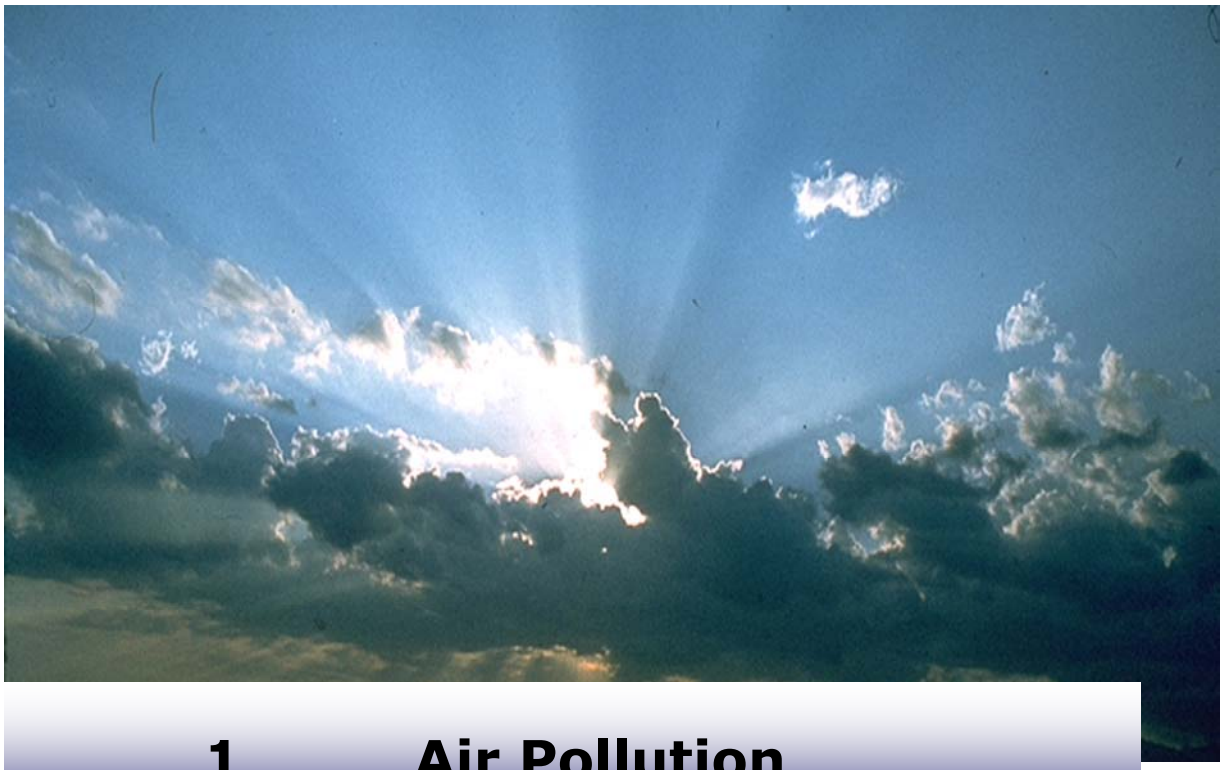


1 Air Pollution

Introduction

Environmental action in Egypt encounters numerous challenges that made it imperative to apply traditional and non-traditional techniques to bridge the gap between the quality of life Egyptians aspire to and that which they really get as a result of ongoing pressures affecting their environment. Harmful emissions into the air represent an environmental pressure that reflects negatively on man's health and productivity; thus leading to a real loss in the national economy.

The multiple sources of air pollution and the heavy load of pollutants are but a normal consequence of accelerated economic growth Egypt witnessed over the past three decades. Higher rates of air pollution are becoming strongly correlated with economic progress. Therefore, the Arab Republic of Egypt has paid special attention to monitoring and reducing such emissions through concerted efforts under taken at both national and international levels alike.

Sources of Pollution

Egypt's climate is an important factor in increasing the pressure of air pollution. Egypt is located in a dry area where precipitation rarely occurs and surface winds are inactive almost all the year round. In addition, heat reflection, resulting from seizure of pollutants within the air layer in juxtaposition with ground surface, causes episodes of acute air pollution, especially during autumn, commonly known as "the black cloud".

Land topography also reflects on air pollution. Desert accounts for more than 90% of the area of Egypt, thus leading to a high concentration of dust in the air as wind blows onto inhabited areas from the neighboring desert lands.

Air pollution increases with the growing socio-economic development. The number of vehicles increases over time. They have already exceeded 3.5 million vehicles in 2005, or 10% annually. This, indeed, is a high growth rate, especially if we take into account the fact that a large number of vehicles are not scraped before the lapse of three folds of their presumed productive age.

Vehicles, including motor-bikes, are the major source of air pollution. Almost two thirds of carbon monoxide and 50% of hydrocarbons and nitrogen oxides that pollute the air are attributed to fuel combustion.

Industrial zones, especially in Greater Cairo (Helwan, Shoubra Elkhaima and El Tibbeen) and numerous other areas abound in various industries, in addition to widespread small industries within the populous mass.

Over-population is a major factor in generating air emissions. Certain polluting industries have particularly increased as a result of population growth, such as cement and construction industries, to fulfill the needs of a growing population including housing and public utilities. Such a state of affairs has been accompanied by an increased volume of solid waste, disposed of by burning in the open air, thus adding more damage to injury.

Over-population resulted in an effective demand for electricity by industries, municipalities and new cities. Again, power generation implied over-use of petroleum fuel at power stations.

Within the Cairo Air Improvement Project, the EEAA conducted a study in 2001 which concluded that solid municipal waste burning in the open air accounts for 36% of the total annual load of pollution with suspended chest particles in Greater Cairo air. Exhaust accounts for 26%, whereas industrial emissions and agriculture waste open burning account for 32% and 6% respectively.

Harmful Effects of Air Pollution

Environmental Monitoring & Workplace Environment Study Center of MOHP, has, in collaboration with the Department of "Community Medicine, Environment and Industries Medicine" of Ain Shams University, conducted a field study to explore the relationship between air pollution and mortality rate as a result of cardiac and respiratory diseases in Egypt, from 1995 through 2001, and cardiac and respiratory disease incidence rates from 1999 through 2001. The study revealed the relationship between air pollution waves and rates of hospitalization as a result of those diseases.

The study concluded that there exists a positive relationship between increased pollution with suspended particles and sulpher dioxide$_2$, on the one hand, and the high rate of mortality from cardiac and respiratory diseases, on the other. A weighted relationship was also found between smoke pollution rates and mortality resulting from lung cancer.

Heart and respiratory disease incidence rates were proven to have been related to both causal agents (suspended particles and smoke). The same was true for acidic oxides and lung diseases.

Air Quality

Air pollutants in Egypt are monitored by the National Network for Monitoring Air Pollutants (NNMAP). NNMAP has 54 stations covering most of the regions exposed to air pollution hazards. Greater Cairo alone is covered by 20 stations to monitor Sulphur Dioxide (SO_2),Nitrogen Dioxide

(NO_2),Ozone(O_3),Carbon Monoxide (CO), black Smoke (BS) and Particulate Matter PM_{10}. The network was initially established in 1999, with 42 stations. Later, renovation works were undertaken and 12 new stations were added (6 in 2004 and 6 in 2005) to cope with the progressive increase in the sources of pollution. see map (1-1) and table (1-1).

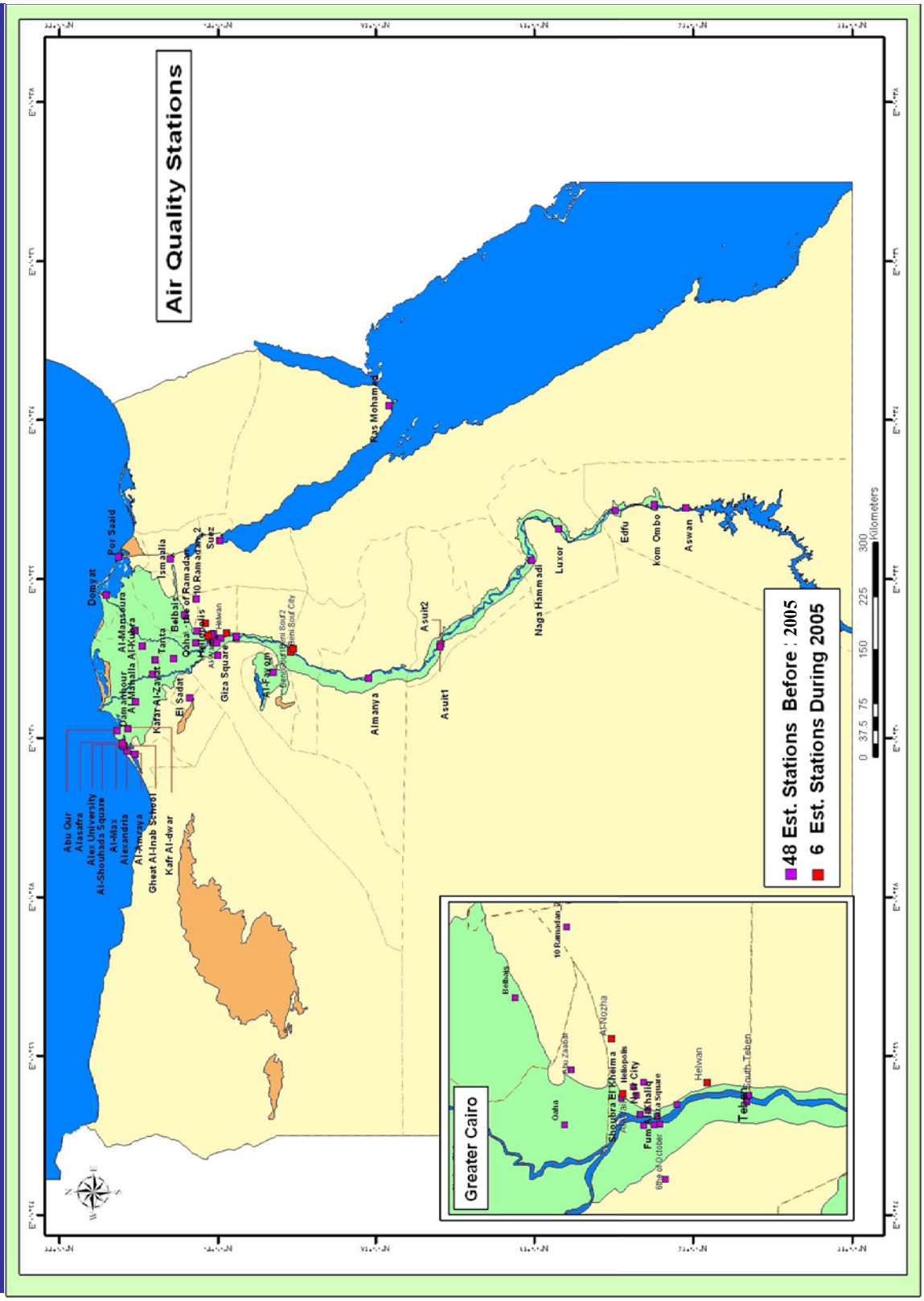
Ministry of State for Environmental Affairs regularly upgrades NNMAP within the framework of a comprehensive system, observing international standards of air pollutant monitoring systems.

Table (1-1) Monitoring Stations & Nature of their sites

Location	Greater Cairo	Alex	Delta	Upper Egypt	Sinai& Canal Cities	Total
Industrial	4	3	3	3		13
New Communities	2	1	3	7		13
Residential Areas	6	2	2	2		12
Traffic dense Areas	5			1		6
Remote Areas	1	1		1	1	4
Areas of Mixed nature	2	1	2	1		6
Total	20	8	10	15	1	54

Cement industry has a direct impact on the quality of air in the surrounding areas. MSEA has, therefore, established a system to monitor dust emissions from these factories around the clock. The operative system measures factory compliance with Environment law No. (4) / 1994. The 15 cement factories are continuously monitored for detection of any violation the very moment it takes place. In 2005, 164 violations were monitored and legal actions have been duly taken vis-à-vis those violating companies. see figure (1-1).

Map (1-1) Air Quality Monitoring Stations in Egypt



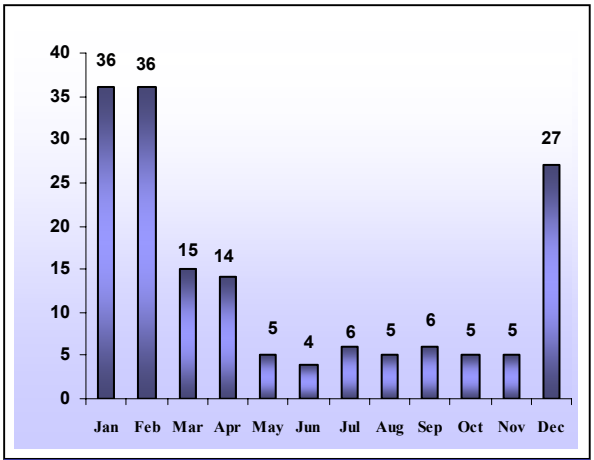


Figure (1-1) Number of violations monitored by the National Network for Monitoring Dust Emissions from Cement Factories in 2005.

Figure (1-1) indicates that violations increased during winter season (Dec., Jan., and Feb.), most probably because some companies, during that time of year, have been implementing their maintenance and replacement works for dust filters to comply with the new standerds stipulated in the amended Executive Regulations of Law No (4) / 1994 which was published in Oct., 2005 and which reduced the maximum limit of dust emissions from cement factories from an earlier level of 500 µg/m^3 to 300 µg/m^3.

Indicators of Ambient Air Quality in Egypt

Pollutants measured by EMNs (Environmental Monitoring Networks) are divided into: **primary pollutants** resulting from industrial production or traffic density, such as Sulphur Oxides, Nitrogen Oxides, particles matter and carbon monoxide; and **Secondary Pollutants** resulting from interactions among primary pollutants or between them and other chemical compounds existent in the air such as ground ozone.

Following are some results on air quality indicators in 2005, based on monitoring data collected from the stations during that year table (1-2).

Table (1-2) Annual Average of the concentration of Major Pollutants in the Air, as measured by the Monitory stations 2004-2005

Location	Pollutants							
	SO_2		NO_2		Chest Particles >10 micron		Black Smoke	
	2004	2005	2004	2005	2004	2005	2004	2005
Qulaly	66	121	67	79	163	97		-
Nationwide	32	59	63	58		178		-
Abasseya	28	36		-	95	105		-
Nasr City	9	12	55	62			43	42
Maadi	46	27	64	42				-
Tibbeen	19	19	29	31	107	82		-
South Tibbeen	18	-					58	51
Fum El-Khalig	42	40	73	58	185	112		-
Shubra El-Khaima	61	86	40	37	167	116		-
Giza	27	29	53	57				-
Qaha			34	37	91	85		-
6th October	4.4	5	12.2	14			26	37
10th Ramadan	4.5	5					23	49
Suez		20	36	36				-
Luxor	12.4	11					46	58
Kum Umbo	144	89				278	294	144
Aswan	28	35						-
El-Max	6.1	-	34	30			23	30
Alexandria 1	8	13	38	48	57	99		-
El-Assafra	3.8	3					18.7	13
Ghiet El-Enab	5.2	8	29	33		37	20	55
Kafr El-Zayat	16	24	25					
Tanta	5.4	5				157	48	47
El-Mahalla	8	4			44			
El-Mansoura	19	8	25	20				-
Damietta	5.2	3				63	45	52
Kafr El-Dawar	5.3	6				132	46.5	28
El-Shuhadaa	21	18	85	58		59		-
Annual Maximum limit stipulated in the by laws of law No.4 of 1994 .	60 µg/m^3		40 µg/m^3		70 µg/m^3		60 µg/m^3	

* There is no annual average of the allowable concentrations in Law (4) / 1994 for NO_2. WHO limit has been used.

Sulfur Dioxide (SO_2)

Sulfur dioxide is often a product of oxidizing sulphur residues of liquid petroleum fuel during combustion in the stationing sources (e.g. power stations and factories) or the mobile sources (e.g. vehicles), especially those operated by solar .

Figure (1-2) Illustrates the following with regard to air quality indicators for SO_2.

1. Egypt's average annual concentration in 2005 did not, at 88% of the monitoring stations, exceed the limit defined legally in the by-laws of law No.4 / 1994 concerning Protection of the Environment.

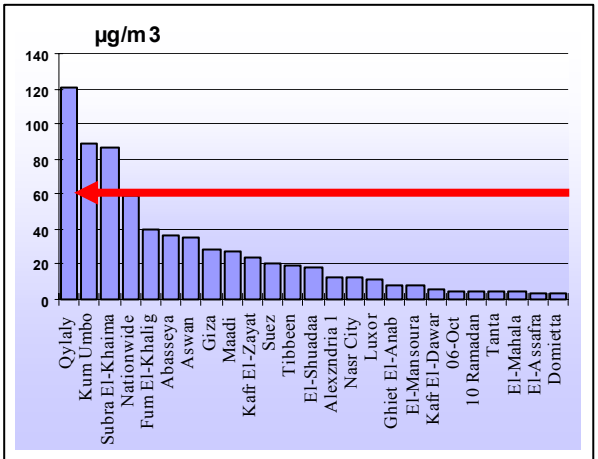


Figure (1-2) Average Annual Concentration of SO2 in 2005

2. Comparing this year's results with those of 2004 figure (1-3), it appears that residential areas have improved by 13% on whole, despite the fact that, in many Greater Cairo locations, SO_2 concentrations have significantly increased by 34%;
   - The percent increase in Guiza Governorate is estimated at 8%.
   - The percent increase in Qalyubia Governorate is estimated at 40%.
   - The percent increase in industrial areas reached 16%, mostly in shoubr al khaima of Qalyubia Governorate and Kom Umbo of Aswan Governorate.
   - The percent increase of SO_2 in traffic dense areas is 50%. However, the annual limit stipulated for in the Executive Regulation of the Environment Law is not exceeded except in one location (Qualaly).
   - The increases in SO_2 concentrations in 2005, compared to 2004, is largely attributed to the use of mazot at some power stations at the expense of natural gas, Monitoring fuel consumption at power stations indicated that lesser volumes of natural gas were used as a result of low supply during the first half of 2005, resulting in greater dependence on mazot which produces SO_2 emissions. Industrial and traffic dense areas were affected more than the residential areas due to the presence of additional sources of pollution therein.

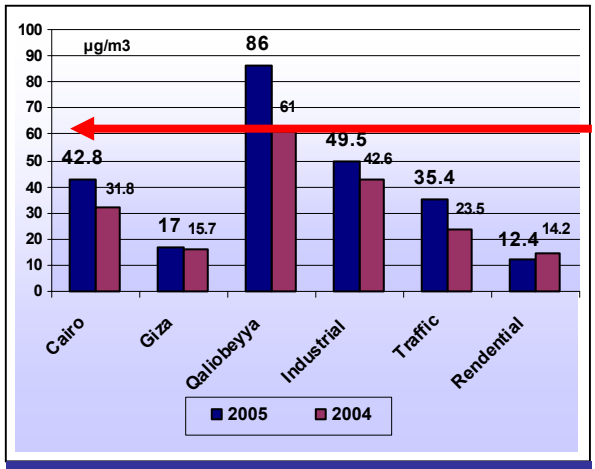


Figure (1-3) Comparing Total Average of SO_2 (2004-2005)

Nitrogen Dioxide (NO_2)

Nitrogen oxides are the product of fuel combustion under high temperature. The by-laws – Executive Regulation- of Law No. (4) / 1994 did not set a maximum limit for NO_2. Applying the WHO standards ($40\mu g/m^3$) , it becomes evident that seven out of fifteen sites have exceeded the WHO limit in 2005.

Figure (1-4) illustrates the following with regard to air quality indicators for NO_2:

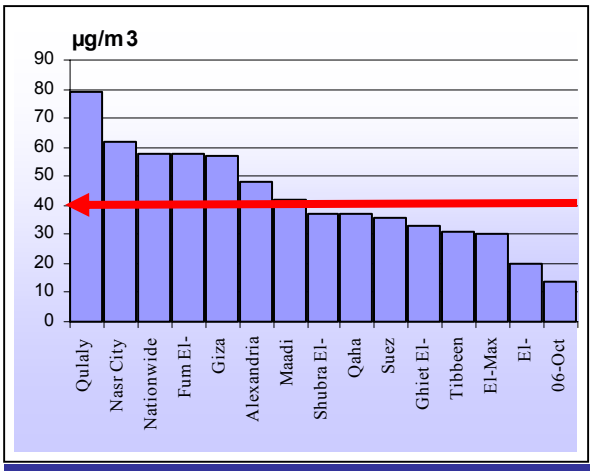


Figure (1-4) Annual Average of NO_2 in 2005

1. NO_2 annual average concentration in 2005 has exceeded the maximum annual limit of the WHO by almost 50% of the monitoring sites nationwide. Most of the increases were recorded at traffic dense areas, thus proving the positive correlation between the increase in NO_2 concentration and car exhausts.
2. Comparing this year's NO_2 nationwide monitoring findings with those of the preceding year (2004), figure (1-5) illustrates the following:
   - In traffic dense areas, the percent increase reached 15%, mostly attributed to the increase in the number of vehicles and subsequently the volume of fuel used.
   - Industrial zones have achieved a 4.8% improvement, mostly attributed to the application of more efficient industrial techniques for fuel combustion.
   - Maadi monitoring station has successfully recorded a 34% improvement, mostly attributed to tight control over slum areas at Batn el Baqara and to the initiation of a special program for the development of El-Fawakhir area of Misr El-Qadimah (Old Cairo).

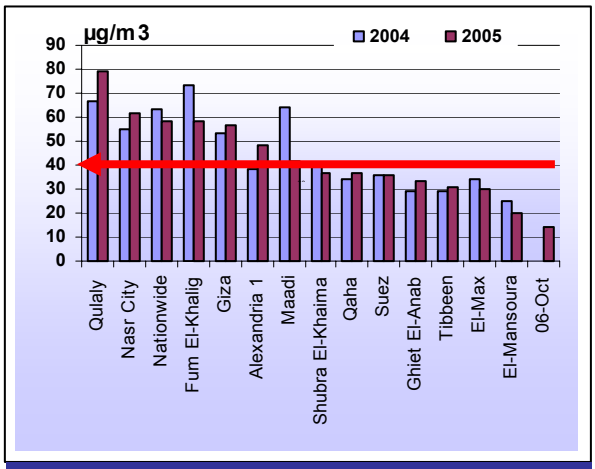


Figure (1-5) Average Annual Concentration of NO_2 (2004-2005)

Black Smoke

The main sources of black smoke pollution are: burning solid waste in the open air and the incomplete combustion of vehicle fuel especially mazot. Air quality indicators for the black smoke illustrates the following:

1. The average annual concentration of smoke in 2005 did not exceed the maximum limit (60 $\mu g/m^3$) stipulated for in the by-laws of law No. 4 / 1994, except in Kom Umbo in Upper Egypt see figure (1-6).

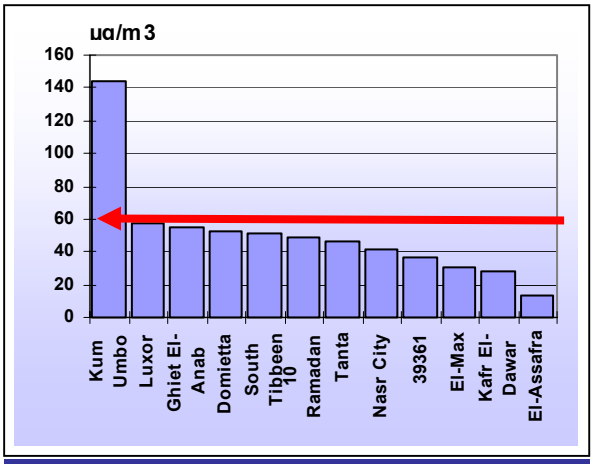


Figure (1-6) Annual rate of black smoke in 2005

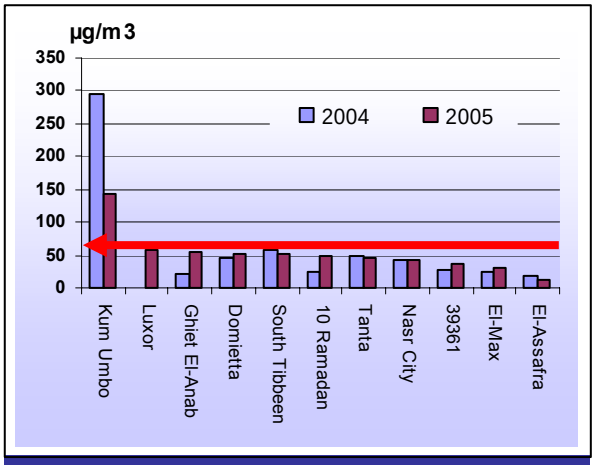


Figure (1-7) Comparison of the average annual concentration of black smoke (2004 – 2005)

2. Comparing this year's monitoring 2003 findings with those of the preceding year (2004), figure (1-7) indicates the following:

   - Industrial zones have recorded a per cent improvement of 40% . Although concentrations were high in certain monitoring sites, others recorded much lower ratio (e.g. Kom Umbo).
   - In residential areas, the per cent increase reached 4.4% (e.g. El-Max/ Alexandria, 6th of October and 10th of – Ramadan cities). However, the maximum limit, stipulated for in the by – laws of law No. (4) / 1994, was not exceeded in any of the monitoring sites erected in the residential areas. The most probable reason for improvement is the strict control and inspection of the informal industries located within the residential areas and the initiation of a program for transferring such polluting industries outside the populous mass.
   - In Nasr City of Metropolitan Cairo, which represents traffic dense areas, smoke monitoring has improved by 2%.

Suspended Chest Dust
(causing lung problems)

In recent years, more focus was placed on concentrations of suspended particles, especially those the diameter of which is less than 10µm and which are highly hazardous to public health. If inhaled, they eventually settle inside the lungs and cause numerous health complications.

Those very fine particles recorded high concentrations in 2005 in most of the monitoring sites, despite the fact that the maximum allowance cited in the Law has been raised from 70 µg/m^3 to 150 µg/m^3 as a daily average and the 70 µg/m^3 as a maximum annual limit see figure (1-8).

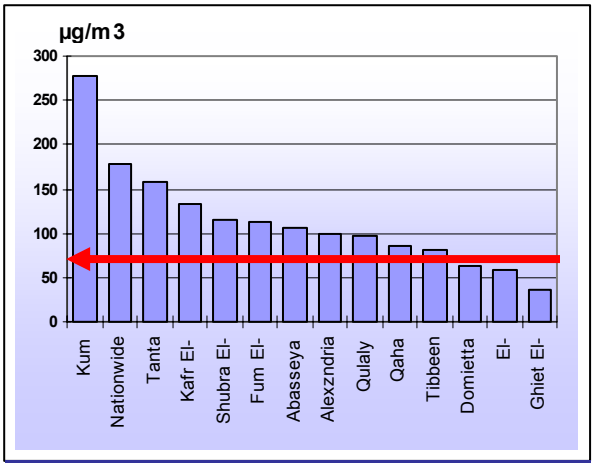


Figure (1-8) Annual rate of suspended chest dust in 2005

Indicators of air quality for the suspended chest dusts revealed the following:

1. The annual average concentration of suspended chest dusts of less than 10 µm have recorded high ratio in most of the monitoring sites nationwide on most of the monitoring days. This was also true for Greater Cairo. However, some improvements have been recorded, compared to earlier years, as industrial installations are using dust filters (e.g. cement factories).

This could also be attributed to the efforts MSEA has been exerting to control garbage burning in the open air. The Ministry has also removed historical accumulations of garbage throughout Greater Cairo. In 2004 and 2005, about 14 million m^3 of solid waste inside Greater Cairo have been transferred to the covered public dumping areas to prevent any possible self – burning. As a result, garbage burning in the open air has decreased in 2005, compared to previous years.

2. Comparing the 2005 findings with those of the preceding year regarding chest dusts of less than 10 µm figure (1-9), it becomes evident that the per cent improvement in traffic dense locations, reached 19.2%. In El-Tibbeen. Industrial Area, per cent improvements recorded 15. 8% as a result of stricter control and inspection measures on emissions of factories in this particular zone, especially for cement factories.

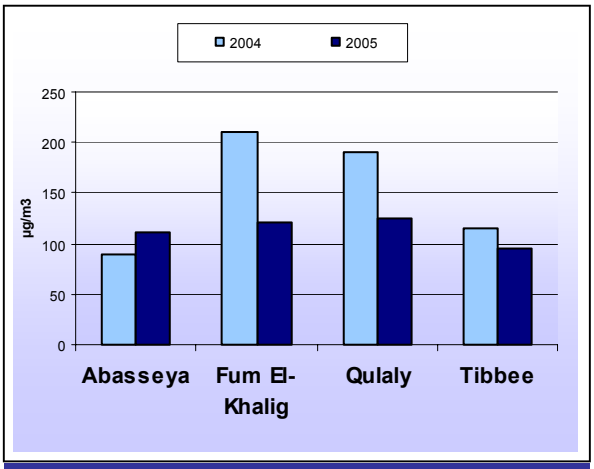


Figure (1-9) Annual average of chest dust concentrations in some monitoring stations in Greater Cairo (2004-2005)

Lead (Pb)

Man's exposure to pollution with lead (Pb) takes various forms. Inhaling lead- polluted air or eating lead- polluted food are but few examples. Inhaling air-polluted with suspended lead particles is the most common source of pollution. As a result, the level of this poisonous element (lead) increases in man's blood in the course of time through the respiratory system. Lead damages the digestive system, immunity system, kidneys, liver and blood vessels . It is quite evident that children's bodies absorb it at percentages much higher than adults; thus becoming more exposed to its detrimental effect.

Results taken from all the lead-monitoring stations indicate that lead has exceeded the maximum limit defined in the Executive Regulation of Law (4) / 1994 figure (1-10). The Regulation was amended to reduce the

maximum limit permissible for residential areas to 0.5 µg/m^3 and for industrial areas to 1.5 µg/m^3 , instead of 1.00 µg for all areas whether industrial or residential.

Lead concentrations in 2005 have, however recorded remarkable reductions, compared to the 1999s (3.6 µg/m^3). In residential areas, they recorded 1.01 µg/m^3 , compared to 2.31 µg/m^3 and 1.09 µg/m^3 for industrial and traffic dense areas respectively figure (1-10). This is attributed largely to the State's efforts to reduce lead concentrations, mainly through promoting the use of lead-free benzene and transferring lead foundries in Shoubra El-Khaima outside the populous mass.

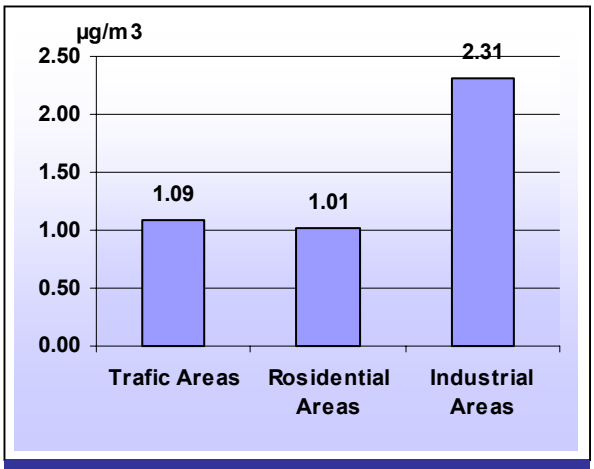


Figure (1-10) General Annual Average of Lead Concentrations, 2005

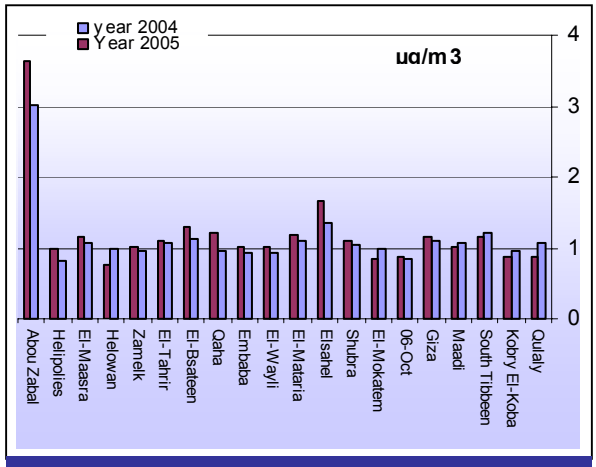


Figure (1-11) Lead's Annual Concentration Rates in 2004 and 2005

Figure (1-11) compares lead concentrations monitored during 2004 and 2005. It indicates that there was a slight increase in 2005, compared to 2004. This is attributed to the increase in industrial activities and a higher level in fuel consumption at most of the monitoring sites. A relatively higher increase was recorded at Abu Za'ba1, resulting from the transfer of lead foundries from Shoubra Elkhaimah to Al-Safa industrial zone at Abu Za'bal, thus increasing the concentration of pollutants at that area.

Severe Air Pollution Episodes in Cairo Skies

Acute air pollution waves, commonly known as "the black cloud", constitute a major phenomenon that is becoming almost chronic since 1999 especially in Cairo sky. It particularly becomes phenomenal after sun set and until early morning. The cloud's density varies from one year to another.

Causes of Acute Air Pollution

Specialists and experts of EEAA and various research systems have studied the black cloud and concluded that numerous factors contribute to its occurrence:

- High quantities of pollutants in Cairo air;
- Occurrence of certain climatic conditions, known as "Heat Reflection"; and
- Cairo topography.

1. There are various sources for polluting Greater Cairo air. Pollution resulting from industry, various means of transport and solid waste burning in the open air are just few examples. Following is an overview of the major sources of pollution in Greater Cairo:

   A. **Industry**: Data generated by the General Authority for Industrialization indicate that Greater Cairo houses almost 50% of Egypt's industrial installations. Most of the industries are concentrated in Helwan and Shobra El khaimah, namely Iron and Steel, Spinning and Weaving, Vehicles, Cement, Chemicals, Oil refineries, Fertilizers, Bricks, Ceramics, Metal Industries and Foundries. The number of Factories registered in Greater Cairo is estimated at about 13608 installations, out of which 13084 are small and medium-sized industrial enterprises and 524 large-scale installations (size of investment exceeds LE20 millions).

   B. Means of Transport: Buses and automobiles are the major means of transport in Greater Cairo. Their emissions include carbon monoxide, nitrogen oxides and black smoke. The number of vehicles operating in Greater Cairo is about 1.5 million vehicles.

   C. Other Sources of Air Pollution in Cairo.

   Solid waste burning in the open air and the fuel used in small industries and workshops are additional sources of air pollution. Furthermore, the wind coming from the north carries with it a load of pollutants issuing from industries in the northern area which extends from Mosturod to Abu Za'bal. Burning agricultural waste, especially rice straw, is another source of polluting Cairo air.

2. With regard to **the phenomenon of Heat Reflection:** under normal climatic conditions, air temperature rises near ground surface during day time. Heat emits from the ground heated by the sun rays. Warm air rises upward, carrying with it the existent pollutants away from the ground surface. The level of pollutants is measured under normal weather conditions all the year round. But when an area is exposed to high atmospheric pressure, causing the air to revolve in reverse cyclones, air currents slowly fall down towards the ground. As they fall, their temperatures increase. When the descending air gets in touch with the air ascending from the ground, the latter's temperature will have become lower than that of the descending air, resulting in a layer between the two air masses which is called "Heat Reflection" region. This layer creates a cover under which the ascending air is detained. Consequently, the pollutants are withheld and their concentrations increase to much higher levels. Those cases are called "Episodes of Severe Air Pollution". Heat Reflection occurs at various times of the year, but its effects are more con-

spicuous during autumn, a transitional season between summer and winter in which different weather changes take place.

3. As for **the topography of Cairo**, it is known that Cairo and Giza cities are located on a quadrangular depression on the two sides of the River Nile. It extends from Shoubra in the north to Helwan in the south. When air is tranquil, pollutants accumulate over that depression. Therefore, Cairo's topography is one of the causes of the black cloud.

In view of the foregoing, the presence of a heat reflection layer, where an already high level of pollutants is seized, is one of the causes of the black cloud which is more felt after sun set and until early morning.

Figure (1-12) indicates that:

1. The number of hours during which concentrations higher than 300 µg/m^3 fell down from 70 hours in 2004 and 185 hours in 2003 and to 51 hours in 2005;
2. The period of continued high concentrations also fell down from 4 – 6 hours in 2004 to less than 3 hours in 2005.
3. As a result, the black cloud was less felt in 2005, compared to previous years.

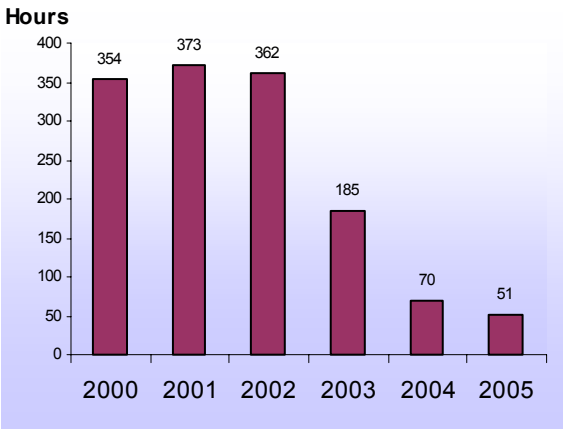


Figure (1-12) Number of hours during which higher concentrations (300 µg/m^3) of chant chest were recorded at Fummel Khalig and Abasseya

Figure (1-13) indicates that:

1. The general average of suspended chest dust in Greater Cairo has considerably decreased in October 2005, compared to October 2004.
2. In Oct. 2005, it recorded about 154 µg/m^3, compared to 170 µg/m^3 in 2004, the least level recorded over the past six years.
3. This low level of concentration proves the success of the Ministry's plan to control sources of municipal and agricultural waste open burning, especially in Greater Cairo and its surrounding areas; and to safely dispose of garbage's historical accumulations.
4. The low level of suspended chest dusts is also attributed to decisions taken by Governors to withhold environmentally- polluting activities and to the good response on the part of violators (foundries, potteries ….etc.).

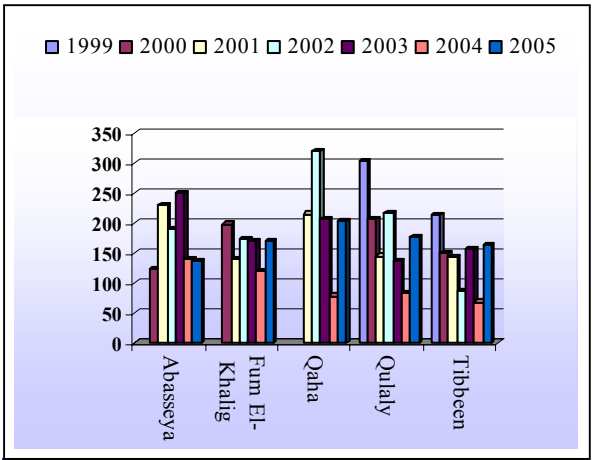


Figure (1-13) General average of chest dust concentrations during October

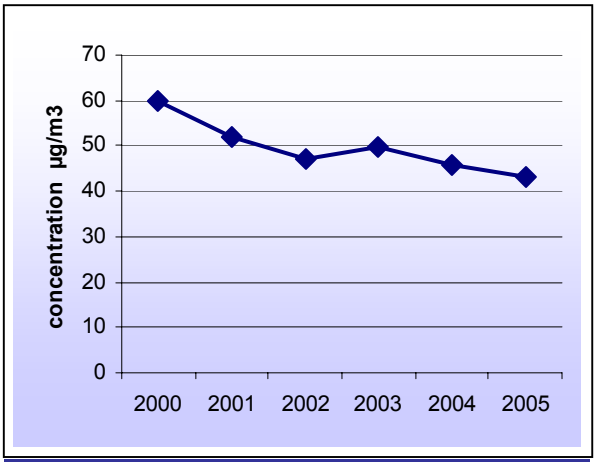


Figure (1-14):Comparison of SO_2 average concentration in October (2000-2005)

Figure 1-14 indicates that:

1. All readings monitored in October 2005 of SO_2 were less than the maximum limit stipulated for in the Executive Regulation of Law (4) / 1994.
2. Concentrations of SO_2, monitored in Greater Cairo in October, were dropped from 46 µg/m^3 in 2004 to 43 µg/m^3 in 2005.
3. This situation is attributed to efforts connected with environmental inspection on polluting industries to ensure further compliance with emission limits provided for in Law no 4 / 1994 .
4. The Ministry of electricity and Energy is obliged to operate its power-generating stations with natural gas and reduce consumption of Mazot during that month.

Figure (1-15) indicates that:

1. All readings monitored in October 2005 of NO_2 were less than the maximum limit set forth in Law 4/ 1994.
2. Compared to 2004, NO_2 concentrations monitored in October 2005 were less, despite higher fuel consumption by production and service sectors.
3. The reduction in NO_2 concentrations is attributed to the efforts of environmental inspection on polluting industries as not to exceed the limits stated in the Executive Regulation of Law No. 4/ 1994.

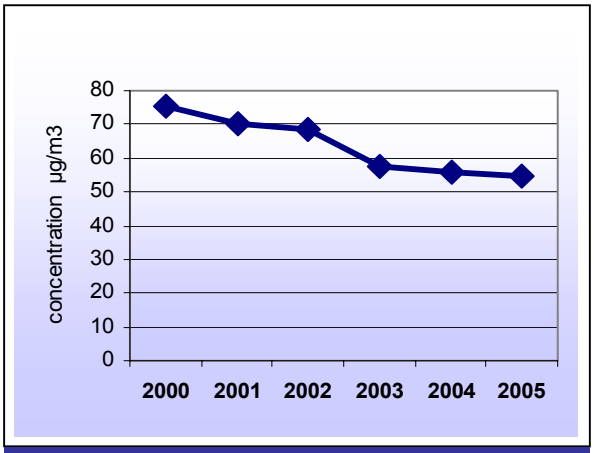


Figure (1-15) General Average of No_2 Concentration in Greater Cairo, during October (2000-2005).

Most Important Indicators of Ambient Air Quality during 2005

1. Remarkable improvement in the readings of air pollutants in 2005, compared to 2004.
2. Earliness of acute air pollution, mostly during the last week of September 2005, as a result of early rice harvest and favorable weather conditions.
3. Remarkable improvement in the concentrations of suspended chest dusts in Egypt's north eastern region in response to the efforts exerted by the MSEA, municipalities, directorates of agriculture and the civil defence brigades for rapid treatment and effective control of pollution sources throughout the Delta governorates.
4. Reduced number of complaints and notifications that went down from 189 in 2004 to 119 in 2005.

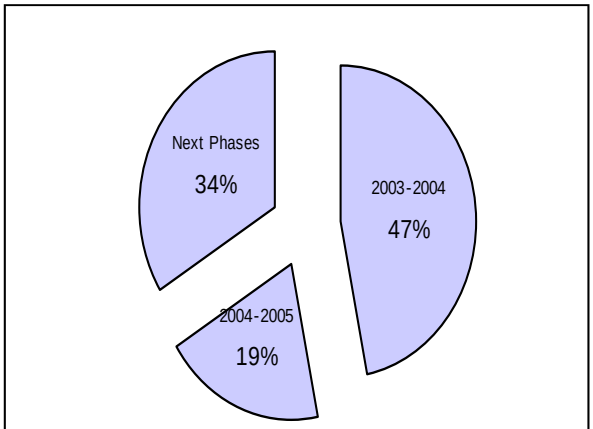
State Efforts to Curb Air Pollution Risks

In collaboration with other government agencies, MSEA has under taken a number of programs and projects to reduce the loads of air pollutants and improve air quality. Following is an overview of those programs and projects:

1. Control of Mobile Sources of Pollution

A. Testing Vehicle Exhaust As Part of Licensing Requirements:

Complementing MSEA's plans to associate vehicle licensing with exhaust testing, the second phase, involving Alexandria, Daqahlia and Beni Sweif, has already started. The cost of testing equipment procured for those governorates, has been equally co-shared by MSEA and the Ministry of the Interior, totaling LE 3 million. At the end of 2005, almost 66% of Egypt's vehicles have been tested (Greater Cairo, Alexandria, Daqahlia and Beni Sweif. figure (1-16).



Figure(1-16) Achievement rates for the exhaust vehicles testing program in the framework of vehicles licensing

b. Vehicle Exhaust Testing of Roads:

In 2005, technical testing of exhaust has been implemented in several areas of Greater Cairo for 13493 vehicles (Benzene and diesel – operated). Joint campaigns by the traffic departments and the EAA in governorates have been launched. Results indicate that almost 67% of the vehicles passed the test see figure (1-17).

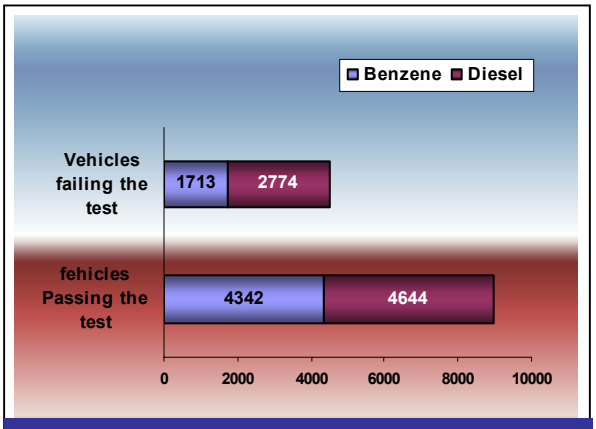


Figure (1-17) Results of technical testing of vehicle exhaust on roads 2005

c. Expanding the use of compressed NG as an alternative environment friendly fuel:

Efforts of the Ministry of Petroleum and MSEA started to bear fruition. About 64000 vehicles have been converted into NG- operated vehicles. Six companies are now working in the field of conversion to natural gas, with 98 NG fuelling stations nationwide.

Within this context, MSEA and MOF are implementing a 4- phase program to convert government-owned benzene-operated vehicles, totaling 4300 in number, into NG-operated vehicles.

The program's phase-1, which started in 2002 through 2005, converted 1630 vehicles owned by 50 government agencies. By mid 2006, end of phase – 2,200 vehicles will have been converted, see figure(1-18 below).

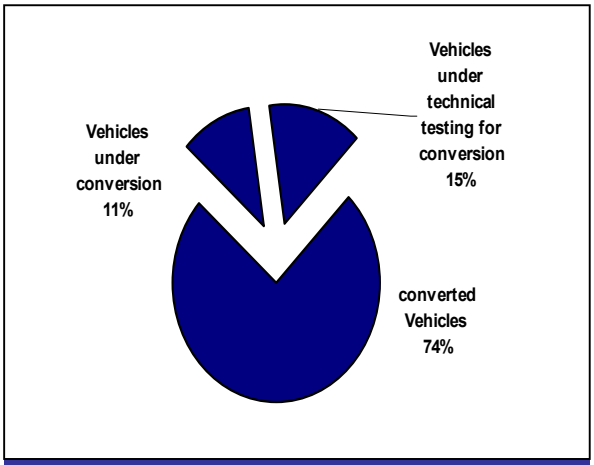


Figure (1-18) Outcomes of phase-1 of conversion of state – owned vehicles into NG- operated vehicles.

EEAA has taken the lead to promote natural gas as an environment friendly alternative in lieu of liquid petroleum fuel in public transport. Initially 50 buses were converted within the Cairo Air Improvement Project (1997-2003) as part of the fleet of buses of the Public Transport Authority (PTA).

PTA has, in 2005, initiated a crucial environmental policy approved by EEAA. It decided to convert 25 public buses annually. NG-operated buses have been operating since the end of 2005, in collaboration with a pioneering Egyptian company for vehicle manufacturing. Currently, PTA has 100 NG - operated buses.

D. Reducing Pollution from Motorcycles.

Studies conducted worldwide concluded that hydro-carbons emitting from one motor-bike with binary vapor engine equates emission from 10 – 15 benzene – operated cars. In Egypt, there are 500,000 motorbikes, 95% of which have binary vapor engines. In Greater Cairo alone, there are 200,000 motorbikes emitting 120,000 tons of air pollutants per annum, thus reflecting negatively on air quality.

Within the context of efforts directed to reduce motor-bike emissions, MOTI issued Ministerial Decree No. 85 / 2004, banning the manufacturing of motor-bikes with binary vapor engines not equipped with oil-injecting pumps as of 31/12/2003, and prohibiting the production of motorbikes with binary vapor engines of all types and sizes in Egypt as of 31/12/2007.

MOTI also issued Ministerial Decree No. 466 / 2004 prohibiting the import of motorbikes with binary vapor engines not equipped with oil injecting pumps.

Likewise, the Minister of Trade and Industry has issued Decree No. 113 / 2005 prohibiting the importation of used motorbikes with binary vapor engines, whatever was the purpose of importation.

2. Control of Pollution Resulting from Stationary Sources

EEAA announced an initiative to promote the use of a natural gas as an alternative to heavy petroleum fuel (Mazot) in the industrial area of southern Cairo (Helwan and Tibbeen), one of the most polluted areas especially where brick factories are located. The project served to convert 32 factories to NG-operated factories.

Future Plan 2007-2012

1. Continuing education, training and capacity building activities.

2. Focusing on major ambient air pollutants and implementing a set of programs to improve air quality, namely:

   Improving fuel quality and using less polluting alternatives.

   a. Reducing vehicle emissions in rural and urban areas.

   b. Reducing air pollution caused by existing industries.

   c. Implementing the National Strategy for Safe Handling of Municipal Solid Waste.

   d. Safely disposing of agricultural wastes, especially rice straw, and avoiding open burning.

References

(1) Air quality Monitoring Report, 2005, Environmental Information and Monitory Program-Environment Quality Sector.

(2) Air Quality Monitoring Report, 2005, Environmental Monitoring Center of MOHD.

(3) Air Quality Monitoring Stations, EEAA.

(4) Law No 4 /1994 and its Executive Regulations.