

AIR QUALITY MANAGEMENT FOR INDUSTRIES

1. Market Overview

Viet Nam is one of the fastest growing economies in Asia, recording an average annual growth in gross domestic product (GDP) of about 7.5% over the last decade, with growth of 8.4% in 2005. The industry and services sectors continue to drive the economy with estimated growth during the first half of 2006 at 9.3% and 7.7%, respectively. Industry's share of economic output has increased steadily, from 22.7% in 1990 to 36.7% in 2000 and around 41% of GDP in 2005.

Rapid economic growth, a growing population, and rapid urbanization cause pressures on environmental quality. Air pollution in cities and industrial areas is causing increasing occurrences of respiratory problems. The industry sector is a major source of environment pollution.

Old plants: These were largely built before 1975 and are small and medium sized with outdated technology. Most of them have not invested in air treatment systems; only some have dust filtration equipments. These old plants are scattered and mainly located right in urban residential areas. Many old plants consume coal and fuel oil (FO) causing air pollution.

New plants: These plants have been set up very quickly in recent years and are largely concentrated in industrial zones. Industrial zones have increased from 80 in 2002 to more than 120 in 2005, and are located in South East region (53%), Coast line in Central region (18%), Red River Delta (18%), and the rest, including Northern Mountain, Central Highland and Mekong River Delta (11%).

Handicraft producing villages: The handicraft factories in these villages are major cause of air pollution within the region. Currently, there are over 1450 handicraft producing villages which use 30% of employment in the rural areas. These villages are largely located in densely populated areas, in the delta areas, close to the urban, and along the rivers. Their production activities are quite diversified, focusing on food processing, slaughtering, textile and dyeing, handicraft, waste recycling, construction materials, etc. Most of these villages use outdated technology, which consume large amount of materials and energy. Equipments used in these villages were largely produced in 50s and 60s. Air pollutants are mainly dust and toxic gases, such as nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO), resulting from using coal in the production process. Some handicraft villages in Ha Tay province have SO₂ and CO concentrations higher than the standard (TCVN 5937-1995) by 2-5 times.

Currently, there are about 800,000 small and medium industrial units. Industrial production activities are increasingly contributing to worsening air quality.

Because of poor urban planning and overcrowding in cities, industrial manufacturing is located in heavily populated urban areas. Many of these industries use outdated machines and technologies with high rate of waste and without any air treatment systems. The importation of second-hand machines is also commonly blamed for increasing air pollution. Besides, as most of them use coal and fuel oil for energy, smoke from fuel oil and coal is the main industrial air pollutant. No full statistics are available about environmental compliance of individual factories, but most of them are polluted at various degrees, mainly with dust and toxic gases.

Very few industrial plants acquired equipment for dust and toxic gases treatment. While new cement plants or those built with foreign investment have installed modern air treatment systems (capable of filtering more than 90% of dust volumes), numerous local plants have not yet installed dust filtration systems.

A survey conducted by the Environmental Engineering Center of the Institute for Chemical Engineering on the air emission and the air pollution management of 185 factories in six industries, including food; textile and garments; paper; mechanical; chemical; and electricity, points out that due to shortage of the air monitoring systems, these factories do not have data on air emission. Most factories in the food, paper, garments, and electricity industries do not have air treatment systems for their equipments that emit toxic gases. Only some of them are equipped with cyclone with water spraying systems, absorbents, ventilation systems, dust filtration systems, etc. Some plants have plan to invest in the air treatment systems and some others are in the process of relocating to the industrial zones. The main air pollution abatement is to lift the emitting chimneys by 10-30 cm. Due to the high degree of pollution in the chemical and mechanical-metallurgy industries, besides lifting chimneys for dispersing, and diluting air pollution, about 50% of the surveyed factories have invested in air treatment systems. In the mechanical-metallurgy industry, only metallurgy factories install air treatment systems, including dust vacuum and filtration systems while many mechanical factories mainly use the ventilation systems only.

In general, main air pollutants caused by industrial production are SO₂, NO₂, NO_x, CO, CO₂, H₂S, dust and volatile organic compound. Overwhelmingly, 95% of the total SO₂ emission are from industry and handicraft production. Only 1-2% of the total SO₂ emission is attributable to transportation and less than 1% of SO₂ emission is due to municipal activities.

Policy and institution:

An Amended Law on Environment Protection (LEP), approved by the National Assembly in late 2005 became effective in July 2006. The LEP contains more specifics about what types of projects must be subject to environment impact assessments (EIAs), and clarifies procedures and timing for conducting and assessing EIAs. The revised LEP requires polluters to clean up pollution and

compensate those affected. Environmental protection authorities are required to report to their communities the names of establishments causing pollution. Citizens can demand that businesses or government agencies explain pollution incidents, any impact a business is having on the environment, and the environment protection measures adopted by the business. Annual 'State of the Environment' reports must be published at regional, industry and national levels. "Polluter pays" fees were introduced and good progress has been made in establishing the fee collecting system in 10 provinces, with the fees then deposited in the Environment Fund. Strategic Environmental Assessments are being piloted.

The new five-year Socio-Economic Development (SEDP) (2006-2010) which was approved by the National Assembly in June 2006, identifies Environment Protection as one of the important pillars for social economic development. Preliminary emission standards on air quality has been put into place including:

- Ambient air quality standard (TCVN 5937-1995)
- Maximum allowable concentration of hazardous substances in ambient air (TCVN 5938-1995)
- Industrial emission standards of inorganic substances in industrial zones (TCVN 6991-2001), in urban areas (TCVN 6992-2001), and in rural areas (TCVN 6993-2001)
- Industrial emission standards of organic substances in industrial zones (TCVN 6994-2001), in urban areas (TCVN 6995-2001), and in rural areas (TCVN 6996-2001)

The environmental review and issuance of environmental certificates for more public investment projects have been delegated to the DONREs, particularly in the regions that are currently driving economic growth, such as Ho Chi Minh City, Hanoi, Da Nang and Binh Duong. With the new measures (economic, administrative and criminal responsibilities) introduced under the revised Law on Environmental Protection, law enforcement is expected to be improved.

2. Market Trends

The Socio-Economic Development (SEDP) for period 2006-2010 approved by the National Assembly in June 2006 sets the GDP annual growth rate at 7.5%-8% and industrial production output growth at 15 – 15.5% per annum on the average. The industry sector will steadily increase its share and by estimated in 2010, the industry's share will account for about 42-43% of GDP, while the services account for 41-42% and agriculture, forestry, and fishery products about 15-16%.

As stated by Minister of Industry, the industry strategy consists of three key focus areas:

- Industries with competitive advantage: textile, garment, agriculture and fishery processing industries, electronics assembly
- Infrastructure-based industries: metallurgy, electricity, chemical, fertilizers, construction materials, exploration, mechanical processing
- Potential industries: electronics inputs, software development, mechanical processing

The manufacturing industry will remain overwhelmingly largest one with the estimated share at 88.3% by 2010. However, many industries mentioned above consume a lot of materials and energy and their production process cause serious environment pollution. Leading sources of air pollution include power plants, cement mills, fertilizer plants, steel mills, and chemical plants.

The survey conducted by the Institute for Labor Protection on 300 production factories exposed to toxic gases pollution, shows proportions of polluted factories are different by industries, but average percent is about 17% (see table 1).

Table 1: Proportion of toxic gases polluted factories in small and medium sized plants

No	Manufacturing Industries	Proportion of polluted factories (%)
1.	Mechanical, electricity, electronics	12.7
2.	Food industry	10.3
3.	Mineral exploration, metallurgy	16.6
4.	Construction materials	19.5
5.	Garment, textile, shoes making	20.6
6.	Paper, fertilizers, chemical	21.8
Average:		16.9

Source: National Institute for Labor Protection

In Hanoi, during 1996-2010, the SO₂ emitted from industrial production (accounting for 99.9%), while the transportation and municipal activities cause less than 1% of the total SO₂ emission. The total SO₂ emission increased by 11.6% in 2003 as compared with that in 1996 and it is expected that the total SO₂ emission by 2010 will increased by 33.4% as compared with that level in 2003 (see table 2).

Table 2: Total SO2 emission by activities

Sector	1996		2003		2010	
	ton	%	ton	%	ton	%
Industry	7169	99.91	8003	99.90	10675	99.89
Transportation	3	0.045	5.4	0.07	9	0.08
Municipal	3	0.045	2.3	0.03	2	0.03
Total	7175		8011		10686	

Source: Center for Environmental Engineer (CEETIA) – Hanoi Construction University

The NO2 emission in Hanoi during 1996-2010 comes mainly from industrial production (67-85%), transportation (11-32%), municipal activities (1-4%). Total NO2 emission in 2003 increased by 44.4% as compared with that in 1996 and it is expected to increased by 47.8% in 2010 (see table 3).

Table 3: Total NO2 emission by activities

Sector	1996		2003		2010	
	ton	%	ton	%	ton	%
Industry	5763	85.01	6822	69.60	9725	67.17
Transportation	773	11.40	2784	28.40	4599	31.76
Municipal	243	3.59	186	2.00	154	1.07
Total	6779		9792		14478	

Source: Center for Environmental Engineer (CEETIA) – Hanoi Construction University

The total suspended particulates (TSP) in Hanoi is attributable to industrial production (62-78%), transportation (36-47%) (see table 4).

Table 4: Total suspended particulates (TSP) by activities

Sector	1996		2003		2010	
	ton	%	ton	%	ton	%
Industry	9289	62.44	9238	66.82	11821	77.63
Transportation	5558	37.36	4565	32.98	3202	22.23
Municipal	30	0.2	23	0.2	19	0.14
Total	14877		13826		14402	

Source: Center for Environmental Engineer (CEETIA) – Hanoi Construction University

Air pollution control equipment currently used for industry are either designed and produced in Vietnam or imported:

- Air treatment system at thermal power plant Formosa, Dong Nai province.

- Air treatment systems for arc furnace (Tan Binh, Thu Duc, Bien Hoa steel plants). This technology is transferred from Swiss and Indian companies. Recently, the National Institute for Labor Protection, the Institute for Mining and Metallurgy, and the Institute for Chemical Engineering in Vietnam have developed and introduced similar technology.

- Air and dust treatment systems at chemical and fertilizer plants (Super Phosphat Lam Thao, Super Phosphat Long Thanh, Tan Binh, Bien Hoa chemical plants, Golden Star rubber plant)

- Air treatment systems at cashew processing plants (Long An, Tay Ninh, SACAFA plants)

- Air treatment systems at detergent plants (TICO, DASO, LIX, Can Tho, and VISO detergent plants)

- Air treatment systems at cigarette manufacturing plants (Thang Long, Vinh Hoi, Sai Gon, Dong Nai, Renold-Da Nang plants)

- Air treatment systems for boilers (26 pharmaceutical factory, Gia Dinh textile factory, PESCO company, Thuan Thien textile and dyeing factory)

- Air treatment systems at galvanized iron sheets production plants (POSVINA, Phuong Nam companies)

- Air treatment systems at cement plants (Ha Tien, Sao Mai, Hiep Phuoc, Nghi Son, Hoang Mai, Hoang Thach cement plants)

- Air treatment systems at animal feed plants (CP Group, Cargil plants)

Figures on the market size of air pollution control equipment in Vietnam are not available. However, the total air pollution control equipment are unofficially estimated to account for about 10% of the total market of environmental equipment and services, implying demand for air related products/technologies to be around US\$57 million for the year of 2006.

3. Sale Prospects

The Government is considering a development of new mechanisms to mobilize funding from various economic sectors for environmental protection to reach a target investment in environmental protection to increase from the current level of 1% of GDP in recent years to 2% in 2010. The Government also has plan to intensify the application of advanced quality assurance, environmental management systems (ISO 9000, ISO 14000, etc.)

To address the environment pollution caused by industry and energy sector, local governments are aware of a need to undertake necessary measures as follows:

- Besides relocating manufacturing industries from residential areas to the suburbs or industrial parks, “cleaner production” and “environmental friendly technology” should be applied to minimize pollution.
- Improve efficiency of using materials, energy and select appropriate materials for production.
- Integrate environment protection in the development plan of the industry, energy sector and of the industrial parks.
- Intensify investment for environment protection.
- Improve the awareness of and strengthen education on environment protection.

Strong measures toward steel plants in Da Nang and Ho Chi Minh City

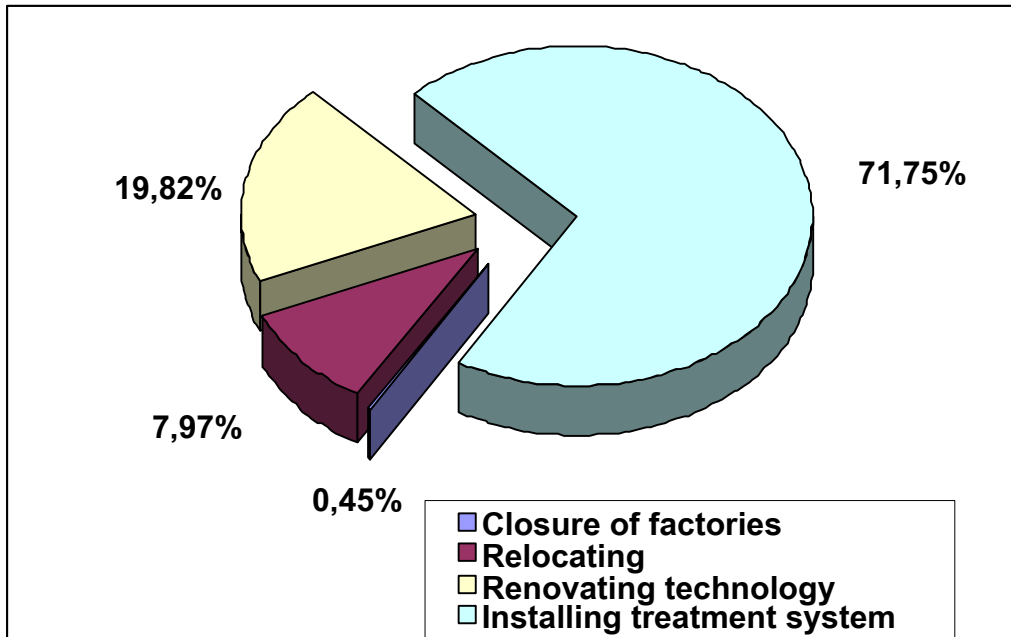
In Hoa Khanh Industrial park, Da Nang city, 13 steel plants with 26 smelting furnaces are operating without air and dust treatment systems, causing serious air pollution in the area. The concentration of toxic gases are much higher than the standard: CO emissions are 67-100 times higher, NOx are 2-6 times higher, especially in some places Pb emissions are 65,500 times higher, Zn: 7.91mg/m³, Cu: 0.03mg/m³, Fe: 0.05 mg/m³... As such, Da Nang People Committee strongly requested these factories to reduce air pollution by 50% by August 31, 2006. Otherwise, these factories shall be closed. In May 2006, Da Nang People Committee suspended operation of Da Nang Steel Company (DSC) due to its toxic gases emission to the environment without any treatment. Da Nang Steel Company is having investment plant of VND 1billion (around USD70,000) for air pollution abatement. The other steel plants in the area are also having similar efforts in the environmental pollution mitigation activities.

Unless having remedial measures to address air pollution or relocating as schedule, operations of both Nha Be and Tan Thuan Steel Plants in Ho Chi Minh City will be suspended.

(Source: Tuoi Tre Newspaper, August 7, 2006)

284 out of 439 serious polluters through out the country are manufacturing units in food, chemical, construction materials, electronics and electricity, handicraft, and other industries. These are now strictly required by local governments on relocating to the suburbs or industrial zones or renovating technologies and installing pollution treatment facilities. In general, major government’s mitigation measures are requests on treatment systems installation (71.75%) and/or technology renovation (19.82%) (see chart 1).

Chart 1: Proportion of mitigation measures for the serious polluters



Source: National Environmental Agency (NEA) – Ministry of Natural Resources and Environment (MONRE)

4. Key Competitors

The key competitors in imported market for air pollution control equipment are Japan, Germany, France, UK, and other European countries. American products have gained recognition for reliability, durability, and precision with advanced technology for air pollution control systems, although generally high prices have made U.S equipment less competitive and unaffordable for industrial enterprises. Moreover, most bilateral ODA comes from governments of other advanced countries, U.S firms face strong competition from Japan and European companies in bilateral ODA-funded projects. To date, there has been limited ODA funding for air pollution abatement efforts. Most of the ODA efforts have been directed toward building air-monitoring stations as a first step toward reducing air pollution.

U.S products, so far have attained a modest market share in Vietnam. However, U.S monitoring and analytical equipment enjoys a global leadership position with a higher marketshare.

5. Market Access

The main ministries responsible for air quality management for industries are Ministry of Natural Resource and Environment (MONRE) and Ministry of Industry (MOI).

Many U.S companies set up representative offices and/or distributors and agents to do business in Vietnam. Local agents and distributors can be invaluable for their existing distribution network, technical and sales staffs, contacts, and relationships with provincial, municipal, and governmental officials. It is important to provide local agents/distributors with adequate training so that they are able to provide quality after-sales services to buyers.

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