goals/(rational) outcomes to be achieved;
- Involvement of individuals or groups of individuals, organisations, authorities (“actors”).

Closely linked to “policy”, is the policy cycle, which describes the dynamics of policies. A simple example of a policy cycle is shown in Figure 2.1

Figure 2.1 - Example of a Simple Policy Cycle



This simple representation of the policy cycle in the above figure can be more detailed as follows:

- **Agenda setting:** This includes identification of the problem(s) to be solved and setting objective(s), research, formulation of policy options and strategies to achieve the objective;
- **Formulation:** This may involve negotiation (between i.e. regulator and industry), formulation and organisation of policies (i.e. legal provisions needed for implementation) to achieve objectives;

- **Implementation:** This involves taking physical measures by (i.e. waste water treatment), enforcement (permitting, inspection, legal action, fines, monitoring);
- **Learning:** This may involve evaluation of the results achieved with the implementation of the policy (i.e. to improve certain elements).

The above shows that policy is complex and dynamic: it has different stages and various dimensions. The role of the different actors in the environmental policy cycle is different. Agenda setting is ideally the result of a societal/scientific debate involving all relevant interests. Policy formulation mainly involves authorities/institutions, whereas the implementation of environmental policy is mainly a task of the actors addressed by environmental policy (i.e. industry).

2.3 Analysing Industrial Pollution Control Policy in Egypt

For the purpose of this study, the concept of the policy cycle needs to be applied on Industrial Pollution Control (IPC) in Egypt. In the following subsections some general remarks and observations will be summarised. These will be analysed further in the next chapters of this report.

2.3.1 Agenda Setting

By introducing environmental laws in Egypt during the last 6 decades (see chapter 4 "Legal Framework"), it can be concluded that the environmental problems in general and more specific in industry have been identified. Gradually several laws were introduced to cope with environmental problems in Egypt (see section 4.2 for an overview of most important Laws).

Law no. 4/1994 and its Executive Regulation were issued as the first comprehensive (or framework) environmental law that supplemented and integrated preceding environment legislations. The Law addresses all three environmental domains: air, water and soil, and moreover (hazardous) waste and noise, thus creating a comprehensive legal framework, in which executive and civil agencies may be involved.

The objectives of the environmental laws in Egypt are rather general (protection of the environment) as are the policies to implement these laws. The policies lack for example quantitative objectives to control/reduce pollution in the country.

None of the mentioned laws are specifically directed towards the industrial sectors. But all these laws have impacts on industry, and specific articles are included in these laws to regulate industrial emissions, discharges and waste management.

The dynamics of the (general) environmental policy is shown by the gradual development of the legal framework, which is common for environmental policy all around the world.

A concern that needs to be addressed in the near future is the increasing pressure on environment by the foreseen industrial development in Egypt (see chapter 3).

2.3.2 Formulation of Policies

At different stages in the last decades the general environmental objectives have been translated into the formulation of policies, which have been made operational in the environmental laws.

As a result of the agenda setting, the Ministry of State for Environmental Affairs (MSEA) and the Egyptian Environmental Affairs Agency (EEAA) have been established. MSEA and EEAA have an important task in developing environmental policies. One of the first (general) policy documents was the National Environmental Action Plan (MSEA, 2001) and the five year Action Plan (EEAA, 2002).

Within the EEAA various departments are active which have responsibilities for IPC: Industry Unit, Inspection and Environmental Impact Assessment unit. Policies have been proposed and developed for (i.e.) Inspection of industrial facilities, EIA's and Cleaner Production. However, no comprehensive policy for IPC has formulated.

For the near future policies need to be formulated to control industrial pollution in such a way that on the one hand industrial output can grow whereas pollution will at least be kept at the current level or preferably decrease.

2.3.3 Implementation of Policies

For the implementation of the environmental laws various institutions are responsible. On the side of the authorities the EEAA has a coordinating role for most laws, in cooperation with other institutions: Ministry of Energy (Law no. 59/1960); the Ministry of Housing and Urban Communities (Law no. 93/1962); Ministry of Water Resources (Law no. 48/1982); the Ministry of Manpower (Law no. 12/2003). Law no. 4/1994 is mainly enforced by EEAA itself, but the permit for construction and operation of an industrial facility is based on Law no. 453/1954 (on "Industrial and Commercial Establishments"). Activities of the authorities in this phase of the policy cycle are linked with Environmental Impact Assessments, permitting, inspection and monitoring.

Of course, the industry plays the major role in the implementation of environmental policies: they have to comply with the regulations by 1) fulfilling administrative obligations (i.e. Environmental Impact Assessment, permits, monitoring) and 2) taking physical measures (i.e. waste water treatment, recycling of waste, controlling air pollution, etc.).

To address future pollution, policy implementation needs to be developed in a way that industries are challenged to reduce pollution beyond the legal standards.

2.3.4 Learning

This last step in the policy cycle involves evaluation of the policy. For example, Law no. 4/1994 (and the modifications in Law no. 9/2009) is a result of the observation that preceding environmental laws did not give a framework to effectively combat pollution. Also the National Environmental Action Programme (NEAP, 2001) observes that “compliance is weak because enforcement is not efficient enough. Egypt needs to strengthen the institutional mechanisms necessary for effective environmental management.” In the NEAP suggestions are made to improve implementation and enforcement.

The Egypt State of the Environment reports give feedback on the results of policies: for example, the report for 2006 (chapter on air pollution) clearly shows that in many instances and places, PM10 and smog levels are above permissible levels (MSEA, 2007, p. 33 - 36). Such observations serve as an indication for strengthening existing or additional policy measures.

Exploration of industrial development scenarios for the future will be needed to assess the need to anticipate environmental problems linked with this rapid development.

2.3.5 Observations and Challenges

The legal framework for environmental protection in Egypt is not specifically developed for controlling industrial pollution. The Law basically addresses all actors and all environmental problems.

However, many of the Executive Regulations of Law no. 4/1994 relate to industrial pollution (i.e. Annex 2, Establishments subject to environmental assessment, Annex 6, Permissible Limits of Air Pollutants in Emissions).

To control industrial pollution and facilitate fast growth of industry at the same time, the EEAA will face enormous challenges. New policies need to be investigated, formulated and implemented, with the aim of achieving a sustainable development of Egyptian industry.

3 INDUSTRY AND INDUSTRIAL POLLUTION IN EGYPT

3.1 Introduction

There is little public information available on industrial pollution in Egypt. The State of the Environment reports, annually published by the EEAA, mainly give a lot of information on the ambient quality of the environment. Very little or no information is available on the annual emissions of the most important pollutants of ambient environment in Egypt: no data is published in the SOE on emissions of air pollutants (CO₂, SO₂, NO_x, VOC, PM10, etc.), industrial water pollution is also weakly documented as is the case with the generation and processing of industrial hazardous and non hazardous wastes.

In this chapter an attempt is made to present some information on industry as such, and an impression of the magnitude of pollution of the environment caused by industry.

Industry in this report comprises, according to international NACE/ISIC classifications (European Commission, 2004):

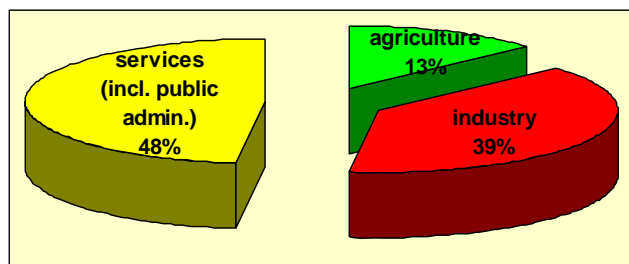
- Mining (B);
- Manufacturing (C);
- Utilities (power and water) (D).

3.2 Industry in Egypt

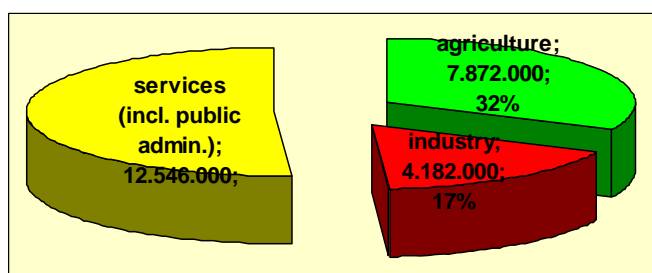
3.2.1 Industrial Production and Employment in Egyptian Economy

Industry constitutes an important part of Egyptian economy, almost 40% of Egyptian GDP is earned in industry. Also for employment industry is important: over 4 million people (about 17% of the labour force) are employed by industry³. This is shown in figures 3.1 and 3.2 (CIA, 2009).

Figure 3.1 - Share of sectors in the Egyptian Economy (2008 estimate)



³ According the Egypt State of the Environment report, 2006 (MSEA, 2007. p. 48) in 2006 industrial production represented 35.5% of the national income and around 25% of total employment

Figure 3.2 - Share of Sectors in Egyptian Employment (2001 estimate)


Within industry, the following sectors largely contribute to the development of industrial employment.

Table 3.1- Evolution of Industrial Employment in Major Industrial Sectors in Egypt in 2006-2009 (x 1000)

Sector	2006/2007 actual	2007/2008 expected	2008/2009 targeted
Food industries	408	430	460
Textile	960	1015	1100
Chemical industries	704	743	780
Basic metal industries	320	333	350
Engineering industries	303	324	326
Total	2,695	2,845	3,016

Source: SIS, 2009c

This table shows the importance of industry as an “engine” for economic growth and employment opportunities.

3.2.2 Industrial Establishments in Egypt

In 2007, according to the SOE (EEAA, 2008) there were around 28,000 industrial settlements⁴. The distribution of these industrial establishments over the different economic sectors is given in the following table.

Table 3.2- Number of Registered Establishments in Manufacturing Industries in Egypt in 2007

Sector	Number of establishments
Foods and beverages and tobacco	5 841
Spinning and weaving, garments, leather	6 256
Wood and products, and upholstery	2 520
Paper and products, printing and publishing	1 693
Other transformational industries	564
Basic chemicals and products	3 250
Construction materials ⁵ , ceramic industry	1 971

⁴ It is not clear if settlements in the Mining industry and the Utilities sector are included in this total

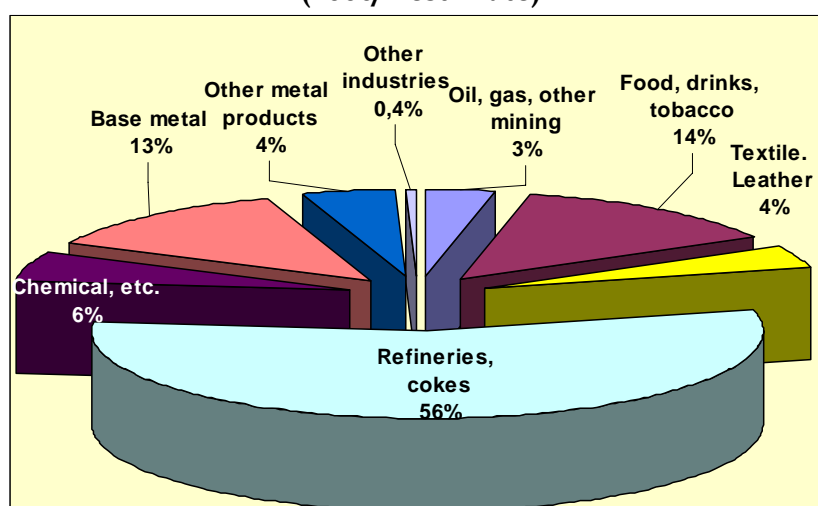
Sector	Number of establishments
Basic metals	568
Metal products, transport machines & equipment	552
Total number of settlements	28 184

Source: EEAA, 2008 (p.231) and MSEA, 2007 (p. 41)

About half of the registered industrial settlements in Egypt is concentrated in the greater Cairo Governorate: 13,608 (EEAA, 2007, p. 89). Most of the industrial settlements in the Cairo governorate can be considered small and medium sized enterprises (SME): over 95%, whereas in total 524 enterprises can be considered large⁶.

In the fiscal year 2006/2007, the total output of manufacturing industries was LE 69 billion. The distribution of the production over the different sectors is shown in the following figure.

Figure 3.3 - Share of Sectors in the Production in Egyptian Manufacturing (2006/7 estimate)



Source: SIS, 2009

Figure 3.3 shows that more than half of the income of manufacturing industries in Egypt is earned in the oil refining (and cokes) industry. Other important sectors are Food, Drinks and Tobacco industry and the Base metals industry.

3.2.3 Industrial Development

In 1999 Egypt and the European Union agreed on an Industrial Modernisation Plan (IMP). The implementation of this plan started in the fiscal year 2002/2003. The program aims to increase the competitiveness of Egyptian industry to meet the challenges of the globalisation and integration into the global economy. The quality

⁵ This includes the cement industry

⁶ The distinctive criterion seems to be the total investment of the enterprise, which is for large Enterprises > L.E. 20 million. It is not clear whether this is the annual investment, or the total cumulative investments made.

of Egyptian products should be improved to make use of the opportunities offered by open markets and international trade agreements. In the period 2002-2005 450 industrial plants were modernised and about € 437 million was spent, of which the EU contributed €250 million. After 2005, the Egyptian Industrial Modernisation Centre coordinated the programme, aiming at modernisation of 7,300 industrial establishments. In the period 2005 - 2007 over 1,300 industrial establishments have been modernised at (investment) costs of LE 23 billion. (SIS, 2009b).

The last 3 years (2006 - 2008) the real growth rate of the GDP of Egypt was around 7% (CIA, 2009).

For the future, the 5th plan (2007/08 - 2011/12) an ambitious development of Egyptian industry is foreseen, as can be seen in the following table:

Table 3.3 Objectives of Industrial Development in Egypt in 2007

Year	Number of projects (x 1000)	Production value Billion LE	Employment Million	Wages Billion LE	Investment costs Billion LE
2007	28.3	311,5	2.6	28.6	255
2011	31.2	756,6	2.87	43.4	433
2015	34.4	903	3.17	63.8	674

Source: SIS, 2009c, based on "Economic and Social Development of the Fifth Plan, 2007/2008 - 2011/2012"

In 8 years time, industrial production is expected to increase by 190%, almost tripling the production level in 2015 compared to 2007⁷.

It can be concluded, that without increasing resource efficiency, pollution will grow each year with about the same pace. But even when IPC and resource efficiency improves each year, it will be extremely difficult to reduce the absolute industrial pollution levels.

3.3 Energy Input in Industry

Although the energy inputs are not the only cause of industrial pollution, it gives an initial indication of the importance of industrial pollution as part of all pollution in a country.

The International Energy Agency (IEA) publishes standardised energy balances for almost all countries in the world. The latest available, standardised, energy statistics for Egypt give data for 2006. In the following table the inputs of fossil fuels in the industrial sectors and in total Egypt are shown to give an impression of these inputs.

⁷ This seems a little optimistic, especially the growth rate between 2007 and 2011 (>>20% per year)

**Table 3.2- Estimated (Fossil) Energy Inputs in Industry in Egypt in 2006
(in PJ/year)⁸**

Sector	total	oil	gas	coal	other
Power (electricity)	906	175	731		
Refineries	177	48	129		
Base metal	21			21	
Other industries	478	266	164	17	31
Total industry	1 583	490	1 024	38	31
Transport	488	476	12		
Other sectors	501	343	127	1	30
Total General	2 572	1 309	1 163	39	61

Source: based on: IEA, 2009 (Energy Balance for Egypt, 2006)

It can be seen that the inputs of fossil fuels in industry in Egypt in 2006 made up over 60% of total energy inputs in Egypt. Compared to the share in GDP (about 40%), it can be concluded that industry uses about 1.6 times more energy than the economy as a whole per LE.

Unfortunately, other standardised information of the inputs of for example water and other resources is not available.

3.4 Industrial Emission of Some Air Pollutants

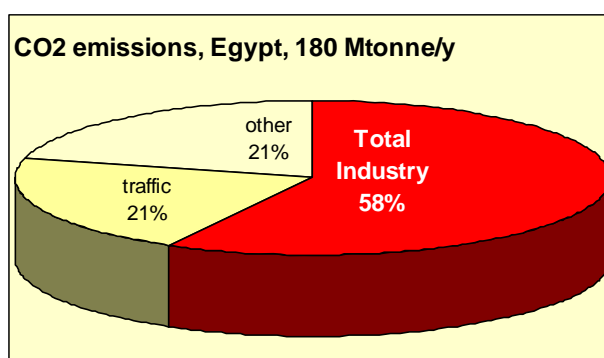
MSEA/EEAA does not publish data on a national level on emissions in the Egypt State of the Environment report. The share of industry in total pollution is not very well documented. The energy balance of Egypt (IEA, 2009) can be used to make rough estimates of air pollution and the share of industry in air pollution, by applying general emission factors for CO₂, SO₂ and NO_x.

Total CO₂ emissions in Egypt are estimated at about 180 Megaton per year⁹. The division of CO₂ emissions over sectors is shown in figure 3.3.

⁸ Due to the way in which the energy balances are published by the IEA, some interpretations have been made which may not represent the actual situation 100% correct, the totals for industry however are in line with the actual situation

⁹ According IEA (2009) CO₂ emissions in Egypt are 152.7 Megatonnes. The difference may be due to the way IEA calculates CO₂ emissions (Kyoto protocol)

Figure 3.3 – Estimated CO₂ Emissions in Egypt (2006 Estimate)

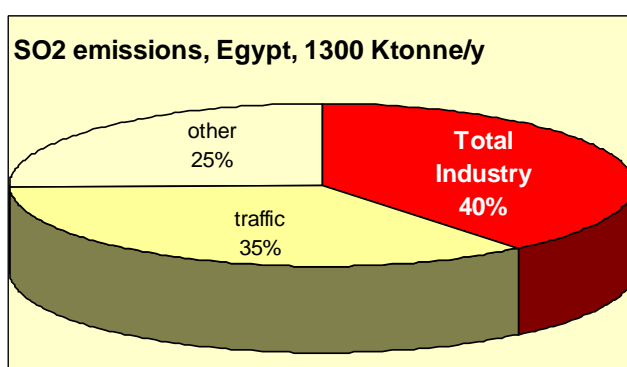


Source: Own estimate, based on IEA, 2009

The estimate shows that roughly 60% of CO₂ emissions in Egypt are caused by the industry¹⁰.

Total SO₂ emissions in Egypt are estimated are about 1,300 Kilon per year as shown in the next figure.

Figure 3.4 – Estimated SO₂ Emissions in Egypt (2006 Estimate)



Source: Own estimate, based on IEA, 2009 and Wikipedia, 2009¹¹

As industry natural gas is (already) the dominant fuel, and natural gas has a (very) low sulphur content, the industry is only responsible for about 40% of the total SO₂ emissions in Egypt.

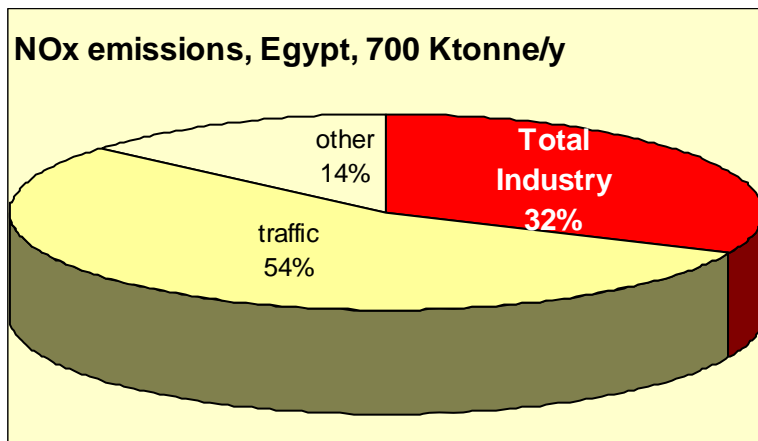
The division of estimated NO_x emissions¹² over sectors in Egypt is presented in figure 3.5.

10 The following (fixed) emission factors have been used: 78 g/GJ for oil; 57,7 g/GJ for natural gas; 101 g/GJ for coal; 100 g/GJ for other fuels

11 Sulphur content of Egypt oil is assumed to be 2 weight%, leading to an emission factor of 40g/kg oil equivalents

12 Actually, for NO_x some information of annual emission by traffic is available for the greater Cairo area (EEAA, 2008, p. 44, Figure 1.16). This shows that annual emissions in this area are about 150 Kilotonne in 2007. This confirms the rough estimate for traffic as presented in figure 3.5.

Figure 3.5 - Estimated NO_x Emissions in Egypt (2006 Estimate)



Source: own estimate, based on IEA, 2009

NO_x emission factors in traffic (mobile sources) are higher than in industry (stationary sources)¹³. As a result, the contribution of industry to NO_x emissions is relatively low, compared to energy inputs.

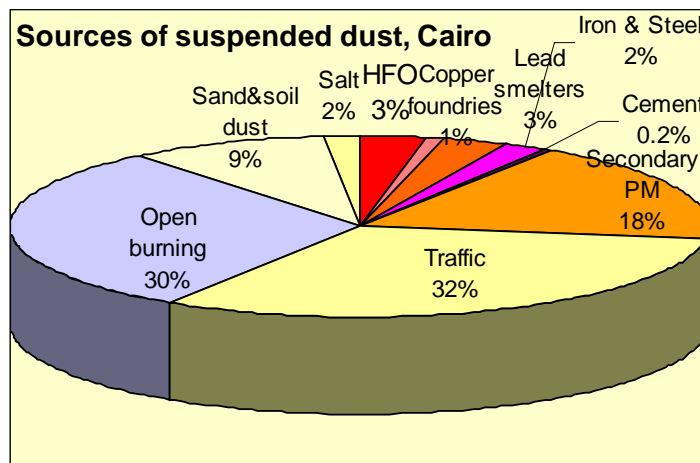
For the emissions of (fine) particles (PM10) it is not possible (without detailed knowledge of process conditions) to estimate emissions by means of emission factors.

In the Cairo Air Improvement project, information on the sources of suspended dust is presented for the Greater Cairo region (see figure 3.6). Although the information given in this report only refers to the Greater Cairo area, it is included here, as it at least gives an indication of the contribution of industry to the air quality in urban areas in Egypt¹⁴.

¹³ It should be mentioned that NO_x emission factors depend on process circumstances. The following emission factors have been assumed: 200 gr/GJ for oil(products), 770 g/GJ for use of gasoline and diesel in traffic; 100 g/GJ for natural gas (used in vehicles: 650 g/GJ), 150 g/GJ for coal and 400 g/GJ for other fuels.

¹⁴ As no information on emission to air of suspended dust in other (urban) areas is available, it is not possible to assess to what extent the information shown in the graph is representative for Egypt as a whole.

Figure 3.6 - Annual Average of Pollution Ratios by Suspended Dust from Various Sources in Greater Cairo



Source: Chemonics, 2004, p. 44

The contribution of industry to total suspended dust ambient levels is small. Little more than 10% of the pollution can be attributed directly to industrial sources. Most air pollution at ambient level is due to traffic, open burning of waste and sand and soil dust.

3.5 Other Industrial Pollution (water, waste)

The contribution of industry to the pollution of water, and the contribution of industry in total waste disposal, no clear or comprehensive data can be found in the documents published by EEAA and MSEA. Only some rough estimates are available which do not give much information on the quantities of water pollution and waste, nor on the types of water pollution and waste.

3.5.1 Solid Waste

The total amount of solid waste generated in Egypt in 2007 is estimated at 66 ton (EEAA, 2008, p. 242). Approximately 5 ton is generated by industry (8%). For 2000 the amount of industrial waste was estimated at 5.9 ton (WB, 2005, Annex 5.1). It is not clear if this number includes also industrial waste recycled, or if this is the waste generated by industry. Most industrial waste is landfilled, often in combination with municipal waste and hazardous waste (MSEA, 2001, p. 25). Experience in other countries shows, that the potential of recycling of industrial waste is very large. Often 90% of waste generated can be recycled, in order to reduce the costs of final disposal.

The annual amount of hazardous waste generated by industry is estimated at 300,000 tonnes (EEAA, 2008, p. 258)(WB, 2005, Annex 5.1). No information is available on the composition of hazardous waste generated by industries. It is reasonable to assume that it concerns more or less the same types of hazardous wastes as produced in other countries. Most hazardous waste is generated in the Cairo and Alexandria

governorates and most hazardous waste is landfilled, often on public (non sanitary) landfills. In Alexandria a specialised landfill for hazardous waste is in operation since 2002, in the Cairo governorate one cement kiln has a licence to destruct industrial and hazardous waste¹⁵.

Given the public concerns and the fast industrial development, it can be anticipated that in the future most of the hazardous waste generated by industries will be recycled or disposed off on sanitary landfills and possibly in industrial incinerators that meet the international standards for processing hazardous waste.

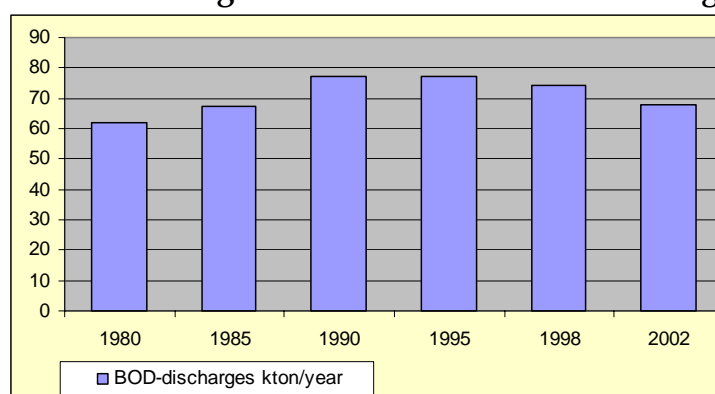
3.5.2 Water

The quality of inland water and fresh water resources is a main concern of the MSEA and other authorities in Egypt (MSEA, 2008, p. 49). In the annual report of the MSEA it is stated that water pollution is a complex problem, and huge investments are needed. According the country assessment of the World bank (WB, 2005, p. 40), industrial wastewater has potentially been the second crucial source of Nile-system water pollution. Until the late 90's some 387 MCM/yr of effluents used to be discharged to the Nile, it's canals and drains.

On the other hand it is stated in the State of the Environment report 2007 (EEAA, 2008, p. 95 - 98), that "the increase of dissolved oxygen level is an evidence of good water quality". And further on (EEAA, 2008, p. 99) it is stated that 99.57% of industrial effluents are within the limits of the law 48/1982, 0,23% of effluents were and only 0.2% is non compliant.

The annual water use by the industrial sector in Egypt is estimated at 4 billion m³ in 2000, 6% of all fresh water use in Egypt (NationMaster, 2009). Total BOD discharges of industry have developed as shown in figure 3.7.

Figure 3.7 - Annual Discharges of Industrial Wastewater in Egypt, 1980 -2002



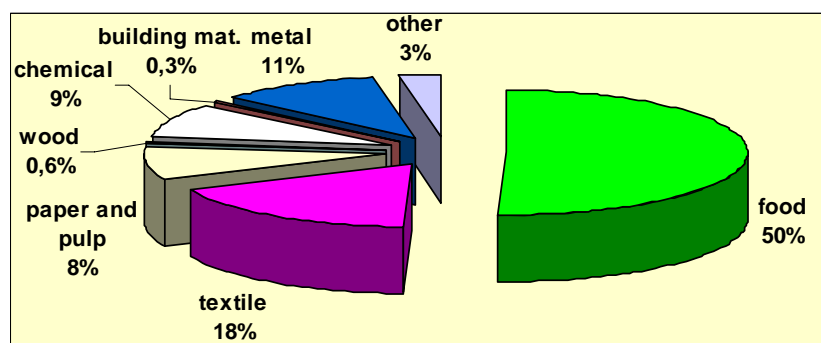
Source: WRI, 2009

¹⁵ In Alexandria a landfill for hazardous waste has been realised (MSEA, 2005, p. 30). In one cement kiln of the Egypt Cement Company (subsidiary of Lafarge) near Suez, hazardous waste can be destructed after an experiment in 2004 co-ordinated with the EEAA (about 5.3 tons/hour). (MSEA, p. 65) (ECC, 2009).

Figure 3.7 shows, that after 1995, BOD discharges of industry have been gradually reduced. How industrial water pollution has developed after 2002 is not documented. Also, no indications of total loads of other water polluting substances by industry (heavy metals, nutrients, etc.) are available.

Figure 3.8 gives an indication of the contribution of the different industrial sectors in industrial water pollution in Egypt.

Figure 3.8 - Share of Industrial Sectors in BOD-Discharges, as % of Total Discharges of Manufacturing Industries (Data 2003)



Source: NationMaster, 2009

The figure shows that most wastewater (BOD) discharges originate from the food industry, followed by the textile industry.

3.5.3 Other

For other environmental problems linked with industrial activities (soil, nature, biodiversity, noise, etc.) information is scarce, making it difficult without further investigation to assess the contribution of industry to the problems or the solutions.

3.6 Expected Development of Industrial Pollution

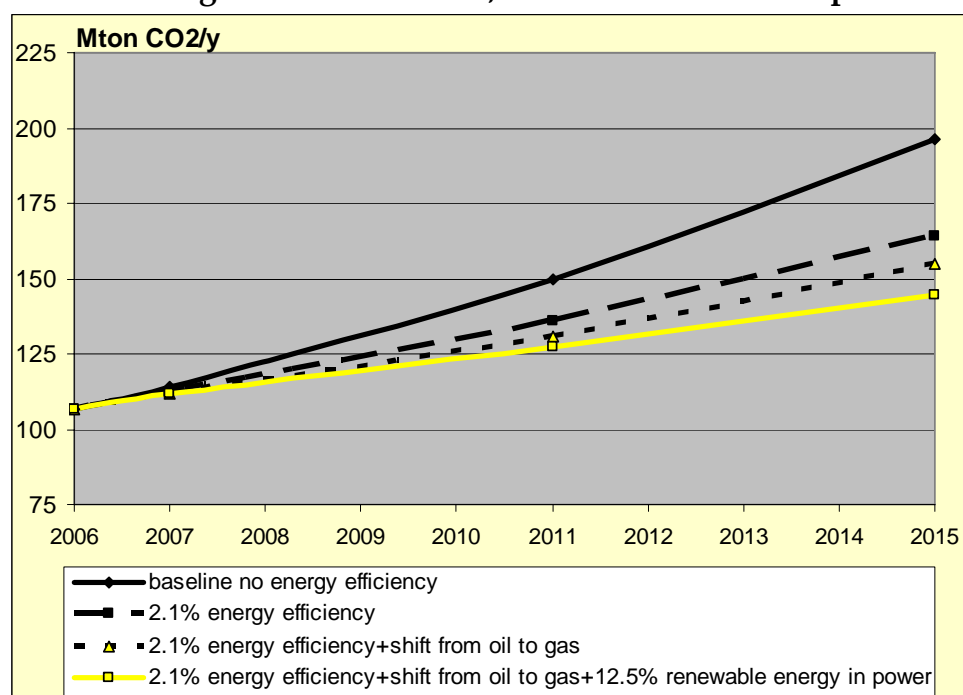
There is limited information on the industrial emissions to air, water and waste, but in the previous sections it has been shown that the contribution of industry to total emissions in Egypt is considerable. In combination with the ambitious projections on industrial development in the coming years, it is clear that it will be a challenge to control industrial pollution.

The National Strategy for CDM (TIMS (E2RC), 2003, p. 2-9) gives a baseline projection for greenhouse emissions. In this study, it is assumed that energy related CO₂ emissions will grow by 4.9%.

In the following graph, some projections of the industrial CO₂-emissions between 2006 - 2015 are given, under different assumptions.

In the baseline projection CO₂-emission are assumed to increase at the same growth rate as industrial production: 7% (which is about the observed growth rate during the last few years (SIS, 2009c). A more realistic approach is sketched by taking into account an improvement of energy efficiency of 2.1%, bringing the growth rate of CO₂-emissions to the 4.9% which is also assumed in the National Strategy for CDM. Furthermore, a projection is made in case the policy to shift from oil to gas in industry is continued. The oil inputs are assumed to decrease by 50% in 2015 compared to 2006, except for the refineries, where it is assumed that inputs will remain stable at the 2006 level. In the most challenging approach, on top of energy efficiency and shift from oil to gas, the share of renewable energy in the power sector increases to 20% in 2020. This is the official target of the energy policy in Egypt as announced by the Supreme Council of Energy of Egypt (SCE) in April 2009. For 2015, it is assumed that 12.5% less fossil fuels will be used). The results of these different projections are shown in figure 3.9.

Figure 3.9 – Development of Industrial CO₂ emissions, 2006 - 2015, Assuming a 7% Growth Rate, Under Various Assumptions



Source: own assessment, based on EIA, SIS, EEAA and SCE

The development of industrial CO₂ emissions in the different projections shows, that without energy efficiency improvements, CO₂-emission would almost double in 9 years time. Even in the projection where all agreed policy measures (see next chapter) are implemented, industrial CO₂-emissions (including the power sector) still will increase with about 40 Mtons.

As emissions of other air-pollutants (SO₂, NO_x, PM) are regulated mainly by concentration standards (see section 4.2), it is reasonable to assume that also emissions of the other air-pollutants may increase in the coming years (although the

increase may be less due to the reduction of the use of oil, which has a positive effect on SO₂ and PM emissions).

Although no projections for water pollution have been made, it can also be assumed that without further measures, compliance with the current concentration standards would inevitably lead to higher water use and pollution levels. This may be partly offset by the targeted modernisation of the Egyptian industry by various industrial programmes (see section 3.2.3).

3.7 Concluding Remarks

From the information presented in this chapter, it is clear that industry is an important factor in the fast growing Egypt economy. Industrial energy input count for about 60% of total energy use in Egypt. Industry is also responsible for about 60% of CO₂ emissions in Egypt.

The share of industry in air pollution (SO₂, NO_x, particles) is estimated to range between 30% - 40%, which is considerable. Given the often high ambient concentrations of air pollutants in urban areas, exceeding the ambient air standards¹⁶, further control of industrial pollution, should be a priority.

An important observation, after reviewing various documents published by MSEA and EEAA is that it appears that there is a lack of a centralised emission registration system. This makes it hard to formulate a comprehensive policy for controlling industrial pollution, as the lack of such information makes it difficult to assess if the situation is gradually improving, and to what extent the industrial activities to reduce pollution are effective.

On the other hand, as it is obvious that still a lot need to be achieved, any project that is implemented to reduce emissions of industrial activities will add its' piece to the higher objective of improving the environmental situation in Egypt. But it is impossible, from the information available, to assess whether these actions are effective, in terms of pollution control and in terms of cost-effectiveness.

¹⁶ Which are less strict than in many other countries

4 IMPLEMENTATION OF INDUSTRIAL POLLUTION CONTROL POLICIES

4.1 Introduction

The basis for policy is the legislation which sets the regulations for Industrial Pollution Control and the institutions that have to enforce the laws.

In this chapter a brief overview will be given of the legal framework that regulates IPC and the institutions that are involved by the enforcement of the law. The chapter ends with an overview of the main policies of the EEAA for IPC.

4.2 Legal Framework

In the last 60 years the legal framework for environmental protection has been developed in Egypt. A not exhaustive chronological overview of the development of the legal framework is the following:

- Law No. 45/1949: Noise Pollution;
- Law No 453/1954: Industrial and Commercial Establishments¹⁷;
- Law No. 21/1958: On Industry organisation and promotion;
- Law No. 59/1960 on Radiation and Energy Resources;
- Law No. 93/1962 on the Protection, Treatment and Safe Disposal of Sewage Waste;
- Law No. 55//1977: Steam Boilers;
- Law No. 3/1982: Urban/Industrial Planning;
- Law No. 48/1982 on the Protection of the River Nile and Waterways from Pollution;
- Law No. 4/1994 and its Executive Regulations on the Protection of Environment;
- Law No. 12/2003 on the Protection of Workers and Vocational Health and Safety;
- In 2007, article 59 of the Egyptian constitution was amended and declares that environmental protection is a national duty, anchoring this issue firmly in the core of the legal framework;
- Law No. 9/2009 which gives some amendments to Law 4/1994¹⁸.

The main environmental law is Law No. 4/1994, which can be seen as a framework law, regulating all environmental aspects of the Egypt society. In the executive regulations of the law specific standards and further rules are given for the practical implementation of the law. In the annexes of the executive regulations various limits and concentration standards (for emissions, discharges, indoor and outdoor air) are given.

17 Regulates amongst others construction, operation and closure of Industrial and Commercial Establishments

18 No complete English version of this law (adopted in February 2009) is available to the international consultant, making it hard to evaluate the amendments. One of the amendments is on the protection of workers, if an industrial establishment has to be shut down for not complying with environmental regulations. Workers maintain their wages during closure of the establishment.

As most standards in the law are based on concentrations of pollutants in exhaust gasses and effluents, the law as such does not limit the total absolute amount of industrial pollution. If a plant doubles its energy use, in principle the total air pollution of the plant may also be doubled. Also, concentration standards for water pollutant may cause that – in order to stay within the legal limits – waste water discharges are diluted (“dilution is the solution to pollution”). This is actually reported by one industry visited by the consultants in the framework of the application of the PROPER system in Industry (see section 5.5.1).

Recently (mid 2009) law no. 4/1994 has been modified, and published: Law 9/2009. The executive regulations are not yet published. Law 9/2009 gives EEAA the possibility and responsibility to regulate emission loads, thus enabling to implement a policy aiming at controlling and reducing the total pollution caused by industry (article 5). The obligation of any polluter to compensate for environmental damage is now firmly based in the law (article 1.28).

In the law no. 4/1994, no specific regulations are currently operational for specific industrial sectors. Also little attention is given to different types of installations or between small, medium and large industries. However, in various executive regulations and guidelines, attention is given to certain specific industrial sectors.

The most important issue is how the law is implemented in industry. This will be discussed in the next chapter.

4.2.1 Evaluation and Recommendations

In the current legal framework, law no. 4/1994 integrates all major environmental issues in one “framework” law. In principle this law and its’ executive regulations (for example on Environmental Impact Assessment) are placed above all other laws that regulate environmental aspects, thus giving to a certain extent transparency on how industries should implement environmental regulations.

Emissions and discharges of wastewater are mainly regulated on basis of concentrations. This makes it difficult to control or reduce total pollution generated by industry (at regional or national level). This is a major drawback for further, comprehensive action to control industrial pollution.

An explicit environmental permit is not regulated by law no 4/1994 (this is regulated by an approved EIA). In principle an EIA is valid forever (in reality not as process modifications or extension of production capacity requires a new EIA).

So far, the law has no specific regulations focussing on specific sectors (like power, refineries, base metal) although it is known from international experience that a sound legal basis for regulating the most polluting sectors (compare for example the Large Combustion Plants directive of the EU and the Integrated Prevention and Pollution Control directive) is needed to move industry in a sustainable direction.

The new Law 9/2009 gives room for more advanced regulations of industrial pollution in new executive regulations. This is for example related to load based permitting (not only on concentrations) and taking into account the carrying capacity of the environment of industrial settlements.

As law no. 4/1994 has been modified recently, it may take a long time to further develop the legal framework, to cope with the environmental challenges that will rise in the near future.

Recommendations:

Give priority to implement load based standards to large industries and make transparent executive regulations to implement these standards. Consider the introduction of environmental permits and limit the validity of permits to for instance 5 years. This gives the authorities the opportunity to implement stricter standards in due time.

4.3 Institutions Involved in IPC

The EEAA is the central institution of the Government of Egypt that is responsible for the implementation and enforcement of environmental legislation, next to the MSEA that formulates the environmental policy. As in other countries, many other Ministries and institutions are involved in the implementation of environmental policy:

- The EEAA's branches in Governorates: Regional Branch Offices (RBO's);
- The EEAA's offices in districts, centres and cities;
- The Ministry of Water Resources and Irrigation;
- The Irrigation Engineering and Sewage Department;
- The General Authority of Sewage affiliate to the Ministry of Housing;
- The Industrial Safety Department at the Ministry of Manpower;
- The Ministry of Trade and Industry;
- The Ministry of Investments;
- Ministry of Electricity and Energy;
- The Ministry of Agriculture and Land Reclamation;
- The General Department for Environmental Affairs at the Ministry of Health;
- The General Egyptian Authority for the Protection of Coasts;
- The General Department for Environment and Surface Water Protection;
- The General Authority for the Development of Tourism;
- Other bodies for which a Cabinet Decree is issued.

Given the large number of institutions involved in the implementation of environmental policy for IPC, coordinating these activities is sometimes difficult. It is not always clear which is the competent authority, or which institutions are in charge of certain aspects of the implementation.

For IPC, the following main activities of the institutions can be distinguished:

- Legal activities (updating laws, executive regulations, decrees, etc.);

- Policy formulation and evaluation (targets, strategies);
- Enforcement (permitting/EIA, monitoring, inspection);
- Other policy actions (economic incentives, public disclosure, stimulation of cleaner production).

Most of these activities mainly involve EEAA and the MSEA. For enforcement of legal provisions, the EEAA depends also on the role of other institutions that are involved in Industrial policy (i.e. Ministry of Trade and Industry, Ministry of Investments) but also on local authorities where it comes to granting operation permission.

But also in other areas, the involvement of other institutions is important, next to the EEAA. For example, energy saving in industry also is a concern of the Ministry of Trade and Industry and the Ministry of Electricity and Energy. Planning of industrial zones will be a main responsibility for the Ministry of Trade and Industry, etc.

A pending problem is the tendency of staff of public institutions to migrate to the private sector, as in government institutions the remuneration possibilities are limited to express the quality of the staff.

4.3.1 Evaluation and Recommendations

The relations between the various authorities are often complex. Various parties are involved in the implementation and enforcement of the law, making it difficult for industries to have a transparent picture of their obligations.

Given the fact that the law has changed recently, there may be an opportunity to streamline procedures in the executive regulations, accompanying the law.

Recommendations:

Make an in depth analysis, based on empirical case-studies of the involvement of various institutions, of the process of implementation of environmental obligations for industry. Identify the overlaps of institutions, clarity of the implementation of procedures, etc. and propose streamlining involvement and roles of various institutions.

4.4 Policies and Policy Actions

In the following table, the main policies of the EEAA on IPC in Egypt are presented, with for each policy-field one or more examples of concrete policy actions.

Table 4.1 Policies of the EEAA on Industrial Pollution Control

Policies	Policy actions				
Enforcement of compliance	EIA's and licencing of industrial facilities	Monitoring of industrial emissions	On line monitoring larger industries	Inspection	Compliance Action Plans
Cleaner production	Reduction of GHG emissions	Energy conservation	Cleaner fuels	Adopt and implement strategy for CP	Public Private Partnership for CP
Economic incentives	Fines	Environmental Protection Fund	Carbon Fund Unit	International grants and loans	
Public disclosure	PROPER	E-govern-ment			
Management of industrial hot spots and guidance of industrial development	Planning of Industrial zones	Carrying capacity	Public Private Partnership on a landfill		
Continuous review update of emission standards, monitoring and compliance procedures	New law 9/2009 and its' executive regulations	Extension of the capacity of the inspection			

In the next chapter, these policies and policy-actions will be discussed in more detail.

5 POLICIES AND POLICY ACTIONS OF EEAA

5.1 Introduction

In this chapter a description, discussion and evaluation of the policies of the EEAA for industrial pollution control (IPC) and the linked policy actions will be given. This is followed by an evaluation of the policy or policy action and one or more recommendations of strengthening or introducing specific policy actions.

Where possible and feasible (in view of available information), the recommendations are supported by a short Cost-Benefit analysis of the policy action (of which details are presented in Annex 1).

The following policies and connected policy actions will be discussed:

- Enforcement of compliance;
- Cleaner production;
- Economic incentives;
- Public disclosure;
- Management of hot spots and guidance of industrial development;
- Continuous review and updating of emission standards, monitoring and compliance procedures.

5.2 Enforcement of Compliance

The policy that aims at compliance of industries with environmental regulations forms the centre of the environmental policy towards industry in Egypt. This policy has three main elements:

- Permitting process, which is based on EIA's;
- Monitoring of industrial emissions, to assess compliance (on line monitoring) and the effects of the IPC policies;
- Inspection of industrial facilities, in order to assess compliance in certain cases.

Furthermore, Compliance Action Plans are used in cases that straight forward compliance would create problems (social, economic, environmental).

Also Public Private Partnership (PPP) plays a role in the enforcement of environmental policy¹⁹.

5.2.1 Environmental Impact Assessment and Licenses

In practice, the Environmental Impact Assessment (EIA) serves as an environmental licence/permit to industries. In Law no. 4/1994, no explicit reference is made to obtaining an environmental licence by industries, nor in the executive regulations.

¹⁹ Mostly limited to the implementation of policies

Law 4/1994 sets out which establishments are subject to the law:

All industries that need an operation permit under the law 21/1958 (on Industry organisation and promotion) or the Law 55/1977 (Concerning the installation and operation of thermal machines and boilers) need to apply for an environmental licence and have to carry out an Environmental Impact Assessment prior to operation or modification.

Also Companies operating in the field of oil exploration, extraction, refining, storage, and transport, and Companies producing and generating electricity production have to apply for an environmental license (annex II of the Executive Regulation of Law no. 4/1994).

About 30,000 settlements are registered as such (see also chapter 3).

When studying the applicable laws, it is obvious that the permitting process is complex, with many institutions involved. Apart from the EEAA, different Ministries and Institutions have an impact on the licensing process: amongst others: The Ministry of Water and Irrigation; The Ministry of Industry; Minister of Petroleum, the Egyptian Electricity Authority; the Rural Electricity Authority; the Ministry of Public Health.

Only for hazardous waste handling and processing the way in which a license can be obtained and the conditions are described in detail in Law no. 4/1994. But an integrated environmental permit, describing all aspects of the environmental performance of an industry is not needed. The current practice is that the EIA serves as such, once it is approved by the authorities. Only with an approved EIA, an industry can obtain a construction and operation permit, which is provided by other authorities than the EEAA (normally the local authorities).

It is recognised that the complex institutional framework hampers the implementation of IPC. Currently efforts are undertaken to streamline procedures linked with the environmental licensing process for industry.

Before an industrial settlement may start operation, extend or modify its' production process, an Environmental Impact Assessment (EIA) has to be performed (Law no. 4/1994, articles 20-22, and Executive Regulation articles 4, 10, 11, 17, 34, 35 and annexes 2 and 3). In most cases, industries have obtained the approved EIA before starting the construction/operation, but this legal provision has not always been implemented in a systematic manner.

The approved EIA serves as an environmental license. If the EIA is approved a licence to construct and operate a facility can be granted.

In the Law and the Executive regulations, there is no distinction made between small, medium and large industrial establishments. Based on article 5 of Law no.

4/1994 the EEAA is responsible for preparing standards and criteria, for owners of projects and establishments to be followed before construction and during operation. The EEA has prepared the "Guide and basis for preparing EIA", which came in to force in 1996, has been amended in 2006 (when EIA procedures were amended) and once more was modified in January 2009.

The following practical distinction is made for establishments/projects that need an EIA:

- "A" list projects for establishments/projects with minor environmental impact;
- "B" list projects for establishments/projects which may result in substantial environmental impact;
- "C" list projects for establishments/projects which require a complete EIA due to their potential environmental impacts.

For each of these three "list types" of EIA's, specific forms have been developed. The procedures for reviewing EIA are differentiated between A, B and C-listed projects:

- For "A list" project, the procedure is relatively "light": The applicant fills in the environmental screening form "A". The "A-list" includes establishments which may be approved based on fundamental information only;
- The "B-list" projects include establishments to be screened for major environmental impacts. The establishments are categorised by activities, quantity of production and project size. In case of establishments with no production capacity limits mentioned, all sizes are included. The applicant has to fill out environmental screening form "B". The procedure consists of two stages:
 - o (1) a screening (filling out form B) possibly followed by:
 - o (2) a scoped EIA on certain identified impacts/processes;
- The "C-list" projects include establishments/projects which due to their potential and substantial environmental impacts need a full EIA study. The establishments are screened by activities, quantity of production and project size. In case of establishments with no production capacity limits mentioned, all sizes are included.

Mainly three parties are involved: the applicant (industrial establishment), the "Competent Administrative Authority" (CAA) and the EEAA. The applicant communicates mainly with the CAA, the CAA has to seek advice with the EEAA, and after receiving that take a decision.

In all cases the applicant may appeal against the decision at the Permanent Appeals Committee (within 30 days after receiving a negative decision). The classification of the projects ("A", "B" or "C") cannot be appealed.

For the most environmentally critical industries/activities EIA guidelines have been drafted (EEAA, 2005a-e):

- Guidelines for Oil and Gas Sector;
- Guidelines for Cement Manufacturing Plants;
- Guidelines for Pharmaceutical Plants;

- Guidelines for Land Reclamation Projects;
- Guidelines for Industrial Estates Development.

The number of annually reviewed EIA's is more or less stable at around 10,000 per year since 1999 (EEAA, 2009b)²⁰. In the year 2000, about 70% of the reviewed EIA's concerned industrial establishments. Most of the industrial EIA's in 2000 were classified as "list B" EIA's, less than 100 were "C-list" EIA's.

In 2006 12,334 EIA's were reviewed, mostly "A-list" EIA's: 8959. Complete "C-list" EIA's were reviewed for 180 establishments (the share of industry is not published in MSEAA, 2007, p. 42). 345 major industrial projects were reviewed, most of these EIA's concerned brick factories (311).

In total, in the period 2000 – 2009 over 100,000 EIA's have been submitted and reviewed, of which approximately 60-70,000 for industrial establishments. Assuming that about 15,000 new industries were established in this period²¹, it can be concluded that between 15,000 and 25,000 industrial establishments have renewed their EIA (due to change in process or extension of activities).

EIA in Egypt is mainly a technical and administrative procedure for the issuance of construction/operation permits. The effectiveness of the Egyptian EIA system is limited by its lack of openness. Awareness of public concerns, use of public knowledge and actions to improve the quality of the EIA are restricted. Since 2004, EEAA tried to improve the EIA information dissemination through the design of an EIA database, which is currently still not fully operational.

An approved EIA has validity until either the production process is modified or extended. This means that in theory, an approved EIA is valid for ever.

A relative new approach is to also include socio-economic conditions and impacts in the EIA. In these sections of the EIA, the "human" factor is included in the assessment. First the socio-economic conditions of the population affected by a project is described, for example the economic activities, the relationship with the environment (for example, a fisherman needs clean surface water to have sufficient yields), income levels, labour division between man and women, the different groups of people living near the project area. The socio-economic impacts for all these groups are described, in case the project affects these conditions (this may be both positive and negative: for example higher incomes, but more pollution). A good example of such descriptions can be found in the Alexandria Integrated Coastal Zone Management Project (EEAA, 2009c).

20 This implies that each year about 10,000 establishments (of which the major part industrial) either start operation or modify operations. If 70% of the EIA's concern industry, this means that about 25% of the all-industrial establishments (28,000 establishments) have to submit an EIA.

21 In 2007 EEAA (2008, p. 231) reports about 1,500 new establishments.

Evaluation and Recommendations

After implementation of the EIA system in Egypt industry, most of the industries have applied for and obtained an approval. Each year during the last decade, about 6000 applications by industrial settlements were processed.

An approved EIA is in principle valid forever. The EIA therefore gives no incentive to enterprises to innovate.

An approved EIA does not result in a formal environmental licence. Actually, an environmental licence as such does not exist in the legal system in Egypt.

With the modified Law no. 4/1994 (Law 9/2009) additional executive regulations will be introduced. For example, load based emissions of (mainly) large industrial establishments will be regulated. New regulations can also be introduced to limit the validity of EIA's for larger industrial establishments, thus giving an incentive to industries to innovate and keep the EIA's up-to-date.

The largest threat of the current EIA system is that industries may not submit information in case of modification or extension of production, making the information submitted in the original EIA out-of-date.

Recommendations:

It is recommended to limit the validity of EIA's, as this will force industries to submit up-to-date information and may also give an incentive to innovate production processes. It also would be beneficial for overall compliance of industry with environmental legislation.

5.2.2 Monitoring Emissions of Industry

Monitoring of emissions to air, water and waste of industries serves several purposes.

For industry itself:

- Monitoring of emissions gives an indication of the overall environmental performance of their operations and indicates whether the industry is in compliance with the environmental license;
- On-line (real time) monitoring by sensors gives industry an indication of the actual process conditions: as soon as monitoring data show extreme values, it is clear that the process monitored is malfunctioning;

For authorities:

- On-line (real time) monitoring gives up to date information on whether the industry stays within the limits of certain permitted emissions (as described in the environmental license) and can be used as a trigger for corrective action;
- Overall monitoring of the relevant emissions of an industry makes clear if the industry operates according to the permitted emissions;
- Monitoring results can be used in a larger framework of the registration of emissions, as to collect information on the progress of IPC policy in a comprehensive manner.

Various forms of monitoring can be distinguished:

- Self monitoring by industry: this is a way of monitoring where the industry itself is responsible for collecting and submitting information on relevant emissions and discharges to the authorities;
- Online (or continuous) monitoring (by means of sensors) give the authorities immediate information of breaches of the environmental license(s) granted to industries;
- Discontinuous monitoring can be used in case of emissions which are classified as "less critical". For this kind of monitoring samples can be taken (according to a sampling protocol), to assess if an industry stays within the limits of permitted emissions or discharges.

Apart from the monitoring of environmental performance of industries also ambient quality monitoring can be carried out. This is in general done outside the industrial sites and in general does not serve as to monitor individual sources of pollution²².

Register of the Environmental Impact of Establishments

(Self) Monitoring of the environmental impact of industrial establishments is anchored in the executive regulations of Law 4/1994. All settlements affected by this law need to keep a register of the environmental impact. Annex 3 of the Executive regulation gives a standard form for the kind of data that need to be registered and thus monitored. The standard form is not very explicit and leaves room for a "flexible" application. For example, it is not explicitly stated that the register needs to be renewed each year, for which substances data need to be recorded and how data need to be recorded and verified (although the standard requires the establishment to explicitly explain how samples are taken, etc.). It is also less clear which procedure needs to be followed by industries how to submit data to EEAA.

The Executive Regulation (article 12) requires that EEAA keeps a central register (database) in which the data from all individual establishments are to be recorded. This register should be regularly (annually) updated (article 18), although the focus of this article is to check if the industrial settlement complies with the regulations, rather than to keep the data on emissions up to date.

If the register contains annually updated information on the environmental performance of industrial settlements, it can be used to monitor the development of emissions of individual establishments (and more important) emissions of sectors or the industry as a whole.

In the Annual Report of the MSEA 2007 (MSEA, 2008) the Industrial Pollution Information System (IPIS) is mentioned as a comprehensive system to monitor

²² Although a strategically placed monitoring station can of course reveal pollution by individual industrial settlements, as well for water pollution as for air pollution.

emissions of industry²³. IPIS is not operational and up to date in the manner as it was designed (PEMA, 2006, p. 6-7). Concerns about IPIS focus on two issues: (i) Link between the central database and regional branch offices and (ii) shortcomings in managing the system by the central administration for information systems in the EEAA (lack of trained staff, resources and computers).

If IPIS is operational and updated regularly, it has the potential to serve as a nationwide emission register.

5.2.3 Online Monitoring

In 2006 an online monitoring system in real time is in operation for the cement industry (MSEA, 2007, p. 42-45). This enables both the cement industries (self monitoring) as the EEAA to monitor emissions of 16 cement companies continuously. The cement industry is the first industry that is monitored online and continuously. The large share and the rapid growth of the cement industry in dust emissions (20% of dust emissions in the greater Cairo area, see section 3.4) is the main reason to prioritise online monitoring in this sector: production increased from 4 million tons in 1975 to 35 million tons in 2006, an average increase of over 7% per year. Further growth may double the production in the coming years.

In 2006 emission limits were tightened (500 mg/m³ in 2005 and 300 mg/m³ in 2006), which in general would lead to a higher number of violations in 2006 compared to 2005 (assuming no additional efforts by industry to reduce concentrations). This actually was the case (5 times more violations in 2006). However, during 2006 the situation has improved and by December 2006 the number of violations dropped by 37% compared to December 2005. In 2007 in total 707 violations were recorded, 31% less than the 1024 violations in 2006 (EEAA, 2008, p. 43).

So the online and continuous monitoring seems to be effective to enforce the legal standards and induce improvements in environmental performance of the cement industry.

In 2008/2009 the fertiliser industry has been notified that online monitoring will be introduced in this sector, and it is expected that in the beginning of 2010 online self monitoring will be operational. Furthermore, currently (2009) studies are under preparation to connect the power sector to the online monitoring system. For the longer term, the online self monitoring will also be applied by the RBO's, with a link to the national headquarter. The aim of these activities is to increase compliance with emission standards, enable estimation of emissions and the development thereof for operational and strategic purposes, enable comparison between regions, and assess local environmental (air)quality.

In a new executive regulation of Law 9/2009, it is regulated that all industries in the cement, power, fertiliser, oil refining and basemetal (including non ferrous alloys)

²³ And also to assess compliance with Legal standards.

sector need to implement on-line monitoring as a means of controlling their emissions. Other industries with a higher pollution rate than 3kg per hour of total suspended particulates or over 30 kg of SO₂ per hour, should also apply online monitoring in the future.

Evaluation and Recommendations

Self monitoring is the cornerstone of the monitoring system for industry in Egypt. In principle all industries should keep records of their emissions and the EEAA should collect these data and store them in a nationwide register. IPIS is developed to record data on industrial emissions, and should help EEAA to be informed about violations of licenses, but also to get a comprehensive overview of industrial pollution.

The continuous monitoring by EEAA of the cement industry shows to be effective. The number of monitored violations of emission standards has decreased in 2006 and continued to decrease in 2007, as a result of the efforts made by the cement industry to reduce dust emissions.

In Egypt there is no systematic monitoring of industrial emissions. Databases designed for this purpose (i.e. IPIS) are not functioning well. There is no linkage between regional information and central databases.

Emission registration/monitoring by industries can help them to better control production process and therefore reduce losses of resources. A consistent database on industrial pollution would enable better policy making of the EEAA concerning IPC.

If monitoring is just used as an instrument for inspections, in stead of monitoring all industrial emissions and trends of emissions, EEAA will not be able to formulate adequate policies concerning IPC.

Recommendations

It is observed that there is a lack of factual data on the environmental performance of industries. Trends are not known, making it hard to formulate an adequate policy concerning IPC. Given the fast growth of industry in Egypt, it is recommended to strengthen the management of data on industrial pollution, either by revival of the IPIS system or by gradually built up databases on the pollution caused by industries.

5.2.4 Inspection of the Environmental Performance of Industry

Inspections are the backbone of most enforcement programs (INECE, 2009, p. 48 - 69). The main objective of an environmental inspection is to assess whether an industrial facility is in compliance with the terms set out in an environmental permit or licence. This is done by gathering facts about a facility, collect and analyse documentation, and record observations.

Although the primary objective of Environmental Inspection is to enforce compliance with environmental regulations and conditions as laid down in environmental licenses, a more comprehensive approach of inspection is to facilitate, educate and give guidance to industry in complying with environmental regulations. In the latter

case this role is rather cooperative (“achieving compliance through cooperation”), whereas in the limited approach, inspection may be focussed on determining non-compliance issues and take punitive actions.

Establishing the Environmental Inspection Department

Law no. 4/1994 gave a three years grace period to existing industrial establishments. In 1999, through the Egyptian Environmental Policy Program (EEPP)²⁴, first steps were taken to institutionalise Environmental Inspection as a corner stone in Environmental Policy. The main tasks of the inspection were defined: enforcement and monitoring of compliance to the law, combating industrial pollution and proposing and participating in policies to eliminate industrial pollution. In the period 2000 - 2003, the way in which the inspection should be organised within the Egyptian institutions were defined, resulting in 2003 in the formal establishment of the Environmental Inspection Department (as part of the EEAA) by the ministerial resolution No 132²⁵. By 2003 the following issues were addressed:

- Preparing the environmental inspection's vision and message;
- Preparing job descriptions of the Department of Environmental Inspection in preparation for integrating it into the organizational structure of the agency upon the availability of funding necessary to do so;
- Building the competencies of environmental inspection personnel;
- Preparing internal procedures and the working guide of department;
- Preparing the environmental inspection guide.

Currently (2009) the Central Inspection Department (CID) in Cairo employs 38 inspectors. In the 8 RBO's in each of these offices about 30 - 35 inspectors are employed to carry out inspections in the 28 governorates of Egypt.

Objectives and Tasks of the Environmental Inspection Department

In article I of the Ministerial resolution the main objectives of the inspection are defined:

- Formulating and evaluating strategies for the environmental inspection, reviewing them with the relevant departments in the agency and external relevant authorities;
- Participating in the preparation of the annual inspection plans of regional branches of the EEAA to ensure compliance with the defined inspection strategies;
- Participating in the preparation of follow-up reports and commitment to coordinate with the relevant departments of the agency;

²⁴ Funded by USAID.

²⁵ In Law 4\1994 no explicit reference is made to the Environmental Inspection. To ensure the sustainability and non-cancellation of Environmental Inspection in the future, the Minister of State for Environmental Affairs issued the ministerial resolution No 132 of 2003 to establish the Environmental Inspection Department.

- Designing and preparing of analytical reports and studies on the environmental situation at the national level. (through the development of environmental commitment and obligation ;
- Developing cooperation with the inspection line ministries and other external bodies that inspect the environment through specific steps between them in accordance with the applicable laws to ensure non-conflicting and overlapping roles and make good use of available national resources.

The tasks and obligations of the environmental inspection are elaborated in Article II of the Ministerial resolution:

- Gathering information and preparing studies on the best ways and methods of inspection of the different activities and regions;
- Publishing and distributing information on inspection systems, to internal and external parties relevant to the environmental inspection;
- Follow-up and updating systems of the environmental inspections in coordination with the relevant departments of the EEAA;
- Preparing analytical reports, which reflect the impact of environmental inspections on the environmental situation and the extent of environmental commitment and obligation on the national and regional level;
- Monitor the contribution of institutions relevant to inspection outside EEAA (Health and Population, Environmental Municipal Units (local), Labour inspection, etc.) and evaluating this contribution, and reporting on it;
- Carrying out environmental auditing on facilities prior to operation to ensure they meet the environmental requirements 2 contained in the environmental impact assessment studies delivered to EEAA.

The EEAA is not the single institution in Egypt that has the power to inspect. An important role in the enforcement process is also taken by the Environmental and Surface Water Police which falls under the competence of the Ministry of Interior.

Functioning of the Environmental Inspection Department between 2003 and 2008

The functioning of the Environmental Inspection Department can be evaluated by comparing objectives, tasks and obligations as laid down in the Ministerial resolution with the actual performance of the inspection.

Till the end of 2008 the following observation can be made:

- There is no specific or written strategy nor policy on environmental inspections;
- No analytical reports have been issued reflecting the impact of environmental inspections on the improvement of the environmental situation and the extent of commitment at the national and regional level;
- No study has been made to evaluate and possibly update the methods of environmental inspection in the years following the establishment of the environmental inspection department;

- Neither study was made to determine the contribution of relevant parties outside EEAA (Health and Population, Local authorities, Labour inspection, etc.)²⁶;
- The Ministerial resolution requires that the environmental inspection shall be carried prior to operation to ensure they meet the environmental requirements contained in the EIA studies delivered to the EEAA. Until the end of 2008, this has not always been done by the environmental inspection.

Due to a lack of a formal strategy, inspections appear to have an at random character. The inspection focuses on certain aspects, like the (environmental) risk of certain industrial settlements, the potential magnitude of the violations (so inspections seem to focus on larger industrial establishments in certain sectors). Also complaints of the public concerning certain establishments may lead to action of the inspection.

In case of violation of Law n. 4/1994, three situations can be distinguished (EEAA/CID, 2009):

1. Violation that Represents Imminent Danger;
2. Violation that Needs a Long Time for Rectification;
3. Violation that can be rectified within 60 days.

In situation 1, EEAA informs the Competent Authorities which takes immediate action (closure).

In situation 2, the owner must apply for a grace period to take corrective actions, which normally is granted by the Inspection. After this period there is a re-inspection. In case the violation persists, the Competent Authorities (after being informed by the Inspection) can take either one of the following actions:

- Stop the violating activities;
- Closure of establishment;
- File law suit for compensation of environmental damage;

At the same time, the Inspection report may be send to the public prosecutor, with legal follow-up, a verdict and either imprisonment or a fine.

In situation 3, in case the violation can be granted reconciliation, the owner has some time to take corrective measures and pay a fine. If no reconciliation is possible, EEAA may either follow the same procedure as under situation 2, or the inspection report can be sent directly to the public prosecutor (as in situation 2).

According to statistics of the general department for environmental inspection in EEAA during the period between year 2000 till 2008:

- 7434 establishments were being inspected;
- Of which 2875 Industrial establishments.

26 nor these contributions were evaluated and reported, as to avoid additional burdens between the Ministry of State for Environmental Affairs and other governmental agencies

For the majority of inspected establishments (4351), violations were turned to the general attorney. For the cement industry, 538 violations were turned to the general attorney. 278 establishments were ordered regularisation. In 7 cases (in 2005) establishments were ordered to stop operation²⁷.

In the performance of their task, the Environmental Inspection so far fails to systematically²⁸:

- Gather information on the facilities to be inspected;
- Hand over this information to the inspection team assigned for inspection;
- Formulate an inspection plan for the facility that is inspected;
- Notifying the relevant administrative parties to participate in the inspections, such as the local administration - the Office of Environmental Affairs - regional branches - the Ministry of Labour and its equivalent in territories, etc;
- Follow up the implementation of environmental violations.

The main objective of inspection is improving enforcement of the Law and promoting implementation of environmental measures. However, neither in the State of the Environmental reports (MSEA, 2007; EEAA, 2008) or Annual report of MSEA, nor in other public documentation of the EEAA/MSEA, information is presented on the functioning of the inspection. No information is available what kind of violations have been observed and how severe the violations are. The inspection functions rather as a punitive institution (observing violations and fining the non compliant industries) than a supporting institution that helps industry to improve their environmental performance (by consultation and voluntary compliance, technical support and funding, self-monitoring of facilities, public awareness, as representing pressure tool upon facilities). Apparently, not much has changed since the World Bank in 2005 (WB, 2005, p. 94) observed that "One major weakness lies in the lack of enforcement and compliance with the terms of the law" and "Establishments' owners found it much easier and cheaper to pay the fine than to rectify or control the polluting activity".

There are two main reasons why the inspection does not function as it could.

The first reason is the lack of trained human resources. During the period from 2003 to 2008 about 15 inspectors, one of the founders of the Department, half of those with master's and doctoral degrees from European universities have left the inspection.

27 During 2001, EEAA published in the newspapers, "more than 170 violating industrial establishment were turned to the general attorney for violating the law of environment", according to the executive chairman at that time.

The national security authorities then immediately contacted EEAA and obtained contact information of these establishments in order to provide security in case employees would cause trouble if they were closed, as a result of becoming unemployed then. Mostly of these establishments belonged to the private sector.

Afterwards, the prime minister issued orders not to close any violating body before presenting the issue to him. So it would not appear as if there was a contradiction among governmental bodies, also in order to coordinate among governmental bodies and to provide social stability for employees.

In order to address the issue, the law of environment in its latest amendments, for the law no. 9/2009, indicates that the employees should continue to receive their salaries in case of closing the establishment as a result of environmental violation.

28 Which implies that it is arbitrary whether it happens or not

According to the financial system within the EEAA, there is no allocated budget to each department (except for special budgets for projects within departments), with the risk of lack of logistics capabilities, as cars, hiring qualified staff and the cancellation of important activities.

Currently (2009), the staffing problems have been solved partly. Whereas in the past the inspection was understaffed, with 15 inspectors at the national level (CID) and about 50 inspectors in the Regional Branch Offices, nowadays at the CID has a staff of 38 inspectors and about 350 inspectors are employed by RBO's.

For new inspectors a 6-12 month training programme has been developed with the focus on their role, the way inspections need to be carried out with attention to waste, air, water and the working environment.

But even with the larger staff, some of the tasks and obligations of the inspection, have are not fulfilled (strategy, policy, analytical reports, etc.).

The second reason is the Environmental and Surface Water Police dominates the inspection process. Rather than advising industries on improved environmental performance and aiming at future environmental improvements, the inspections focus on finding violations and taking punitive actions. This is confirmed by the amounts of fines collected in 2006/2007 (see ESP, 2007b, p. 22). It is observed that the priorities of the environmental inspection (in the previous four years), are to inspect as much facilities as possible, regardless of the actions to reduce pollution. This with the objective to collect large amounts of money through the introduction of reconciliation rules for environmental violations²⁹. As a result environmental inspectors become less interested in carrying out the environmental inspection with the objective to reduce pollution.

Evaluation and Recommendations

The Inspection department is formally established by a Ministerial resolution, describing the tasks of the inspection department. Although the Ministerial resolution No. 132 is in force, since 2003, the Environmental Inspection Department fails to perform many of the tasks as described in the resolution. Little public information is available on the functioning of the inspection, internal information is not recorded in a comprehensive way and exchange of information (between central and regional inspection) is weak. Moreover, in stead of aiming at improving the environmental performance of industry, the inspection focuses on punitive actions. There is no evidence that due to the existence and acts of the inspection the general compliance of industry with environmental regulations has improved.

Given the mandate of the Ministerial resolution to collect and analyse and publish information on environmental inspections, and the current staff, the Inspection

²⁹ If the violator pays 25% of the maximum fine, the case will not be brought to court.

Department should implement these important tasks. This would evidently lead to increased trust and transparency of the activities of the Inspection.

The reconciliation procedure may lead to pervert incentives to the inspection: in stead of aiming at improvement of the environment, non compliance fees can become a purpose of their own.

Recommendations:

Improvement of the environmental inspection can be achieved the following would be taken into account:

- Define a transparent inspection strategy and planning at national, regional and local level;
- Emphasis on the idea that the inspection should focus on improving the environmental performance of industry, rather than a punitive institution;
- Provide the environmental inspection with appropriate human and logistic resources and remove the causes of the instability of staff and management;
- Provide the management of the inspection with an operational information system, able to manage thousands of files and issuing follow-up reports and provide analytical reports on the environmental status of the industry and geographical areas. Link the information system to the agency's regional branches to ensure a database covering all parts of the Republic and link the environmental inspection information system to the information system of the hazardous substances administration.
- Involve public and other governmental agencies in the protection of the environment.

5.2.5 Compliance Action Plans

A Compliance Action Plans (CAP) is a way to achieve compliance with environmental legislation in industry. A CAP differs from a legislative approach as it gives industries the opportunity to make and implement an action plan, rather than that the authorities describe mandatory measures that a non-compliant industry has to obey. CAP's are used all over the world in environmental policy to achieve compliance in a smooth way.

In Egypt, CAP's have been used when the EPAP 1 project was implemented. In order to get financial support from the EPAP 1 project, industries had to develop and implement a CAP. The CAP as such has no legal basis in the Law no. 4/1994, but the EEAA has to a certain extent freedom of how to implement the law. Also economic and social arguments are used to allow CAP's (as closure of all non-compliant industries can have a disastrous effects on the economy and employment).

In summary, a CAP involves the following steps (Punkari, 2008):

- Description of the environmental status;
 - o General information about the factory:
 - Main production processes;
 - Process description;

- Process flow diagrams;
- Products;
- Raw Materials.
- Utilities:
 - Description;
 - Water consumption;
 - Energy consumption;
- Material, water & Energy balance;
- Surrounding area;
- Current environmental status:
 - Air emission:
Stack emissions for boilers, furnace and electrical generator;
Dust emissions;
 - Work environmental emissions;
 - Liquid wastes (end pipe);
 - Hazardous Material;
 - Solid Waste;
 - Hazardous waste;
- Existing pollution - Abatement units;
- Available licenses;
- Pollution abatement action plan:
 - List of Projects;
 - Sub Project Requirements
 - Time Table for Implementation of the sub-project;
 - Environmental management responsibilities;
 - Investment planning;
 - Cost and benefits;
 - Financing of investments and operation;
- Follow up and monitoring plan for sub-project after implementation:
 - Performance Indicators.

Often industries lack the expertise to complete a CAP, and also the authorities have lack of knowledge and manpower to assist the CAP. In practice, this means that external consultants will be needed to conduct and implement a CAP, to assist both industries and authorities.

Past experiences (EPAP 1) have shown that the companies were not able to produce CAP as expected. As a consequence, the CAP's have not had wanted impacts and also the enforcement has been inefficient.

Evaluation and Recommendations

CAP's give a practical alternative for legal procedures and prosecution. A CAP also makes clear what actions an industry needs to take and which investments are involved. It may prevent closure of industries and therefore loss of employment and income. It also is a better way than legal prosecution as this does not guarantee that

after prosecution and payment of fines the industry will be in compliance, whereas a CAP is actually focussed on compliance.

If the industry has too little financial means or has no access to the capital markets and/or soft loan/grants, compliance action plans will not solve the problems for both society and the company. Apparently this is a major drawback in the current (2009) situation, as little to no use has been made of CAP's in the last years (after EPAP 1).

The EPAP 2 in principle gives a new opportunity to enhance the CAP's as a means to increase compliance in industry. Problems linked with lack of knowledge, expertise and sufficient resources to hire staff (able to develop and implement CAP's) must be addressed.

Recommendations:

It is recommended to investigate how CAP's can be used (again) in the framework of EPAP 2. It can be argued that financial support for the application of CAP's for enterprises would be given, and also some specialised staff in EEAA should be available to assist in the process of CAP's. The need for external consultations needs to be investigated.

5.2.6 Public Private Partnerships

The implementation of the environmental policy of the Egyptian Government depends amongst others on enhancing partnership between the public and private sectors and states:

“In view of the commitment of the Egyptian Government towards environmental management and protection, and out of understanding the importance of the role of the private sector in this regard, the Ministry of State for Environmental Affairs, together with its executive authority, offer continuous support to the private sector to participate in offering environmental services”.

This support depends on several regulations that include the commitment of the Egyptian Government to the application of the Environment Law, implementation of demonstration projects and encouragement of technology transfer, exchange of expertise between the foreign and national private sectors. This procedure aims at finding an appropriate environment for data and expertise transfer. For example, a cooperation mechanism with the Dutch Government is currently prepared to offer financial support to the partnership between the Egyptian and Dutch private sectors in the field of environmental services.

There are cooperation protocols between the Ministry of Environment, the Federation of Egyptian Industries, and the 10th of Ramadan industrial city, to support partnership with the private sector to implement the integrated environmental management initiatives in the field of industry.

Due to the increasing demand for specialized competencies in the field of environmental services, a manual, which includes providers of information, equipments and environmental services, has been prepared in 2000/2001.

An example of a PPP construction in the field of enforcement is the Management and operation of the Environmental Monitoring Networks in Egypt. The EEAA assigned the management and maintenance of the national Environmental Monitoring Networks (quality of air monitoring network, noise monitoring network) to the private sector –through a tender among the specialized companies.

5.3 Cleaner Production

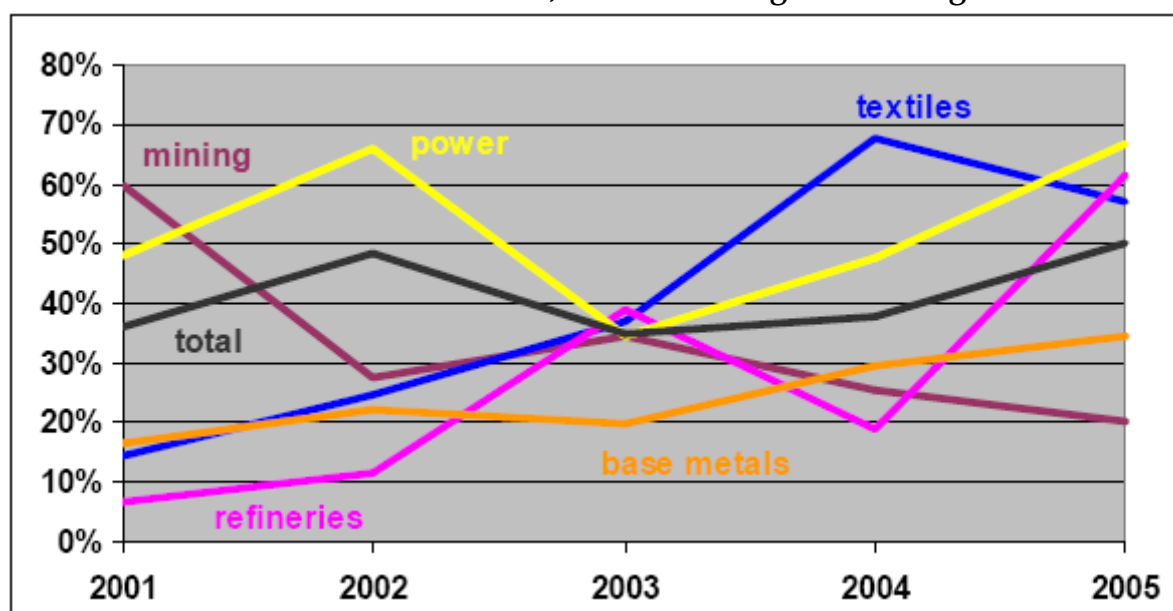
Cleaner Production (CP) has been promoted for over 20 years in many countries (US, EU, Japan, etc.). The cleaner production approach is to look at the production process in an integrated way, in stead of just focussing on pollution of industries.

In stead of applying only “end-of-pipe” technology to control pollution, the focus is on prevention of the cause of pollution by integrating the environmental concerns in the “normal” production processes.

CP can be summarised as “doing more with less” or more formally, continuously increase resource efficiency and apply cleaner process inputs.

That this approach can be successful is shown by the following figure:

Figure 5.1 - Integrated Investments as Percentage of total Environmental Protection Investments, in the EU Weighted Average



Source: Jantzen, 2007 in VITO, 2007, p. 104

Figure 4.1 shows the share of integrated investments in total environmental investments for selected industries in the EU. On average, between 35% and 50% of environmental investments is classified as “integrated”, which points at the success of the cleaner production approach in the EU. For some of the sectors an upward trend seems to be present: textile, refineries and the base metal sector.

5.3.1 Cleaner Production Action Plan

In 2004, a proposal for a “Strategy and Action Plan for Cleaner Production in Egyptian Industry” (EEAA, 2004) is published. In this document it is recognised that a strategy for Cleaner Production should be a co-ordinated action plan of the Ministry of Industry and Technology (MIT) and the Egyptian Environmental Affairs Agency (EEAA), with the involvement and partnership of the Egyptian industries (represented by their federation) which are the actual implementers of the required measures.

In the proposal for a strategy and action plan ambitious goals have been set:

- The Performance of New Industrial Establishments exceeds National Average Performance;
- Existing industrial establishments progress towards cleaner production within a specified timeframe;
- The share of clean products increase continuously on the local market;
- Industrial establishments bear increasing percentage of actual costs of input material and services;
- Necessary knowledge is available;
- Required technical capacities is available.

For all of these goals specific actions for the immediate, short, middle and long term are defined. Only a few of these actions have been addressed:

- Modifying EIA Guidelines to Include CP Practices;
- Facilitating access to available funds (the EPF, see 5.4.3);
- Capitalizing on International Agreements (Clean Development Mechanism);
- Implementing Selected Demonstration Projects (for example: shift from Heavy Fuel Oil in brick factories to natural gas).

But other proposed actions have not been addressed, like:

- Adoption of CP Practices in Applicable Regulations for new industrial establishments;
- Developing National Environmental Standards for CP;
- Compliance Agreements to Encourage Facilities to Adopt CP;
- Fiscal Incentives for Technology upgrading in Egyptian industry;
- Use Economic Instruments;
- Establishing a Local “Eco-label” Scheme;
- Encouraging Local Targeted Research;
- Extension Services to SME’s.

One of the major problems for implementing and monitoring the potential success of CP in Egypt is the lack of factual information (see also the section on monitoring). The strategy points out (EEAA, 2004, p. 14):

“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 and compare it with the international performance to enable identifying the extent of improvement."

As long as such essential information is not available, the implementation of CP will remain an ad hoc activity.

5.3.2 Cleaner Production Projects

Although the strategy and action plan have not been officially adopted by a policy statement, the Egyptian government supports the basic ideas of the strategy and action plan, which is recently confirmed at the round table conference of the Arab League for sustainable production and consumption (Khaleej Times, 2009). Currently the government supports about 50 cleaner production projects in industry. Also, in the Environmental Protection Fund, specific resources are available to support cleaner production initiatives (ACI, approximately LE 20 million per year, see 4.10.3).

5.3.3 Reduction of Emissions of Green House Gasses and Energy Saving

As Egypt participates in "Kyoto", projects aiming at the reduction of greenhouse gas emissions are part of the environmental policy in Egypt. Many of the projects that are currently under development with aid of the Cleaner Development Mechanism focus at industrial emissions. For further details see section 5.4.

5.3.4 Promote the Use of Cleaner Fuels in Industry

As already mentioned, the EEAA has successfully implemented projects in brick factories to shift from heavy fuel oil ("mazut") to natural gas. This policy aims at continuation of this policy action.

5.3.5 PPP in Applying Cleaner Production Technology

The Industrial Pollution Reduction Project mainly focused on 40 companies of the major polluting companies, the most of which belong to the industrial public sector. Environmental compliance plans and studies have been prepared. Unfortunately, most of these companies were not creditworthy to obtain soft loans from the banks participating in the project, due old debts or absence of one of the conditions of financial security procedures. Therefore, the industrial pollution reduction project shifted to the private sector factories.

In addition, technical support from the European Commission and the Euro-Mediterranean Partnership and Investment Institute is presented to support the Egyptian industry, improve the environmental condition of the industrial facilities, and train environmental cadres; support the environmental media sector, and NGOs working in the field environment; and to create fields of cooperation between the

public sector and the Egyptian financial institutions (public and private sector banks) to support the industrial sector (public sector / private sector).

The Egyptian Environmental Initiatives Fund (EEIF) (financed by the Canadian Technical Assistance, from 1997 - 2010) in Ismailia, Port Said and Suez Governorates, aims to encourage small and medium enterprises (SMEs), non-governmental organizations (NGOs) and entrepreneurs to implement environmental projects which help preserve Egypt's natural resources, especially soil and water. It provides both technical and financial assistance.

The Egyptian Environmental Initiatives Fund (EEIF) is a responsive financing mechanism to support SME and NGO initiatives which offer a high potential for sustainable success, innovation and replication, and which strengthen the role of these organizations in environmental policy development and implementation.

5.3.6 Evaluation and Recommendations

There is a written proposal for a policy aiming at the implementation of CP in Egypt, and the concept of CP is supported by both most important Ministries, not only in words but also in partial implementation of CP in Egypt.

So far only partial elements of the proposed CP policy have been implemented in Egypt. Important elements, like inclusion of CP in the Law, or fiscal stimulations for (imported) CP technologies have not been implemented. The recent revision of Law no. 4/1994 has not included CP aspects.

For the short and medium term the EPF and CDM have sufficient financial means available to support CP. Development of positive financial incentives give an opportunity to further enhance CP. PPP also facilitates the introduction of CP in industry.

The lack of factual information enabling monitoring of the progress of CP, and the lack of knowledge transfer to Egyptian SME's makes the implementation of CP uncertain. Also the lack of a clear time schedule for implementation of certain elements of the CP policy does not assist a successful implementation of the CP-strategy.

Recommendations:

In the light of the fast development of the industry, it is urgent that Egypt adopts the CP strategy at a higher level, than currently is the case. Only if CP is implemented in all industries of all sizes, the Egyptian environment can cope with the foreseen doubling or even tripling of industrial outputs in the coming 15 years. Elements of CP should include at least increasing energy efficiency and the use of cleaner fuels in industry. It will be necessary to set clear time schedules for the implementation of elements of the CP strategy in the (near) future.

5.4 Economic Incentives

The use of economic incentives is widespread in environmental policy all over the world. Two main types of economic incentives can be distinguished:

- Negative economic incentives: taxes, fines;
- Positive economic incentives: subsidies, grants, soft-loans.

The most applied economic incentive in the world is probably the taxation of energy. This increases the price for the user of energy and thus gives an incentive to use energy in an efficient way³⁰.

In most European countries taxation of pollution is implemented in various forms: landfill taxation, packaging, wastewater charges, charges on air pollution (SO₂, NO_x, dust, etc.), aircraft noise, etc. In most cases there is a relationship between the amount of pollution, and the level of charges or taxes paid: the more pollution, the higher the bill. The effectiveness of such economic incentives strongly depends on the level of the taxation on the one hand and the costs to industry to reduce pollution (and thus avoid paying the tax³¹).

Fines can also be considered as a sort of economic incentive, but in most cases the level of a fine is only weakly (or not at all) related to the pollution caused. This is due to the fact that fines are mostly seen as a legal instrument, with maximal fines defined in laws or executive regulations. Moreover, fines can only be applied, if the polluter is "caught". The polluter can (and often will) in such a case weight the benefits of non-compliance (avoiding costs of pollution control) against the risk of paying a fine.

Subsidies, grants and soft loans are so called positive economic incentives. These have the advantage that the polluter is approached in a positive way. Subsidies will lower the costs for the industry to comply with environmental needs. For the public budget subsidies may have the disadvantage of claiming public financial resources that otherwise could be used for other purposes. A tread of subsidies (to the subsidised sectors/enterprises) is that subsidies are normally limited in time. Only very few subsidy scheme's have a long lifetime³². Another draw back for both the

30 The effectiveness of the taxation of energy depends on the level of the taxes. But it also depends on who is taxed. In general, taxing consumers through gasoline and electricity taxation is less effective than the same taxation of enterprises. This is mainly due to the fact that consumers in general have fewer options to reduce their energy use (buying a new more efficient car is often difficult with limited household budgets) or is less aware of the tax. Enterprises on the other hand, understand that the tax forms a part of production costs, which can be lowered in case of process modification.

31 If it is more costly to reduce pollution than to pay the pollution tax, in general an industry will not make an investment to reduce pollution. On the other hand, if the tax has such a level that environmental friendly behaviour is cheaper than polluting the environment, the industry will have a rational economic incentive to combat pollution. Examples of effective pollution taxes are the landfill taxes (it is in general cheaper to reduce waste to landfill by recycling than to pay the landfill tax) and waste water charges (as in industry, the onsite treatment of wastewater is often cheaper than to pay the wastewater charge).

32 For example, in the EU subsidies are often limited: subsidies depend of the available budget. Rules to apply for subsidies may be changed (quite often). Subsidies are often used to stimulate innovations, as soon as the innovation becomes "standard" technology, the subsidy ceases.

authorities and the enterprises is the amount of bureaucracy needed to certify that the subsidy is actually used for the purpose it was developed for.

In many countries, positive (subsidies) and negative (taxes, charges) economic incentives are linked: part or all of the revenues of taxes/charges is used to subsidise environmental projects/investments, often through an Environmental Fund.

In Egypt, the following economic incentives are used in IPC:

- Negative incentives: fines, compensation payment for environmental damages and fees;
- Positive incentives: subsidies/investment support through the Environmental Protection Fund (EPF), the Carbon Fund and international grants and (soft) loans.

The positive and negative incentive are linked to each other: revenues of fines are used as resource for the Environmental Protection Fund.

5.4.1 Fines

Law no. 4/1994 allows EEAA to fine non compliant establishments. Also, compensation payments can be imposed on the polluter (articles 84 -100). The level of the fines varies from LE 100 to over LE 1 million, depending on the violation. The revenues of fines, compensation payments and fees are channelled to the Environmental Protection Fund (EPF) (article 14).

It is difficult to assess if fines and compensation payments have any significant role in enforcement. Although a fine of for example LE 1 million seems “substantial”, it also may still be a “cheap” solution for an enterprise, if the investment that otherwise would have to be made counts for several millions LE or more. In such cases it will be beneficial for the enterprise not to comply with regulations and pay fines or compensation.

A polluter that is fined may go to court and challenge the fine or compensation payment. MSEA is aware that if the judicial system has not enough knowledge of environmental affairs and application of environmental laws, it cannot act in a desired manner (see MSEA, 2008, p. 192-193).

The revenues of fines form an important source of finance for the Environmental Protection Fund, in 2004/2005 LE 26.1 million was collected, in 2005/2006 LE 6 million and in 2006/2007 LE 59.3 million. For 2007-2010, the annual revenues of fines are projected at LE 8 million (ESP, 2007b, p. 22).

5.4.2 Environmental Taxation

In Law no. 4/1994, no provisions are included to introduce environmental taxes or charges that are somehow linked with the amount of pollution of the environment. It is not clear why such a provision is not present in the Law, as these taxes have proven to be effective (and efficient), and are also advocated in for example the

Country Environmental Analysis (World Bank, 2005, p. 83, 117, 128). But this report also states why it is difficult to introduce incentive taxes and charges in Egypt.

Several projects after 2000 have investigated the possibilities to introduce environmental taxes (USAID, 2001 and USAID, 2002), but this has not resulted in concrete proposals to introduce such incentive and revenue raising taxes, although studies show that to a certain extent such taxes would be feasible and acceptable (under conditions).

In the past, in the cement industry a resource tax has been applied. For each ton of cement produced LE 5 was added to the price. The revenues were earmarked for environmental investments (for example filters) and for the working environment. The system functioned satisfactory until the cement industry was privatised, and the earmarking was not applied in practice anymore.

Within EEAA, there are some discussions to introduce forms of environmental taxation, like:

- Tax on pollution volume (as incentive to reduce pollution);
- Tax on waste generation (as to reduce waste generation or landfill);
- Tax on import or use of harmful substances (as to limit the use of these substances);
- Tax on raw materials (as to promote recycling).

These discussions have not yet resulted in concrete policy proposals and have not resulted in amendments of Law 4/1994.

Conditions under which pollution related taxation might be acceptable in Egypt are the following:

- Revenues should be used for subsidising environmental investments (i.e. the EPF), focussing on industries that have a program of environmental reform;
- Revenues should be spent in a transparent way, procedures should be clear to industries;
- The environmental taxation should not affect prices and availability of goods and services for consumers.

Apart from introducing a tax on energy or pollution, it will be necessary to gradually withdraw subsidies on energy³³. It can even be argued that for the time being, the withdrawal of subsidies will have larger beneficial effects for the environment than a tax on energy.

³³ It is the policy of the government of Egypt to gradually withdraw these subsidies, with the aim of a non subsidised energy sector in 2016. This has been delayed due to the worldwide financial economic crisis, which also has affected Egypt.

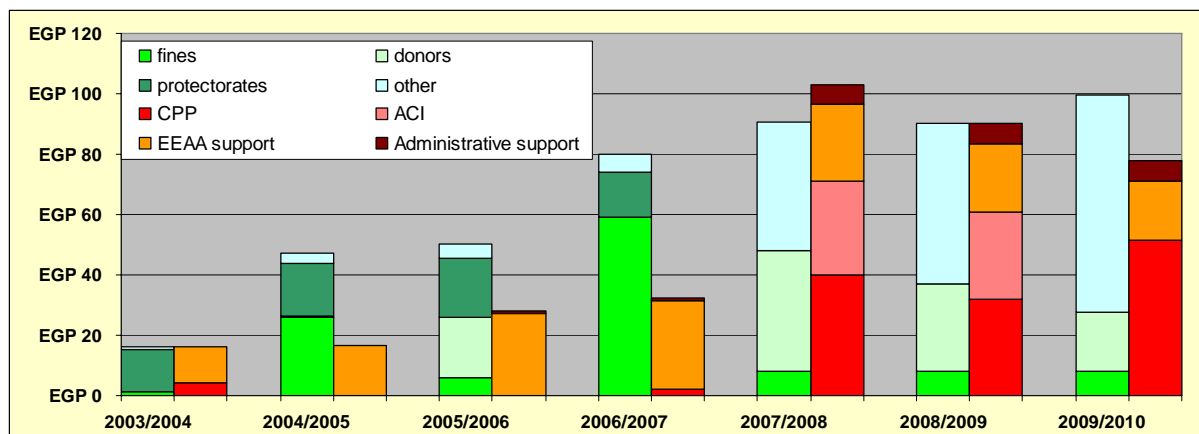
5.4.3 Environmental Protection Fund (EPF)

Positive incentives are a corner stone of the IPC policy. Next to International loans, grants and agreements, the Environmental Protection Fund is a major positive economic mechanism to support environmental investments in general and IPC in particular. It is active since 2000.

The EPF has its' legal basis in Law no. 4/1994 (article 14-16, and articles 7-9 of the Executive Regulations). Information on the objectives, the targeted projects and (environmental) actors, the functioning, sources of financing, magnitude of the fund can be found on the website of EEAA (see also ESP, 2007a and ESP 2007b). The EPF is "extra budgetary", which means that it is no part of the budget of the Central Government. The advantage of this is that unspent money can be shifted to the next budget year.

Since the establishment of the EPF, revenues were considerably higher than expenditures (see figure 4.2). Till mid 2007, total surplus of the EPF was LE 100 million.

Figure 4.2 – Annual Revenues and Expenditures of the Environmental Protection Fund (in LE million), Realisation (-2007) and Projection (-2010)



Source: ESP, 2007b, p. 22-23

In the period 2003 – 2006, only 23 projects (of 220 applications) have been approved and completed (ESP, 2007b, p. 13).

In the period 2007/2008 till 2009/2010, the total annual revenues are between LE 90 and 100 million. This will be used (roughly) as follows:

- Grants and Soft-loans for the Competitive Project Programme (CCP) (to small and medium sized enterprises): ≈ 45%;
- Achieve a Cleaner Production system (ACI component): ≈ 20%;
- EEAA support: ≈ 25%;
- Administration and surplus: ≈ 10%;

Although from the budget of the EPF it is not possible to exactly assess the share of industry in the projects, a rough estimate is that about 65% of total disbursements will be directed towards industry (CPP and ACI).

From data of 2007, it can be concluded that the total environmental investments induced (or related to EFP disbursements) are 3 times higher than the share of EPF grants, soft loans and interest subsidies (ESP, 2007n, p. 14). Projected on the period 2007 - 2010, one may conclude that the annual investments linked with EPF financing, will be in the range of LE 300 million per year.

Most of the budget is anticipated to be disbursed as soft-loans and grants (and a small part as interest subsidies (Interest rate subsidy, Subsidy of 6% of the bank's interest rate for SME's)). So far, the EPF does not yet provide Share capital (Financial share capital investment in private sector companies implementing unusual and innovate environmental projects).

5.4.4 Carbon Fund Unit (CFU)

The Carbon Fund Unit (CFU) is managed by the EPF and was established under the Environmental Pollution Abatement Project II (EPAP) to finance projects under the Kyoto Protocol's Clean Development Mechanism (CDM). Income to the CFU will come from portions of the revenues for the sale to the World Bank and other buyers of Carbon Emission Reductions (CERs) generated. In 2007 a modest LE 700,000 was received, but it is anticipated that the CDM will generate large amounts of money which will be used for climate projects.

In April 2009 52 project have been approved by the Egyptian Council for Clean Development Mechanism, of which 32 projects in the industrial sector.

These projects include improve energy efficiency, transformation to use natural gas, joint generation of heat and power (CHP) and reduction of nitrous acid emissions in fertilizer industry. A total of US\$ 1.266 billion needs to be invested, achieving an annual reduction of over 8.1 million ton of CO₂ equivalents. So far, 5 projects have been finalised with a reduction of 2.5 million ton of CO₂ equivalents (EEAA, 2009a).

5.4.5 International Loans and Donors

Egypt has attracted many international donor projects in the field of environment, of which many are linked with IPC (see also section 4.11).

For IPC, it is anticipated that in the framework of the EPAP II project, about LE 2 billion will have to be invested in the coming years (MSEA, 2007, p. 49). About 50% hereof (US\$ 175 million), will be financed by international donors by means of grants and loans (EEAA, 2008, p. 232).

5.4.6 Costs, Benefits and Investments of IPC

Although strictly spoken, the costs and investments needed for IPC are not an "economic incentive", still these costs are very important (and often used as a contra

argument against further policies). Therefore, in Annex I an estimate is given of the costs and benefits of IPC in Egypt is presented. In Annex II, an indicative overview is given of the investments for IPC between 1996 and 2015.

The results of both the CBA for IPC and the indicative investments for IPC between 1996 and 2015 will be discussed briefly in this section.

The basis for this CBA is an updated assessment of the Costs of Environmental Degradation, applying the same methodology as has been applied by the World Bank.

The results are presented in the following summarised overview of potential costs (of remediation of industrial pollution) and potentially avoided damages due to industrial pollution.

Table 4.1 - Indicative Assessment of Potential Remediation Costs and Environmental Degradation Costs Due to Industrial Pollution in Egypt, in LE Million

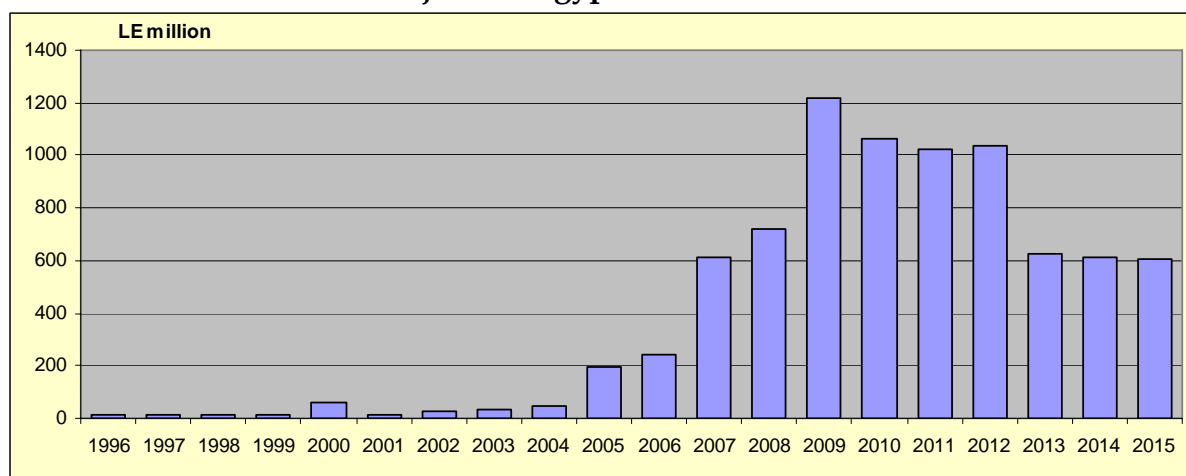
Category	Costs of remediation 2008	Damages 2008	Damages 2015
Global Environment		(8,400)	(12,600)
Air pollution	2,700	6,600	9,900
Water pollution	500	850	1,300
Waste	1,000	1,800	2,700
Total	4,200	9,250 (17,650)	13,900 (26,500)

Source: own assessment, based on a.o. WB, 2002a
Between brackets the costs/damages of GHG

The table indicates that to remediate industrial pollution, annually about LE 4.2 billion should be spent by industry (2008). The potential damages (excluding Global Environment) that can be avoided partly range from LE 9.2 billion (2008) to LE 13.9 billion (2015). This indicates that avoiding part of the damages due to industrial pollution will be beneficial to the Egyptian society.

The following graph gives a (non exhaustive) overview of the magnitude of the IPC projects in Egypt, in the past, currently and in the future. Roughly estimated, in the period 1996 - 2015 about 13,000 enterprises/projects are or will be financed through various channels, with an estimated total investment of about LE 8 billion. As mainly (partially) subsidised projects are included in this assessment, the private environmental investments that are linked to new production facilities are not included. This also may also be an explanation for the decrease in investments after 2009.

Figure 5.3 – Indicative Overview of Estimated Investments in Industrial Pollution Control Projects in Egypt between 1996 and 2015



The graph shows that only after 2004 investments in IPC are reaching a significant level (> LE 100 million per year), boosting in the period 2007 -2012 (which is linked with EPAP 2).

Apart from these investments, the operation and maintenance of environmental installations and for example waste management will lead to an increasing amount of annual expenditures (which are estimated at LE 4.2 billion in 2008).

5.4.7 Conclusions and Recommendations on Economic Incentives

The positive economic incentives are the backbone of IPC policy on economic incentives of the EEAA . For the coming years, large funds will be available for investments in industry, mainly from two sources: International Financial Institutions/donors (IFI's) and the EPF.

The reliance on external finance creates a risk to the (non formal) investment strategy for industry: as soon as these funds dry out, there is a risk that environmental investments in industry will decrease to low levels.

The EPF is dependent on revenues from mainly fines (which in the ideal situation of full compliance will tend to be zero) and revenues raised by natural protectorates. Little effort has been made in the last years to find new resources from environmental taxation.

The use of taxation as an incentive to reduce pollution, which has been successful in many countries in the world, has so far been neglected in the policies of using economic tools in Egypt.

If it is more profitable for a non compliant industry to rather pay fines than to comply (and invest in abatement technology and good housekeeping) it will be hard to use these instruments to enforce environmental legislation.

The large potential amount of finance available gives the Egyptian industrial sector large opportunities to invest in IPC and Cleaner Production.

Use can be made of the (high) levels of fines (and compensation payments) as defined in law no. 4/1994.

The lack of own resources of the private sector (as the IFI's and EPF only partly subsidise IPC projects) reduces the effectiveness of economic instruments. The main part of the needed investments should be financed by the industries themselves, either by own resources or (national) loans.

As advanced environmental technologies often need to be imported, import duties on such equipment may be a threshold to use this type of equipment.

Recommendations:

Seek to encourage the involvement of Egyptian financial institutions (banks) to participate in the financing of IPC and Cleaner production investments. The basic requirements are available (involvement of many international donors and IFI's and the mechanisms of the EPF).

Investigate if (i) part of the revenues from existing taxes (i.e. energy) or (ii) new environmental taxes, can be earmarked to the EPF to make the income of the fund more stable in the future.

Investigate the use of economic incentives (taxation) to influence environmental behaviour of enterprises. Examples are: tax on landfilling waste, tax on discharging waste water (based on load).

Reduce or abolish import duties on equipment for CP and environmental installations.

Fines should be applied in relation to the environmental damage caused by violations.

5.5 Public Disclosure of Information

The EEAA encourages the disclosure of environmental information to the public. Some of the policy actions developed (or under development) will be discussed briefly in this section.

5.5.1 PROPER System

In principle the MSEA has taken the decision to implement the so-called PROPER system in Egypt. Currently (end of 2009), in the framework of EPAP II, pilots are under preparation and implementation in the Governorates of Greater Cairo and Alexandria.

The PROPER system aims at enforcement of environmental standards and beyond through public participation (in addition to the already existing approaches to achieve compliance with standards). The system has proven to be to a certain extent effective in developing countries like China, Indonesia and India (Punkari, 2009, World bank, 2002, EFD, 2008a/b).

In brief, PROPER system can be described as follows:

- The enterprise has to fill in a questionnaire concerning the environmental situation;
- The questionnaire is organised in such a way, that the more questions can be answered positively, the higher the enterprise is ranked;
- Ranking of the environmental performance of an enterprise is presented by colours:
 - o Black: very poor;
 - o Red: poor;
 - o Blue: adequate (in compliance);
 - o Green: good (better than compliance)
 - o Gold: excellent (continuously seeking improving environmental performance);
- In order to monitor progress, the questionnaire has to be filled in periodically (for example each year);
- Results should be published on a website or for example in the (local or national) press³⁴

5.5.2 E-government

Currently, the Egyptian government (Ministry of State for Administrative Development with all ministries and other bodies) is preparing and implementing an integrated initiative to build systems for automating the services provided to the public through the "e-government" initiative. The aim is to provide government services to citizens, business and investors in an efficient way as to reduce the efforts for the public (Egypt government, 2009).

In the field of environment, the following services are under development (in co-operation with the MSEO):

- Inquiries about Environmental Impact Assessments;
- Complaints or inquiries about any environmental problems;
- Follow up on complaints that had been submitted.

As the e-government system is under development and implementation, in October 2009 these services are not yet operational, but shall be in the near future.

34 In Egypt it is proposed to publish PROPER results on a page sponsored by the EEAA in the National newspaper.

5.5.3 Raising Awareness on Cleaner Production Technology

Within the framework of promoting the policy of integrating cleaner production technology in industry, EPAP organized training courses for journalists from governmental newspapers, environmental inspectors, and NGOs on the main principles of cleaner production technology. The training courses included holding workshops in Egypt for environmental experts and study tours in Finland.

5.5.4 Raising Awareness on the Stockholm Convention on Persistent Organic Pollutants (POPs)

The United Nations Industrial Development Organization (UNIDO) and the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA) organised a workshop on 30/31 March 2010, in Cairo, to raise regional awareness on the implementation of Stockholm Convention on Persistent Organic Pollutants (POPs).

5.5.5 Regional Environmental Management Improvement Project in the Arab Republic of Egypt (REMIP)

The objective of the Regional Environmental Management Improvement Project (REMIP) sponsored by Japan International Cooperation Agency (JICA) is capacity development of EEAA and RBOs for formulating and developing countermeasures against regional environmental issues. REMIP was composed of eight outputs in order to realize the project objective. Among eight outputs, Output 6/Working Group 5 (WG5) was established for achieving the following objective:

Output 6: GDME&E of EEAA and concerned RBOs become capable of raising public awareness to Emus, enterprises, NGOs, and citizens

Two surveys were conducted to explore environmental awareness:

- The first survey was conducted during the period from August to January 2007, and aimed at exploring the level of environmental awareness and opinions on environmental issues.
- The second survey was conducted during the period from July to September 2008, and aimed at exploring the public needs to work on applying additional activities to raise environmental awareness.

5.5.6 Evaluation and Recommendations

Public awareness has proven to be important to successfully implement environmental policy. The PROPER approach has been proven efficient to achieve IPC (compliance and further emission reductions) in many other developing countries like China, Indonesia and India. It therefore can help to achieve a situation in Egyptian industry to reduce emission beyond the environmental standards, which will be needed if industrial output will be almost tripled in the period 2007 -2015.

Implementation of the PROPER system may also challenge enterprises that are not included to get involved (due to public pressure or due to concerns of the management of the enterprise).

The success of PROPER largely depends on the willingness of industries to implement the system in the coming years. The success of raising public awareness largely depends on the ability and willingness of the public to understand the urgency of environmental problems.

The PROPER system and other public disclosure systems create an opportunity (1) for enterprises to communicate that they take environment serious and (2) for authorities that they support the idea that enterprises have a large own responsibility in improving their environmental performance beyond the legal requirements. The PROPER system is one of the few possibilities to encourage continuous environmental improvement of enterprises beyond environmental compliance. The PROPER system supports also other initiatives for environmental improvements, like CP, improvement of energy efficiency, shift to cleaner fuels (natural gas).

The threat of a public disclosure system like PROPER is that only a few “good” enterprises will co-operate, whereas the aim should be to include as many as possible industries.

Recommendations:

It is recommended to promote the PROPER system and start with a formal introduction as soon as possible. Also, the results of the first round of PROPER should be made public as soon as possible, and continuous updated publications (on the web and in newspapers) should be safeguarded.

EEAA should train some staff to assist enterprises that want to get involved in the system. EEAA should also advocate the use of PROPER.

It can be considered guarantee enterprises with a better than blue (“adequate”) score to be left outside inspections.

Other public disclosure activities on IPC should be continued and strengthened, as to continuously raise awareness of the public of the importance of IPC.

5.6 Management of Industrial “Hot Spots” and Guidance of Future Industrial Development

From an environmental point of view, it is often recommendable to concentrate industrial activities in specific industrial zones. This concept is applied throughout the world in spatial planning of economic activities. Also in Egypt, industrial zones are defined and regulated.

5.6.1 Legal Provisions for Industrial Zones

The legal basis for the planning of industrial zones can be found in Law no. 4 of 1994, amended by Law no. 9 of 2009 Part 1 – Protection of Land Environment from Pollution – Chapter 1 Development and Environment (Article 19) (1):

“Each and every public or private normal or legal person shall present an Environmental Impact Assessment (EIA) of the facility or the project to the competent administrative authority or the licensing authority before initiating the implementation of the project. The EIA shall be conducted in accordance with the elements, designs, criteria, principles, and qualitative loads issued by the EEAA in coordination with the competent authorities, and the competent administrative authorities shall present maps of the industrial zones illustrating the permitted industries according to the environmental loads”

The Executive Regulation of this law specifies the facilities and projects that are subject to this article, and in this case the competent administrative authorities shall be responsible of presenting maps of the industrial zones.

A draft proposal -has been prepared to amend Article 10 of the Executive Regulation of the law, which is related to the assessment of environmental impact of the facilities that are to be licensed or alleged to be established- to obligate the competent administrative authorities to present studies of the loads of environmental pollution and plan of activity distribution to ensure their consistency and absence of any negative impacts in case of neighbouring incompatible activities in the industrial zones. The draft of the amendments of the Executive Regulation will be presented to the Prime Minister for endorsement in 2010.

5.6.2 EEAA Guidelines for Planning Industrial Zones

In 2005, the EEAA issued a manual for developing industrial zones -in English- to assist providers of industrial projects in presenting EIAs at the establishment and planning of industrial zones.

This manual has not been issued according to a decision that obligates its application; however, it is used by the Central Department of Assessment of Industrial Impact at studying the establishment of new industrial zones.

The manual regulations do not include any standard criteria that can be followed while choosing or planning industrial zones, except for referring to the necessity of abiding by the standards of drainage and emissions included in the Environmental Law, and the law of sewage disposal in public sewers (no. 93 of 1962) amended by decision no. 44 of 2000, and the law of drainage in the river Nile (law no. 48 of 1982).

These regulations were exchanged with the Industrial Zones Development Authority and Ministry of Investment.

The Ministerial Committee issued two resolutions, no. 18/06/05/3 dated 26/5/2005 and no. 3/12/05/3 dated 5/12/2005 to prohibit the establishment of any industrial activities outside the accredited industrial zones.

5.6.3 Carrying Capacity

Carrying capacity was - until recently - not defined in the Law 4/1994. This Law uses the term "pollution load and units" (pollutant tons/year), and the term "qualitative load and units" (kilograms of pollutant/produced ton).

The two terms are mentioned in several articles of the law, including: (Article 1 "qualitative loads"), (Article 12 "pollution load"), (Article 19 "environmental loads"), (Article 34 "total pollution"),... etc, as well as the Executive Regulation of the law, including: (Article 1 "qualitative loads"), (Article 12 "pollution load of the facility"), (Appendix 3 "form of register of the impact of facility's activity on the environment, qualitative load, pollution load"), ... etc..

Article 19 of the law (on the necessity of presenting EIAs of projects before initiating their implementation) lays the responsibility of setting the foundations of pollution loads and qualitative loads on the publications issued by the EEAA in coordination with the competent administrative authorities, which have a mandate over the project land or have the right to issue license for the project. Article 19 also obligates the competent administrative authority to present maps of the industrial zones illustrating types of permitted industries according to environmental loads. The General Authority for Industrial Development, which is affiliated to the Ministries of Trade, Industry, the Ministry of Housing, and the administrative authorities of the industrial cities and governorates, is considered one of the competent administrative authorities.

A draft proposal has been prepared to amend Article 10 of the Executive Regulation of the Law 9/2009 to obligate the competent administrative authorities to present a study of environmental pollution loads and activity distribution plan, to ensure their consistency and absence of any negative impacts in case of neighbouring incompatible activities in the industrial zones.

At the same time a new article has been added under no. 36 bis in the draft of the amendments of the Executive Regulation that grants the Minister of Environment the authority and responsibility of issuing lists of allowed loads and qualitative loads of pollutants, which reads as follows:

Article 36 bis:

"The Minister in charge of environmental affairs shall issue lists of allowed loads and qualitative loads of pollutants to the productive units in different industries, and enter into force as of their publication in the Egyptian newspapers"

The current Executive Regulation of the Environmental Law (no. 4/1994, and its amendments in law no. 9/2009), and the draft proposed amendments, do not include

tables of the allowed values of loads and qualitative loads for productive units in different industries, except for the tables included in Appendix 6 bis 1 (which set rules for online continuous selfmonitoring for certain polluting industries).

The practical application of the concept of environmental capacity

The Law (Article (22)1) obliges industrial facility to keep registers indicating the impact of the facility on the environment. The current Executive Regulation of the law outlines in Appendix 3 ("the form of the register indicating the impact of the facility on the environment") the practical means to deal with pollution load and qualitative loads in the facility, where data will be registered in the register under the following titles:

- Gas emissions and their rates:
 - o Rate of gas emissions (m³ / year) and calculation of pollutant load (tons / year);
 - o Qualitative load (kilogram of pollutant per produced ton).

- Liquid wastes:
 - o Pollutant load (ton / year) and qualitative load (kilogram of pollutant / produced ton).

The draft amendment of the Executive Regulation also includes the addition of a new clause to Article 17 of the Executive Regulation for the environmental register which "obligates the facility to inform the EEAA -on a regular basis (annually)- of the drainage rates, concentrations and annual loads of pollutants (of gaseous emissions, liquid drainage and wastes"

The environmental capacity of industrial zones

A committee from the Ministry of Industry, called the Committee on Pollution Loads, in coordination with the EEAA, made a list of industrial activities which are not allowed to be added to the old industrial zones in Greater Cairo (Shubra Al Khaimah, Al Amiriah, Al Khanka, Al Zawya Al Hamra, and Abbaseya) which can not tolerate load further pollution loads.

The existing industrial zones in (Helwan - El Tebein)

Within the framework of the rules of the Committee on Pollution Loads, the category (C) projects (such as cement and fertilizer factories) are subject to the demand to present an additional study beside the EIA, which is a study of the qualitative risk assessment (QRA). The concluded outcomes of the study are compared with those of the monitoring station of an area of excellent environmental quality, in case the outcomes of the study did not exceed the outcomes of the monitoring stations, the EIA of the project is approved, otherwise the project is rejected.

5.6.4 Evaluation and Recommendations

As far as industrial activities have (large) negative environmental impacts, the concentration of industrial activities in industrial zones has proven to be an important tool for IPC. Moreover, the establishment of such zones enables to carry

out certain environmental activities (like EIA) in coordination between industries rather than for each industrial establishment individually.

The lack of transparent ways of assessing the pollution loads of industrial zones, due to the lack of monitoring of industrial emissions (by the authorities), may sometimes lead to non optimal decisions.

The new Law 9/2009 gives the opportunity to implement ways of assessing the carrying capacity in a more scientific way (as it is quite difficult to assess pollution loads of a variety of industrial sources).

Recommendations:

It is recommended to include transparent calculation methods in the executive regulations of Law 9/2009 concerning the carrying capacity of the environment surrounding industrial zones. Also attention should be given to the way in which the overall carrying capacity will be distributed over a variety of industries that are or want to be settled in an industrial zone.

5.7 Continuous Review and Updating of Emission Standards, Monitoring and Inspection Procedures

This policy is directly linked with the policy cycle as discussed in chapter 2. The new law 9/2009 and the upcoming executive regulations are an example of this continuous process of renewal and updating. Another example is the strengthening of the Inspection of the EEAA with additional manpower in the central inspection department and the RBO's.

6 STRENGTHENING POLICY ACTIONS FOR INDUSTRIAL POLLUTION CONTROL

6.1 Introduction

In chapter 3 the industrial structure and projected developments in the coming years have been sketched. Estimates have been made of the share of industry in total pollution generated in Egypt. Also consideration has been given to the potential developments of industrial pollution in the light of the industrial development.

In chapters 4 and 5 the Egyptian environmental policy towards industry has been discussed and analysed. By means of analysing (if appropriate) the strength, weaknesses, opportunities and threats, the various elements of IPC in Egypt have been evaluated.

Based on the available information, specific recommendations for improvements of the policy have been proposed. Some of these proposals for policy action are generic, whereas others are more specific.

In this chapter the proposed policy actions will be summarised. Some of the proposed policy actions will be analysed by means of a global, mainly qualitative cost-benefit analysis. This will assist the EEAA and the MSEA to assess priorities for IPC in the near future³⁵.

The brief presentation in chapter 3 of the industrial developments in Egypt, the assessment of industrial pollution and the potential growth thereof, make clear that in Egypt, IPC needs to be further developed. Additional policy measures are needed, to avoid an overload of air- and water pollution caused by industry and increased waste management problems.

Further industrial development in Egypt is a need to raise the level of economic wellbeing of the Egyptian population, but the point is reached, where IPC should be strengthened in order to prevent further growth of absolute pollution levels in regions and the country as a whole and achieve reductions.

In general sense this is recognised by the government of Egypt by including environmental protection as a national duty in the constitution. Moreover, recently the central environmental law (no. 4/1994) is amended by law 9/2009 and various actions (both modernisation of the economy and on reducing environmental stress) are under implementation which encourage increased attention for IPC.

However, even with these actions, combined with the little information on environmental trends in industry that is available, it is clear that strengthening of the policy actions should be high on the agenda.

To encounter the potential growth of industrial pollution the EEAA intends to implement the following policy actions:

³⁵ As the CBA's are rather general, also other considerations should play a role in the final decision making process

6.1 Enforcement of Compliance:

6.1.1 Environmental Impact Assessment (EIA)

Limit the validity of permits

An EIA is valid as long as an industry does not change process or extends output. In order to create a more dynamic ambiance for EIA (as pollution loads need to be reduced with increasing production) the following is recommended:

It is recommended to limit the validity of EIA's, as this will force industries to submit up-to-date information and may also give an incentive to innovate production processes. It also would be beneficial for overall compliance of industry with environmental legislation.

6.1.2 Monitoring of Industrial Emissions

Load based emission standards

The analysis in chapter 3 shows that concentration standards alone, will not be sufficient to change the trend of increasing pollution from industries. Therefore it is recommended to:

Give priority to implement load based standards to large industries and make transparent executive regulations to implement these standards.

The indicative CBA shows that load based standards may yield large benefits, with likely a healthy B/C factor.

Database on emissions of industries (Emission register)

It is observed that there is a lack of factual data on the environmental performance of industries. Trends are not known, making it hard to formulate an adequate policy concerning IPC. Given the fast growth of industry in Egypt, it is recommended:

To strengthen the management of data on industrial pollution, either by revival of the IPIS system or by gradually built up databases on the pollution caused by industries (industrial emission register).

Online monitoring of emissions of larger industries

Currently the MSEA/EEAA is developing regulations that aim at online monitoring of (air) emissions of all main industrial facilities in Egypt. As online monitoring in the cement industry has been proven effective, it is recommended:

To implement online monitoring according to a realistic time path in all other major industries.

6.1.3 Inspection of the Environmental Performance of Industry

Improve the functioning of the Environmental Inspection

Although some improvements are achieved in the last years, the role and task of the environmental inspection can be enhanced. It is therefore recommended:

Define a transparent inspection strategy and planning at national, regional and local level;

Emphasis on the idea that the inspection should focus on improving the environmental performance of industry, rather than a punitive institution;

Provide the environmental inspection with appropriate human and logistic resources and remove the causes of the instability of staff and management;

Provide the management of the inspection with an operational information system, able to manage thousands of files and issuing follow-up reports and provide analytical reports on the environmental status of the industry and geographical areas. Link the information system to the agency's regional branches to ensure a database covering all parts of the Republic and link the environmental inspection information system to the information system of the hazardous substances administration.

Involve public and other governmental agencies in the protection of the environment.

6.1.4 Enforcement Compliance Action Plans

Promote Compliance Action Plans

Compliance Action Plans (CAP's) give an opportunity for enterprises and the authorities to settle non compliant cases in a reasonable way, avoiding a rigid legislative approach.

It is recommended to investigate how CAP's can be used (again) in the framework of EPAP 2. It can be argued that financial support for the application of CAP's for enterprises would be given, and also some specialised staff in EEAA should be available to assist in the process of CAP's. The need for external consultations needs to be investigated.

The indicative CBA on CAP's shows that compliance with the current environmental standards will probably lead to large societal benefits.

6.2 Cleaner Production

Adopt the strategy for Cleaner Production, shift to natural gas and energy conservation

The industry in Egypt grows at a high rate, and the ambitions of the Egyptian government are to increase industrial output considerably and at the same time make the industry competitive on the world market and thus take environmental concerns very serious. In the light of the fast development of the industry, the following can be recommended:

Egypt urgently adopts the CP strategy at a higher level, than currently. Only if CP is implemented in all industries of all sizes, the Egyptian environment can cope with the foreseen doubling or even tripling of industrial outputs in the coming 10 years. Elements of CP should include at least increasing energy efficiency and the use of cleaner fuels in industry.

The indicative CBA's on energy conservation in industry and the shift from Heavy Fuel Oil to natural gas show, that such measures may yield large financial and economic benefits, with likely a good B/C factor.

6.3 Economic Incentives

Further develop the use of economic incentives for IPC in Egypt

Often, economic arguments are the basis for non compliant behaviour of industries. This may be either lack of financial resources, the absence of economic incentives to comply or a mixture of economic and non economic behaviour. In view of the industrial growth and the ambitions of the Egyptian government, the following recommendations concerning the use of economic incentives can be made:

Seek to encourage the involvement of Egyptian financial institutions (banks) to participate in the financing of IPC and Cleaner production investments. The basic requirements are available (involvement of many international donors and IFI's and the mechanisms of the EPF).

Investigate if (i) part of the revenues from existing taxes (i.e. energy) or (ii) new environmental taxes, can be earmarked to the EPF to make the income of the fund more stable in the future.

Investigate the use of economic incentives (taxation) to influence environmental behaviour of enterprises. Examples are: tax on landfilling waste, tax on discharging waste water (based on load).

Reduce or abolish import duties on equipment for CP and environmental installations.

Fines should be applied in relation to the environmental damage caused by violations.

6.4 Public Disclosure of Information

Introduce the PROPER system in Egypt

Compliance beyond the current environmental standards is essential in Egypt given the rapid growth of industry. A system like PROPER can help with that. Therefore it is recommended:

To promote the PROPER system and start with a formal introduction as soon as possible. Also, the results of the first round of PROPER should be made public as soon as possible, and continuous updated publications (on the web and in newspapers) should be safeguarded.

EEAA should train some staff to assist enterprises that want to get involved in the system. EEAA should also advocate the use of PROPER. It can be considered guarantee enterprises with a better than blue (“adequate”) score to be left outside inspections.

Experience with PROPER in other developing countries shows that the application of the system can actually trigger environmental performance of enterprises beyond compliance.

LITERATURE REFERENCES

Blok, K, 1994, "ICARUS-3 - The Potential of Energy Efficiency Improvement in the Netherlands up to 2000 and 2015", database and model by J.G. de Beer, M.T. van Wees, E. Worrell, K. Blok, Dept. of Science, Technology and Society, Utrecht University, NWS-94013, Utrecht, 1994.

Chemonics, 2004, "The Cairo Air Improvement Project", final report, March 2004.

CIA, 2009, "The World Factbook, Egypt", Central Intelligence Agency of the United States, <https://www.cia.gov/library/publications/the-world-factbook/>

CIDA, 2005, "Climate Change Initiative", website CIDA.

EUROPEAN COMMISSION, 2004, "Revision of ISIC/NACE and consequences for national accounts, Report to the Advisory Expert Group on the meeting of EU National Accounts", Working Group of 23-24 November 2004.

ECC, 2009, "Alternative Fuel & Raw Material (AFR)", Egyptian Cement Company, Cairo, www.egyptiancement.com

EEAA, 2002, "Five year Action Plan of the EEAA", <http://www.eeaa.gov.eg/english/main/policies4.asp>

EEAA, 2004, "Strategy and Action Plan for Cleaner Production in Egyptian Industry", 2004.

EEAA, 2005a, "Environmental Impact Assessment Guidelines for Oil and Gas Sector", Cairo, January 2005.

EEAA, 2005b, "Environmental Impact Assessment, Guidelines for Cement Manufacturing Plants", Cairo, January 2005.

EEAA, 2005c, "Environmental Impact Assessment, Guidelines for Pharmaceutical Plants Cairo", January 2005.

EEAA, 2005d, "Environmental Impact Assessment, Guidelines for Land Reclamation Projects" Cairo, January 2005.

EEAA, 2005e, "Environmental Impact Assessment, Guidelines for Industrial Estates Development", Prepared by Egyptian Environmental Affairs Agency (EEAA) Entec UK Ltd as part of the SEAM Project, Cairo, January 2005.

EEAA, 2008, "Egypt State of the Environment report, 2007", Cairo, December 2008.

EEAA, 2009a, "Minister of Environment, Egypt encourages developed countries' investments to establish projects of Clean Development Mechanism", news of 1 April 2009 published in the website of EEAA,

EEAA, 2009b, "Achievements and Planned Activities, Environmental Impact Assessment", website EEAA, 2009. www.eeaa.gov.eg/english/main/accomp9.asp

EEAA, 2009c, "Alexandria Integrated Coastal Zone Management Project, Environmental and Social Impact Assessment", Draft Final, October 2009.

EEAA/CID, 2009, "Process diagram of Environmental Inspections", Central Inspection Department.

EfD, 2008, "What Kinds of Firms Are More Sensitive to Public Disclosure Programs for Pollution Control? The Case of Indonesia's PROPER Program", by Jorge H. García, Shakeb Afsah, and Thomas Sterner, Environment for Development, Discussion Paper Series (EfD DP 08-12), Gotenburg, Sweden, March 2008. <http://www.efdinitiative.org/>

EfD, 2008b, "Does Disclosure Reduce Pollution? Evidence from India's Green Rating Project", Nicholas Power s , Allen Blackman, Thomas P. Lyon and Urvashi Narain, Environment for Development, Discussion Paper Series (EfD DP 08-27), Gotenburg, Sweden, October 2008. <http://www.efdinitiative.org/>

Egypt government, 2009, "E-government", website under development of the Government of Egypt, www.gov.eg/services/

ESP, 2007a, "Business Plan 2007 - 2010 For The New Environmental Protection Fund", Environmental Sector Programme, EEAA - Danida, Cairo, 30 June 2007.

ESP, 2007b, "EPF Progress Report During the Period From January 2007 to June 2007", Environmental Sector Programme, EEAA - Danida, Cairo, 2007.

IEA, 2009, "Energy Balance for Egypt, 2006", International Energy Agency, Paris, September 2009, <http://www.iea.org/Textbase/stats/>

INECE, 2009, "Principles of Environmental Compliance and Enforcement, Handbook", International Network for Environmental Compliance and Enforcement, Washington, April 2009.

Jantzen, 2004, "Assessment of the Economic Value of Environmental Degradation in Serbia", Final report, Environmental Capacity Building Programme 2003 - An EU funded project managed by the European Agency for Reconstruction, 03/SER01/09/002.

Jantzen, J., 2006, "Large Combustion Plants Turkey, Case study on the mitigation costs of various policy scenarios to reduce emission of lignite fired power plants", study by the Institute for Applied Environmental Economics for the World Bank, July 2006.

Jantzen, J., 2007, "Comparative analysis of Eurostat's environmental protection expenditures" in VITO, 2007, "Sectoral Costs of Environmental Policy, Final Report", December 2007, Belgium.

Khaleej Times, 2009, "Cleaner Production", article on the round table for cleaner production, held at the headquarters of the Secretariat of the Arab League, 4 October 2009.

MSEA, 2001, "The National Environmental Action Plan of Egypt 2002/17 Environment at the Centre of Modernizing Egypt", Incomplete Draft not for Circulation, Comments are Welcome, 25 December 2001.

MSEA/EEAA, 2001, "Environmental Protection Fund, Annual Report, Fiscal Year 2000-2001", 2001.

MSEA, 2005, "Implementation of the Stockholm Convention, National Implementation Plan - Egypt", July 2005.

MSEA, 2007, "Egypt State of the Environment report, 2006", Cairo, December 2007.

MSEA, 2008, "Annual Report, 2007", Januari 2008.

NationMaster, 2009, "Egyptian Environmental Statistics", www.NationMaster.com, Australia, 2003-2009.

PEMA, 2006, "The Egyptian Environmental Information Systems Project", Project Report No. 18, in co-operation with the Egyptian Environmental Affairs Agency (EEAA), Centre for Projects Evaluation and Macro-economic Analysis (established by Ministry of International Co-operation), May 2006.

Punkari, Dr. Mikko, 2008, "Draft, Policy Review: Compliance Action Plans", Institutional Strengthening of the EEAA to Improve its Environmental Policies Formulation and Environmental Management Capabilities, November 2008.

Resources for the Future, 2000, "How Do Public Disclosure Pollution Control Programs Work? Evidence from Indonesia", by Shakeb Afsah, Allen Blackman, and Damayanti Ratunanda, Washington, October 2000.

SIS, 2009, "Egypt in Figures, 2009, by selling price of manufacturing industry in Egypt", State Information Services of Egypt,

SIS, 2009b, "Industry and Trade", State Information Services of Egypt, 2009.

SIS, 2009c, "Industry and Trade, Industrial employment", Economic Development Plan for the year 2008/2009, quoted by State Information Services of Egypt, 2009.

TIMS (E2RC), 2003, "Egypt's national strategy Study on the Clean Development Mechanism", Cairo, 2003.

USAID, 2001, "Peer Review of Progress on Economic Instruments Study", United States Agency for International Development, Egyptian Environmental Policy Program (EEPP), Program Support Unit, Submitted by Robert C. Anderson, February 8, 2001.

USAID, 2001, "Egyptian Laws & Economic Instruments", paper written by Dr. Saeed El Hakim, February 2001.

USAID, 2002, "Economic Instruments for Improved Water Resources Management in Egypt", Prepared by EPIQ for United States Agency for International Development, April 2002,

VITO, 2007, "Costs and Benefits associated with the implementation of the Water Framework Directive, with a special focus on agriculture: Final Report", report prepared for the European Commission, DG Environment, author(s): Leo De Nocker (VITO), Steven Broekx (VITO), Inge Liekens (VITO), Benjamin Görlach (Ecologic), Jochem Jantzen (TME), Paul Campling (VITO).

Wikipedia, 2009, "List of crude oil products",
http://en.wikipedia.org/wiki/List_of_crude_oil_products

World Bank, 2005, "Arab Republic of Egypt, Country Environmental Analysis (1992 - 2002), Washington.

World Bank, 2002a, "Arab Republic of Egypt, Cost Assessment of Environmental Degradation, sector note", June 29, 2002.

World Bank, 2002b, "Environmental Performance Rating and Disclosure, China's Green-Watch Program", by Hua Wang, Jun Bi, David Wheeler, Jinnan Wang, Dong Cao, Genfa Lu, Yuan Wang, September 2002, Washington.

WRI, 2009, "Earthtrends, Water Resources and Freshwater Ecosystems", World Resources Institute, based on Development Data Group, The World Bank. 2006 World Development Indicators Online. Washington, DC: The World Bank.
http://publications.worldbank.org/e-commerce/catalog/product?item_id=631625.

ANNEX I: COST BENEFIT ANALYSIS OF SELECTED POLICY MEASURES

Introduction

In the framework of this policy documents Cost Benefit Analysis is applied on a selection of policy measures. The following policy measures have been selected:

- Energy conservation in Industry;
- Promote the use of cleaner fuels;
- Implementation of PROPER;
- Compliance Action Programmes;
- Level of environmental non-compliance fines in accordance with environmental damage;
- Move from concentration based environmental permits to load based permits.

In the next sections, the way in which the CBA has been applied and the type of data used will be discussed for these case-studies.

Before the case-studies are presented some general remarks on the application of CBA for IPC will be made, focussing on a few issues which should be taken into consideration when using the results of the CBA's.

CBA for IPC policy measures

CBA is developed as a means to assess societal costs and benefits. In most cases CBA is applied for large scale societal (construction) projects (road-construction, construction of a large industrial sites, construction of hydropower dams, etc.). CBA is sometimes applied on general policy proposals, for example, in the EU for new (environmental) directives, like the Water Framework Directive (see VITO, 2007). Less common is the use of CBA for specific policy measures.

In the framework on this policy document, some of the policy measures are general, others are specific. This will be discussed in this annex for the policy measures for a CBA has been applied.

For a CBA to be credible and reliable, various conditions have to be met. Some of the most important conditions are:

- Clear description of the policy measure, including the goals of the policy measure;
- Clear and reliable information of the parameters influenced by the policy;
- A clear demarcation of the issues to be taken on board in the CBA of the policy measure.

In the cases reviewed a concern is that some of the policy measures overlap each other:

- Improving industrial energy efficiency will also lead to less (relatively) use of oil thus decrease air pollution
- Implementing PROPER in large industries may also boost energy efficiency;
- Compliance Action Plans will reduce emissions (and possibly will lead to fuel-switch);
- Higher fines will lead possibly lead to better compliance, as is the case with CAP's.

In the next section, an attempt is made to assess the contribution of the industry in Egypt in the "Cost of Environmental Degradation", using some of the results of the study performed for the World Bank (World Bank, 2002a).

Cost of environmental degradation due to industrial pollution

In the World Bank study (World Bank, 2002a) an attempt was made to make a rough assessment of the costs of environmental degradation. The estimates "should be considered as orders of magnitude, and a range is provided to indicate the level of uncertainty". The estimate is made on basis of various information sources and is valid for the year 1999. The study estimates the damages for Egypt as a whole, without specifying the contribution of industry.

Since 1999, the economy in Egypt has developed rapidly, which makes it necessary to adapt the estimates published in 2002 to the current (2009) situation. Also, it is necessary to assess which part of the damages can be linked to industrial pollution.

The following approach has been followed:

- Air pollution: damages have been assessed as follows:
 - o Damages were estimated as 1.1 – 3.2% of GDP (World Bank, 2002a);
 - o GDP in 2008 was about LE 875 billion (CIA, 2009)³⁶;
 - o Share of industry is roughly estimated at 35% (see chapter 3);
 - o Total damage of industrial air pollution is estimated at between LE 3,369 million and LE 9,800 million per year;
- Water pollution: damages have been assessed as follows:
 - o Damages were estimated as 0.7 – 1.2% of GDP (World Bank, 2002a);
 - o GDP in 2008 was about LE 875 billion (CIA, 2009);
 - o Share of industry is roughly estimated at 10%;
 - o Total damage of industrial water pollution is estimated at between LE 613 million and LE 1,050 million per year;
- Waste: damages have been assessed as follows:
 - o Waste landfilled estimated at 6 million tons per year, Hazardous waste landfilled about 0.3 million tons (see Chapter 3);
 - o Damage of landfill estimated at € 10 - € 45 per ton waste, and 8 times higher for hazardous waste (Jantzen, 2004). This results in unit damage costs of LE 80 – 350 per ton non-hazardous waste and LE 640 – 2,800 per ton hazardous waste;

³⁶ Using an exchange rate of LE 5.4/US\$, GDP (2008) was US\$ 162.2 billion.

- Total damage of industrial waste is estimated at between LE 672 million and LE 2,940 million per year;
- **Global Environment:** damages have been assessed as follows:
 - Industrial CO₂ emissions are estimated at 104 million tons per year (see Chapter 3);
 - Per ton CO₂ damages are estimated between US\$ 10 and 20, or LE 54 - LE 108 per ton;
 - Total damage of industrial waste is estimated at between LE 5,616 million and LE 11,232 million per year;

In the following table these estimates are summarised and compared to the industrial production in Egypt (2008): LE 339 billion (38.7% of LE 875 billion).

Table A.1 - Cost Assessment of Environmental Degradation due to Industrial Pollution in Egypt (2008), in LE million

Damage Category	as % of industrial production					
	low	high	average	low	high	average
Global Environment	5,600	11,200	8,400	1.7%	3.3%	2.5%
Air pollution	3,400	9,800	6,600	1.0%	2.9%	1.9%
Water pollution	600	1,100	850	0.2%	0.3%	0.3%
Waste	700	2,900	1,800	0.2%	0.9%	0.5%
Total	10,300	25,000	17,650	3.0%	7.4%	5.2%

Source: own assessment, based on a.o. WB, 2002a

According to these estimates, the environmental degradation counts for 3 - 7.4% of industrial production (average 5.2%). The absolute damage costs will increase if industrial production increases (which is the ambition of the Egyptian government) and measures to reduce pollution (relative or absolute) will fail to be sufficient effective.

The presented estimates also make clear that environmental policy measures, if implemented in an effective way, can reduce considerable damages.

As the Cost Benefit Analysis should take future damages, rather than current damages into consideration, also a rough estimate is made for the Costs of Environmental Degradation in 2015. For this purpose the simple assumption is made that by 2015, CO₂ emissions will be about 50% higher than in 2008 (assuming that each year an autonomous energy efficiency gain will be achieved of 2.1%, otherwise industrial CO₂-emissions would be about 70-75% higher in 2015). This results in the following estimated Costs of Environmental Degradation in 2015.

Table A.2 - Cost Assessment of Environmental Degradation due to Industrial Pollution in Egypt (2015), in LE million

Damage Category	average
Global Environment	12,600
Air pollution	9,900
Water pollution	1,300
Waste	2,700
Total	26,500

Source: own assessment, based on a.o. WB, 2002a

Energy Conservation in Industry

Energy conservation in industry is essential to manage global environmental problems (CO₂ emissions), but also air pollution. As Egyptian industry is fast growing, and the ambitions are high, stimulating industrial energy efficiency needs to be a priority.

This proposed policy measure can be characterised as follows:

- It addresses the problem of the use of fossil fuels, energy efficiency and climate change;
- It is limited to the industrial sectors;
- The scope of this policy proposal is very general: it can be any kind of policy aiming at energy conservation, and it includes all technical possibilities;
- The way in which this policy proposal should be implemented is not specified, this may include all three major approaches: regulation, economic incentives and voluntary.

Currently, the phase of this proposal in the policy cycle is somewhere between agenda setting and formulation of the policy. No concrete ideas yet exists how to implement such a policy.

To enable a CBA for this policy proposal, further quantitative specification of this policy must be made. At least it must be clear what quantitative target is aimed at in which time frame. This may for example be:

- 30% improvement of overall energy efficiency in Egyptian industry. This implies that the energy inputs per unit production should be reduced by 30%;
- The time frame may be 10 to 15 years to achieve the overall objective.

To assess costs and benefits of such a policy the following (minimal) basic information would be needed:

- Energy use by Egyptian industry, per (sub) sector and by type of fuel or energy;
- The development path of the (energy use in) industry;
- Resulting CO₂ emissions and other air pollutants (PM₁₀, SO₂, NO_x, VOC) as a result of industrial energy use and their contribution to ambient air quality;

- A classification of the stationary sources: large-, medium sized and smaller energy installations, this includes indication of installed power, boiler efficiency, etc.;
- An indication of the current energy prices for industry, and expectations of the development of the energy prices in the mid/long term (15 years);

Apart from the current situation and quantification of all kind of information, the costs of this policy proposal will not only depend on the overall objective, but also on the way it is implemented. Energy conservation in industry can be promoted through various channels like:

- (Voluntary) Agreements with producers of energy equipment and industries on improvements of on energy efficiency;
- Subsidies for energy efficient solutions (both interesting for industries that use these solutions as the sectors that supply);
- Promotion and information campaigns;
- Legal provisions;
- Energy labels.

Costs and Benefits of Energy conservation

As this proposed policy lacks specification only a very general assessment can be made, using the following assumptions:

- Total energy use of 2,400 PJ in industry (2015);
- Saving of 30%: 720 PJ in 2015;
- Average price of LE 20 per GJ;
- Total savings are LE 14.5 billion per year (in 2015).

On top of this savings air pollution and global environment would benefit:

- Air pollution by industry: total damages are LE 6.6 billion in 2008 (average of low and high estimate), assuming growth of 150% (till 2015), these damages would be LE 9.9 billion in 2015. If air pollution is reduced by 30%, damages will be reduced by about LE 3 billion;
- Damage to Global Environment by industry are estimated at LE 8.4 billion (2008), and LE 12.6 billion in 2015. If CO₂ emissions are reduced by 30%, damages will be reduced by about LE 3.8 billion;
- Total environmental benefits of energy saving in industry would be: 6.6 billion per year in 2015.

So total societal and private benefits could be in the range of LE 20 billion per year.

Investment cost of energy conservation range from LE 0 per GJ to LE 10,000 per GJ, depending on the kind of measure taken (Blok, 1995). On average investment costs could be up to about LE 500 per GJ saved (per year), depending on the measures implemented. Annual costs (depreciation + interest + O&M) of about half of the measures would be LE 25 per GJ or less. This implies that a 30% energy conservation in industry probably will lead to a Benefit-Cost ratio larger than 1.

Use of Cleaner Fuel in Industry

Switching from “dirty” fuels (oil, solid fuels) to clean natural gas will improve the air quality. It may also lead to improved energy efficiency in industries (as new gasfired installations will be more efficient than oil fired installations).

This policy can be characterised as follows:

- It addresses the wish of switching from relative dirty fuels (oil, solid fuels like coal and wood) to cleaner fuels (natural gas);
- It is limited to (fossil) energy inputs in the industrial sectors;
- The scope of this policy proposal is specific. It addresses certain types of liquid and solid fuels to be replaced by natural gas. This can only be achieved if:
 - o The gas supply infrastructure is extended to enterprises that currently have no access to natural gas, or are not connected to the gas network;
 - o The energy consuming installations are replaced or retrofitted for the use of natural gas;
- The way in which this policy proposal should be implemented is not specified, this may include all three major approaches: regulation, economic incentives and voluntary. Most likely is a mixture of regulation and voluntary compliance.

Currently, this policy measure is under implementation for some industries (brick factories for example). No concrete plans are published how to implement this policy in all industries.

To enable a CBA for this policy proposal, further quantitative specification of this policy must be made. At least it must be clear what quantitative target is aimed at in which time frame. This may for example be:

- 65% of industries currently using liquid fuels should be connected to the gas-network;
- A time frame may that in 2015 the overall objective is achieved.

To assess the costs and benefits of this proposal at least the following basic information will be needed:

- Current use of liquid fuels;
- Needed extension of the gas-network (and investments for that);
- Current energy input costs for the industries concerned and the alternative costs of the use of natural gas;
- Current contribution to air pollution of these industries (annual load, but also an estimate of the influence of these fuels to the concentrations of these pollutants to urban air pollution).

It may well be that in this case, the benefits of the fuel switch are even profitable for these industries without taking into account the additional benefits for society (due to lower levels of air pollution).

Also a choice must be made on the type of implementation: voluntary or mandatory. In case a voluntary approach is taken, it may well be that for the individual industry it may turn out to be more expensive than the current fuels used. This will also largely depend of the type of energy consuming equipment (and the technical state thereof) that is in use in industry.

Costs and Benefits of Fuel switch

The benefits of a shift from oil to gas in industry can be estimated assuming the following:

- Use of oil (in baseline) 750 PJ/year (2015);
- Oil replaced: 65% or 480 PJ /year (2015);
- Annual damage of industrial air pollution: LE 9.9 billion, of which at least 35% can be attributed to the use of oil: LE 3.5 billion. 65% of this would be avoided: LE 2.3 billion per year (2015);
- Also CO₂-emissions would be reduced by 10 Mton, leading to an additional benefit of about LE 1 billion;
- Total environment related benefits of the fuel switch would amount to approximately LE 3.3 billion per year;
- Apart from these societal, environment related benefits, fuel costs for industries would decrease (CIDA, 2005). The costs of heavy fuel oil (HFO) inputs in industry will be about LE 55/GJ, whereas natural gas would cost LE 20/GJ to industry³⁷. So each GJ of HFO replaced would save LE 35. If 480 PJ HFO would be replaced by natural gas, savings would be LE 16.8 billion/year.

The investment needed for gasification is difficult to assess. The energy input for “other industries” (see table 3.2) consists for 55% of oil (2006). So a large share of industry uses oil, probably about 17,000 enterprises (of which most are SME’s).

The investment in gasification would imply on the one hand an extension of the external gas-supply network (investment by the gas-company) and on the other hand renewal of kettles, furnaces, etc.

In the “Climate Change Initiative” project, funded partly by CIDA (CIDA, 2005), about LE 12 million in external gas infrastructure was invested to connect 50 brick factories to the gas network. About LE 30 million was invested for internal conversion costs. So the external network costs can be roughly estimated at LE 250,000 per connection, internal conversion costs at LE 600,000 per connection.

If these numbers are representative for all industries that would need to be converted (65% of 17,000 = 11,000 industrial establishments), total investments in the gas network would be LE 2.75 billion. Internal conversion costs would be LE 6.6 billion. Probably these numbers are an overestimation, as many enterprises will have lower annual energy input than brick factories.

But even if the estimated investment costs (LE 9.5 billion) are near reality, the costs of fuel switch would be offset by the annual savings of fuel costs and the avoided environmental damages.

³⁷ Heavy Fuel Oil costs US\$ 450 per ton (November 2009), natural gas \$ 3 per million BTU.

Use of Compliance Action Plans (CAPs)

Compliance Action Plans (CAPs) give enterprises more flexibility in the way they implement environmental regulations (see Punkari, 2008).

From a purely legal point of view, "rules are rules", so the result of the implementation of an environmental regulation would "automatically" occur, as soon as enterprises comply. In practice however, compliance with environmental regulations is often not 100%. This can be due to various reasons: unwillingness; lack of financial resources; implementation of environmental regulations has to be adjusted to investment-planning; unclear regulations; etc.

This policy can be characterised as follows:

- It addresses the problem of compliance with environmental regulations in industry: implementation of all environmental regulations for enterprises in a flexible³⁸, but consistent way. In some cases this proves to give better results than a strictly regulatory approach;
- CAP can - in theory- be applied to small, medium and large industries, However, given the information needs and procedures involved with a CAP, it seems more applicable to larger industrial establishments than for SME's;
- The scope of this policy is rather specific: it deals with the procedures by which compliance with environmental regulation is achieved in industries;
- As the policy aims at improving environmental permitting by CAPs, the way in which the policy is to be implemented is defined.

This policy proposal focuses on the procedures in the implementation stage of environmental policy. The main purpose is to increase compliance of industries with environmental regulations. As pointed out in section 4.4 more almost 60% of inspected establishments do not comply with environmental regulations. As the magnitude of the severity of non-compliance is not systematically reported, it is hard to draw any solid conclusion on this finding. It may well be that if all industries would comply with regulations, their pollution would be considerably less, but it may also be that most of non-compliant industries have minor violations of regulations (and thus their pollution levels would hardly differ from the compliant situation).

Costs and Benefits of CAP's

The costs and benefits of this policy measure depend on the level of compliance before and after implementing CAP's.

- In the case of non compliance the following costs and benefits can be distinguished:
 - o Costs for society would be the additional damage to environment (compared to the compliant situation);

³⁸ In the sense that the enterprise may apply for a grace period and active assistance can be expected from permitting authorities.

- Costs for the non-compliant enterprise would be the fines they have to pay; benefits would be the avoided investment and operational costs to comply with regulation;
- In case of compliance the following costs and benefits can be distinguished:
 - Benefits for society would be the avoided damages of non-compliance; costs would be the loss of income through fines;
 - Costs for the enterprise would be the additional investments and operational costs to comply with regulation.

As no factual information is available on the magnitude of additional pollution due to non-compliance, it is impossible to carry out an overall CBA for CAP's. But based on the "Cost Assessment of Environmental Degradation, sector note" (WB, 2002a) an indication of the potential costs and benefits of IPC compliance can be given.

Table A.3 - Indication of Cost and Benefits of compliance of industry with environmental standards through CAP's, in LE million

	Total damages	Avoided damages	Costs of remediation	B/C factor
Air	6,600	4,400	2,700	1.6
Water	800	600	500	1.2
Waste, non hazardous	1,300	900	900	1.0
Waste, hazardous	500	300	100	3.0
Total	9,200	6,200	4,200	1.5

Source: own assessment, based on a.o. WB, 2002a

The total damages due to air- and water-pollution are taken from table A.1. It is assumed that full compliance leads to a reduction of 2/3 of the damages. Total avoided damages are estimated at LE 6.2 billion/year (in 2008).

The costs of remediation are based on the World Bank estimate, but for both air and water pollution, costs were multiplied by a factor 2.9 (to express economic growth between 1999 and 2008). Only remediation costs for industry (from World bank, 2002a) are taken into account (for air it is assumed that 35% of cost relate to industry). Total annual remediation costs are estimated at LE 4.2 billion. This number should be increased with the administrative costs of CAP, which might be several LE 100 millions³⁹.

This indicative calculation shows that in general, the benefits of compliance would outweigh the costs by a factor 1.5 (or 1.25 if CAP costs are included).

Implementation of PROPER

PROPER aims at persuading industries to reduce their emissions beyond compliance. Implementation of the PROPER system would put a voluntary pressure on the participants to improve their environmental performance continuously.

³⁹ if 60% of all 30,000 industries would implement a CAP-procedure

This PROPER policy proposal can be characterised as follows:

- It is applicable in case of all environmental regulations for all compartments;
- In principle, it applies to all industries that want to participate;
- The scope of the policy proposal is well defined and specific, in the sense that it focuses on continuous improvement of environmental performance beyond compliance;
- The way in which PROPER can be implemented is clear: by means of applying the system periodically by the industries themselves and publish the results.

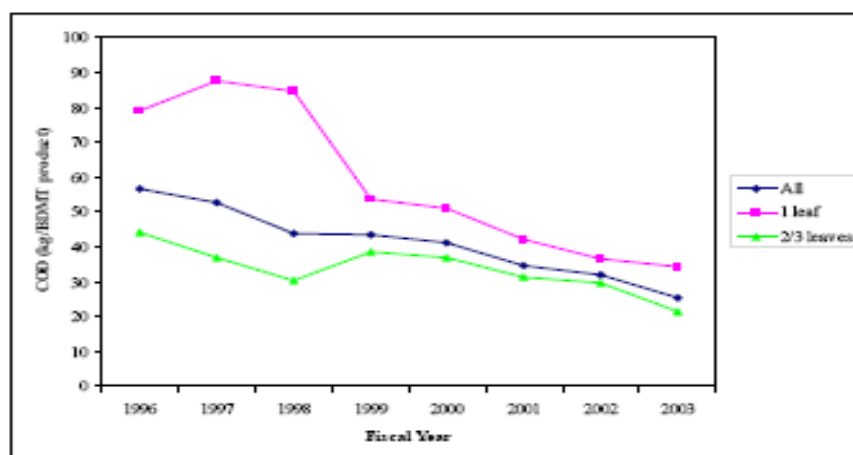
Costs and Benefits of implementing PROPER

The costs and benefits of implementing PROPER are the following:

- For the industries (and for public authorities), the additional administrative costs are almost zero. In a few hours (if environmental records are kept), the system can be applied and results are available;
- As soon as PROPER challenges an industry to improve environmental performance, it is clear that additional investments have to be made. As these investments would (in principle) be voluntary (as they are above standards), the industry can make their own cost-effective assessment of which investments (or actions like “good housekeeping”) are most effective and efficient;
- For society, the benefits of PROPER depend on the effectiveness of application of the system by industries. Does it actually lead to reduced pollution?

An indication of the effectiveness of PROPER is shown in the next figure:

Figure A.1: Annual unweighted average discharge of COD from 22 paper and pulp plants in India



Source: EfD, 2008b

This Figure shows that the application of PROPER in the paper and pulp industry in India has led to a continuous improvement of the environmental performance of the participating companies.

Also reports from China and Indonesia show that the system triggers IPC in participating industries (World Bank, 2002b; Resources for the Future, 2000).

Link the Level of Environmental Fines with the Level of Environmental Damage Caused by Pollution

This policy proposal aims at a better enforcement of environmental laws, by making it more expensive for non compliant industries to continue with non-compliance. The hypothesis behind this policy is that currently industries do not obey the environmental law as non-compliance is cheaper than compliance.

If fines are set at levels linked with the environmental damage caused by the pollution, there is an economic stimulus for these industries to comply with laws and regulations.

This policy proposal can be characterised as follows:

- It is applicable in case of all environmental regulations for all compartments, as far as it is possible to put a “price tag” on the damage caused by the pollution;
- In principle, it applies to all industries that may be involved in court cases due to non-compliance with environmental regulations;
- The scope of the policy proposal is well defined and specific, in the sense that it focuses on a specific part of (overall) environmental policy to ensure compliance: the legal prosecution of non compliance with environmental regulation;
- The way in which such policy can be implemented is more or less clear: by means of estimating the environmental damage, the level of fines can be determined. It is clear that this would need further consideration (for example: how many non compliant environmental situations in industries are actually prosecuted?).

Costs and Benefits of Environmental Fines in accordance with the Level of Environmental Damage Caused by Pollution

From a purely economic point of view any industry aiming at cost minimization would take the following “costs” into account:

- The actual costs of compliance (investment in purification, operation thereof properly, etc.). These costs can be avoided by non-compliance;
- The chance to be prosecuted (depends on number of inspections and quality of inspections);
- The legal costs of prosecution (lawyer, legal taxes, fines);
- The time it takes the authorities to enforce compliance.

If an industry can postpone an environmental investment or improvement for several years at low legal costs, this “non compliant” behaviour may be very profitable for the industry. If the fines and the chance of being prosecuted are set at a high level, the industry knows that if it is prosecuted, it will lose all its’ illegally made profits (of avoiding an investment or any other compliant behaviour that saved

costs) and also has to compensate for environmental damage. This may influence compliance behaviour of industries.

In this case, applying CBA has a double or even triple dimension:

- For the non compliant industry, their behaviour is the result of a narrow CBA (at business level);
- For each case prosecuted, costs and benefits for both the non compliant industry as well as for society will be weighted;
- Finally, at societal level, this way of prosecution may lead to improved compliance and thus less pollution, which can be economically valued.

The following information would be needed to assess costs and benefits of this policy:

- An indication of the improved environmental behaviour of industries as a result of such a system. To do so, one needs to know current practice, proposed future practice, an indication of the profits of non compliance for an industry;
- An assessment of the damages caused by non compliance and the reduction thereof due to this policy;
- An assessment of the costs of such a change in the legal prosecution of non compliant industries. What does it take for prosecutors to estimate the “profits of non compliance” and the “environmental damages caused during the period of non compliance”?

As the above mentioned information is not available, no CBA can be carried out for this proposal.

Introducing load Environmental Based Permits in Addition to Concentration Based Permits

The idea behind this policy proposal is that if only concentrations of pollutants (in flue gasses, waste water) are used in permits, no consideration is given to the total annual pollution load caused by an industry. So for smaller and larger establishments, the same standards apply, whereas the pollution loads may differ by factors. There are various reasons why total loads can and should also be taken into account, especially for larger polluting sources:

- If the concentration standard is based on what is achievable for small sources, it may well be that opportunities for further reduction for larger sources are simply not applied as they are not required;
- Local conditions or a national strategy may urge for further reductions than will be achieved by applying concentration standards;
- It would allow environmental authorities to focus most of their efforts on the largest sources of pollution (assuming that for smaller installations/sources harmonised standards apply);
- The cost-effectiveness of certain targeted pollutants can be improved;
- Potentially, a higher level of environmental protection can be achieved.

But there are also problems to be solved before load based permits can be introduced:

- How to avoid arbitrary judgements by permitting authorities? In other words: how can transparency be safeguarded?
- How to deal with a fast growing production facility?

At least, this way of permitting requires that the staff of the permitting authorities is sufficient qualified to assess the potential of environmental technologies (in relation to the production processes).

This policy proposal can be characterised follows:

- "Better focussed environmental permitting" in all environmental domains;
- It focuses on all larger industrial sources causing pollution;
- Specific in the sense that the policy aims at changing the permitting process for larger industries;
- How it should be implemented exactly needs to be determined, but the direction is clear.

Costs and Benefits of Load based environmental permits

At least two (theoretical) benefits of such policy can be identified:

- Higher level of protection of the environment, which can be valuated in monetary terms;
- (Potentially) cost-effectiveness gains for industries (as a whole). This can be estimated by comparing the costs of load based permits with the alternative costs to achieve the same level of environmental protection by applying concentration standards.

Information to assess potential costs and benefits of such policy includes:

- An indication of reduction objectives for water, air and soil/waste pollution and the role industry should play in it.
- Current and projected amounts of pollution, and the share of larger sources in this pollution;
- The way in which such permitting is implemented;
- Cost functions for the abatement of pollution in industry (small, medium, large) for some main pollutants.

As the information needed to assess costs and benefits of this proposal is lacking, only indications can be given of the costs and benefits of load based permits.

If it is assumed that due to load based permits the EEAA would manage to keep environmental pollution at the 2008 level, in stead of a growth of emissions due to increased production, the benefits of this policy would be the difference between the environmental damages caused by industry in 2015 minus those of 2008. In the next table an indication of these additional benefits⁴⁰ is given:

40 the benefits are additional, as in case of concentration standards, the level of environmental damage would be higher. The avoided damages are additional to the benefits of compliance with current environmental standards.

Table A.4 – Indication of Benefits of load based permits by comparing environmental damage caused by industry in 2015 with 2008, in LE million

	Projected Damages 2015	Damages 2008	Benefits of load based permits, difference
Air pollution	9,900	6,600	3,300
Water pollution	1,300	850	450
Waste	2,700	1,800	900
Total	13,900	9,250	4,650

Source: own assessment, based on a.o. WB, 2002a

The indicative assessment of additional benefits of load based permits shows that the benefits are in the order of LE 4-5 billion per year in 2015, if load based permits lead to a “stand still” of industrial pollution.

The magnitude of the costs to achieve this level of environmental protection cannot be assessed in an easy way, but from the indicative CBA for CAP’s one may conclude that the additional costs would be in the order of 65% of benefits: LE 3 billion per year.

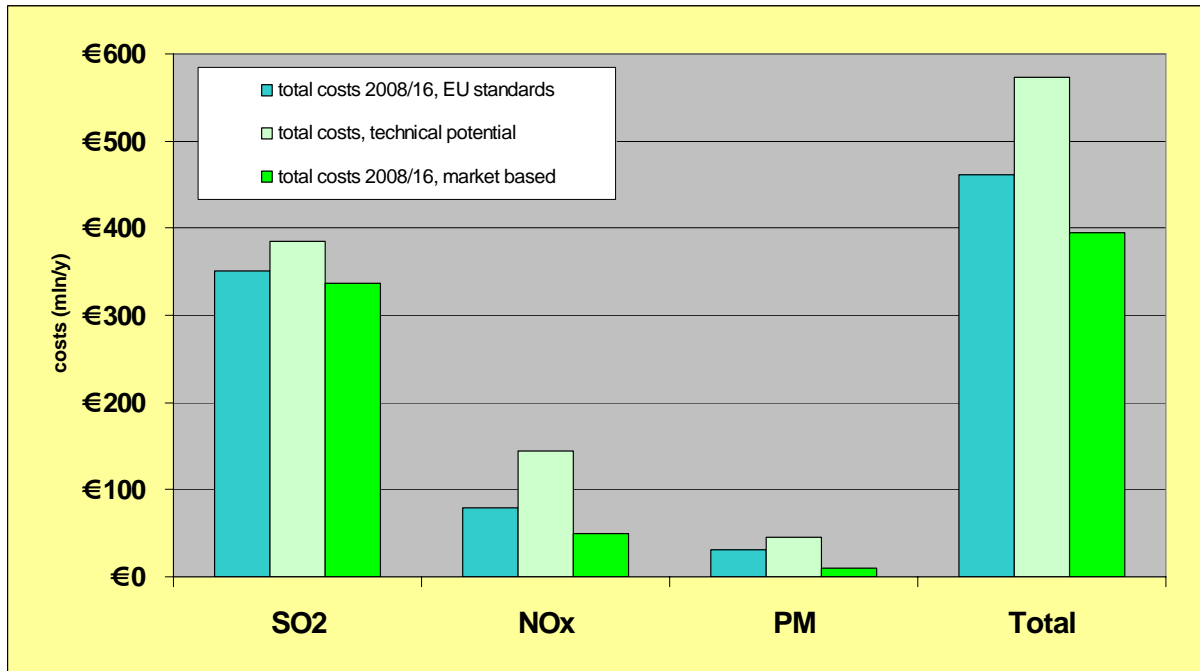
Load based permits may also lead to a more cost-effective solution of reducing pollution:

- In case of stricter standards (than the current standards), in order to achieve that industrial pollution in total does not increase between 2008 and 2015, smaller sources of pollution would have to make higher investments per unit of pollution abated than larger sources⁴¹;
- If load based permits are applied in an optimal sense, more pollution could be abated by larger sources (at lower costs) and smaller sources could be spared.

Various studies show that a market based approach could lead to a more optimal distribution of abatement costs. An example of the potential cost-savings of market based approach (where permits are based on loads) compared to an regulatory approach based on emission standards is shown in the next figure.

⁴¹ In general, larger sources have lower costs of pollution abatement per unit of pollution,

Figure A.2 – Estimated additional annual abatement costs for implementing EU standards, technical maximal potential and market based approaches, for Large combustion plants in Turkey



Source: Janrzen, 2006, Figure 5.9

In this figure, the abatement costs for power plants are shown for 3 situations :

- Total annual costs, applying the EU concentration standards for power plants (blue bars);
- Total annual costs of the full technical potential (light green bars);
- Total annual costs of market based approach (using loads based on traded emission permits).

The analysis shows, that in the case of Turkey's power plants, compared to rigid EU standards, a market based approach could save about € 50 million per year (≈LE 400 million).

So a clever implementation of environmental policy can also save on abatement costs for the industries addressed.

ANNEX II OVERVIEW OF IPC PROJECTS IN EGYPT IN THE PAST AND FUTURE

To get an indication of the magnitude of the IPC projects in Egypt, from various documents the following table was constructed. This table gives an indicative, non-exhaustive overview of IPC projects in Egypt that have been completed and that are in the pipeline.

Roughly estimated, about 13,000 enterprises/projects are or will be financed through various channels, with a total investment of about LE 8 billion.

Table II.1- Indicative overview of estimated investments in Industrial Pollution Control projects in Egypt between 1996 and 2015

Period	Funding	Description	Number of Projects	Estimated Investment (mln LE)
1996 2008	KfW	Public Business Sector Environmental Protection Fund	54	182
2000	EPF+own	The Iron & Steel Company, New Electr. Control System Blast Furnace 3	1	45
2000		Oil Products Company Used Oil Recycling	1	2
2000		Sherbeen City Government Slaughterhouse Modernization	1	1
2001	EPF+own	Unknown	1	1
2002	EPF+own	Unknown	11	2
2003	EPF+own	Unknown	2	8
2004 2007	CIDA+own	Brick-manufacturing factories, Qaliubya, convert from oil to gas	50	45
2008 ->	EPF + own	Brick-manufacturing factories, Qaliubya	12	10
2008 ->	EPF + own	Brick-manufacturing factories, Giza	400	300
2002 2008	EPF + own	ACI FEI	66	64
2004 2008	US AID	Shobra El Khaima, lead contamination	5	50
2005 2009	WB GEF	Solar Energy Al Korymat area.	1	750
2005 2008	UNDP	Halon management bank	1	1
2005 2010	UNIDO	CFC's solvents	1	1
2006 2008	WB GEF	CDM, nitrous acid emissions in fertilizer industry	5	135
2007	EPF + own	CP Project	22	40
2007 ->	EPF + own	Relocating and Developing SMEs, Potteries Cairo	179	35
2007 ->		Relocating and Developing SMEs, Potteries Cairo	29	6
2007 ->		Relocating and Developing SMEs, Smelters Qaliubya	99	19
2007 ->		Relocating and Developing SMEs, Smelters Giza	41	8
2007 ->		Relocating and Developing SMEs, Smelters Cairo	569	112
2007 ->		Relocating and Developing SMEs, Kilns Qaliubya	166	33
2007 ->	EPF + own	Relocating and Developing SMEs, Marble workshops and Stone Crushers, Cairo	250	49
2007 ->	EPF + own	Developing SMEs, Quarries activities, Giza	294	58
2007 ->		Developing SMEs, Quarries activities, Cairo	50	10
2007 ->		Developing SMEs, Quarries activities, Qaliubya	3	1
2009 ->		Developing SMEs, Mining	1206	237
2009 ->	EPF + own	Relocating and Developing SMEs, Textile	6000	1178
2008 2009	EPF + own	CP Projects	32	32

Industrial Pollution Control Policies in Egypt

Period	Funding	Description	Number of Projects	Estimated Investment (mln LE)
2008 2009		ACI EMG Fund	31	31
2009 2010		CP Projects	52	52
2009 2010		ACI EMG Fund	29	29
2007 2012	WB GEF	Industrial Pollution Prevention Project 2, Qaliubya	35	294
2007 2012	JBIC EIB	Industrial Pollution Prevention Project 2, Alexandria	20	459
2007 2012	AFD	Industrial Pollution Prevention Project 2, Cairo	139	1057
2007 2012	Finland	Industrial Pollution Prevention Project 2, Giza	6	127
2008 2012	KfW+own	Environmental Protection Project for Private, Public Business and Industrial Sectors	50	419
2009 2015?	WB GEF	CDM projects	3000	2299
1996 2015		Total (indication)	12914	8181

Sources: MSEA/EEAA, 2001; ESP, 2007b, p. 22-23; CIDA, 2007; MSEA, 2007; MSEA, 2008; EEAA, 2008; EEAA, 2009a