



ASEAN – German Technical Cooperation
Clean Air for Smaller Cities in the ASEAN Region

gtz

Indonesia Country Profile: Focus on Smaller Cities

Prepared by
Clean Air Initiative for Asian Cities (CAI-Asia) Center
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About CAI-Asia

The Clean Air Initiative for Asian Cities (CAI-Asia) was established as a joint initiative by the Asian Development Bank, World Bank, and the United States – Asia Environmental Partnership (a project of USAID) in 2001.

CAI-Asia promotes and demonstrates innovative ways to improve the air quality of Asian cities through sharing experiences and building partnerships. Since 2007, this multi-stakeholder initiative is divided into

- The CAI-Asia Center, a regional, Philippine-based non-profit organization as the implementing arm of CAI-Asia
- The CAI-Asia Partnership, a United Nations Type II Partnership, with over 160 member organizations
- CAI-Asia Country Networks in China, India, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka, and Viet Nam.

ABBREVIATIONS

ADB	Asian Development Bank
ADEKSI	Indonesian Municipal Councils Association
ADKASI	Association of Indonesian Regency Parliament
AEB	Clean Emission Association
ADO	Automotive Diesel Oil
ASEAN	Association of Southeast Asian Nations
APBN	State Revenue and Expenditure
APEKSI	Indonesian Municipalities Association
APPSI	Association for Provincial Government of Indonesia
AQMS	Air Quality Monitoring network system
APKASI	Indonesian Governmental Regencies Association
BAPPENAS	National Development Planning Agency
BATAN	National Atomic Board
BKMG	Climatological, Meteorological and Geophysical Board
BRT	Bus Rapid Transit
BTKL	Environmental Health Laboratories
CAI-Asia	Clean Air Initiative for Asian Cities
CDM	Clean Development Mechanism
CFD	Car Free Day
CH ₄	Methane
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CNG	Compressed natural gas
DAU	General allocation fund
DAK	Special allocation fund
DANIDA	Danish International Development Agency
DKI	Special Capital Region
DNA	Designated National Agency
GDP	Gross domestic product
EIA	Environmental Impact Assessment
EST	Environmentally sustainable transport
GPUB	Generation for Clean Air
GTZ	German Technical Cooperation
HC	Hydrocarbons
IDR	Indonesian Rupiah
I&M	Inspection and Maintenance
ITB	Bandung Institute of Technology
JICA	Japan International Cooperation Agency
Komnas MPB	National Commission for Clean Development Mechanism
LAPAN	National Aeronautical Board
LPG	Liquefied petroleum gas
µg/m ³	microgram per cubic meter
MoE	Ministry of Environment
MRT	Mass rapid transit
NAAQS	National Ambient Air Quality Standards
NAP	National Action Plan

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1. INTRODUCTION

Air pollution levels in the megacities of Asia show a stabilizing trend but still exceed World Health Organization guidelines.¹ Studies also show poor air quality, not only in the megacities of Asia, but also in smaller cities with populations of 200,000 to 1.5 million. While megacities often receive support for improving air quality; similar assistance seldom reaches smaller cities.²

Responding to the need to strengthen air quality management in smaller cities, the Association of Southeast Asian Nations (ASEAN) – German Technical Cooperation Project on “Clean Air for Smaller Cities in the ASEAN Region” is being implemented starting 2009. The Project aims to empower smaller cities to develop and implement “Clean Air Action Plans” with stakeholder participation. In its initial phase, up to fourteen cities with 200,000 to 1.5 million inhabitants in the ASEAN region will receive assistance. Preparation of country profiles, national workshops to sensitize stakeholders on clean air issues, set up of a sustainable regional training system, and conferences for dissemination of city experiences are among the project activities to support action plan development and implementation.

Country Profiles focusing on smaller cities are being prepared for several ASEAN countries. These provide background information and findings on:

- **State of the Air (Chapter 2):** What is the air quality in smaller cities? Which of the smaller cities in the country are experiencing air pollution challenges or will soon enter into this situation?
- **Legal framework for air quality management (Chapter 3):** What is the air quality management system in place in smaller cities? What is the legal framework for air quality management in the country and in smaller cities? What power and resources are available to smaller cities to develop and implement clean air action plans?
- **Stakeholders (Chapter 4):** Do stakeholders take an active part in air quality management for smaller cities? How do smaller cities engage stakeholders in air quality management?

¹ CAI-Asia Center. Air Quality in Asian Cities. 2008

² CAI-Asia Center. Compendium of Air Quality Management and Sustainable Urban Transport Projects in Asia. 2007

2. STATE OF THE AIR

Understanding the air pollution problem of a country requires an examination of its geography and climate, the drivers (urbanization, industry and economy, energy, and transport), sources, status, and impacts of air pollution. This Chapter provides an overview of the air pollution challenge in Indonesia.

2.1 General Information

Indonesia is considered the world's largest archipelago with 17,504 islands of which 6,000 are inhabited.^{3,4} With a land area of about 1.9 million square kilometers, Indonesia is slightly smaller than Mexico.⁵ Its largest islands are: Kalimantan, Sumatra, Papua, Sulawesi, and Java. About fifty-eight percent of Indonesia's population lives on Java.⁶ The capital, Jakarta, is located in the northeast coast of Java island and covers 661.52 square kilometers.

The archipelago is almost entirely tropical in climate, with the coastal plains averaging 28°C, the inland and mountain areas averaging 26°C, and the higher mountain regions, 23°C. The area's relative humidity ranges between 70–90%. There are extreme variations in rainfall linked with the monsoons: dry season (June to September) and a rainy season (December to March). Prevailing wind patterns interact with local topographic conditions to produce significant variations in rainfall throughout the archipelago with the western and northern parts of Indonesia generally experiencing the most precipitation. The city of Bogor, near Jakarta, lays claim to having the world's highest number of rainstorms at 322 per year. The islands closest to Australia and the eastern tip of Java tend to be dry.⁷

In 2008, it was estimated that Indonesia had about 228.5 million people.⁸ As of June 2005, there were at least 26 municipalities in Indonesia with a population of between 200,000 to 1.5 million.⁹ For purposes of this Country Profile, the term "smaller cities" refers to cities with a population of 200,000 to 1.5 million. Population densities of a sample of 22 cities range from 821 to 41,348 inhabitants per square kilometer; Jakarta is the fifth most dense with 13,474 inhabitants per square kilometer in 2005 (Annex 1). In terms of urbanization, Jakarta is considered fully urbanized. Forecasts show Lampung province will have the highest rate of urbanization from the year 2000 to 2025 (Annex 2). In 2025, it is expected that a large percentage of the population in the provinces of DI Yogyakarta (82.8%), Banten (81.5%), West Java (81.4%), and Bali (79.6%) will be living in urban areas.¹⁰ Air quality would be most important to attain in the densest and most populated cities and provinces of Indonesia.

³ Badan Pusat Statistik (BPS). Trends of the Selected Socio-Economic Indicators of Indonesia, 2008

⁴ Embassy of the Republic of Indonesia, Washington, D.C. 2008

⁵ UN Statistics Division. Demographic Statistics. <http://data.un.org/Data.aspx?d=POP&f=tableCode%3a19#POP>

⁶ BPS. Trends of the Selected Socio-Economic Indicators of Indonesia, 2008

⁷ CAI-Asia. Indonesia Country Synthesis Report on Urban Air Quality Management. 2006

⁸ BPS. Trends of the Selected Socio-Economic Indicators of Indonesia, 2008

⁹ City Population (citing Badan Pusat Statistik). http://www.citypopulation.de/Indonesia.html#Stadt_alpha

¹⁰ BPS, BAPPENAS, UNPF. Indonesia Population Projection 2000-2005. 2005

Indonesia's gross domestic product (GDP) grew by 6.32% from 2006 to 2007.¹¹ The recently re-elected President Yudhoyono set a target of 4 to 4.5% economic growth in 2009.¹² The importance of the manufacturing industry in Indonesia's economy is evident from its contribution to GDP. In 2006, it contributed 27.5% to GDP. Three other industries each contributed less than 20% to GDP in 2006 (Trade, hotel and restaurants at 15%; Agriculture, livestock, forestry and fishery at 13%; and Mining and quarrying at 11%).¹³ Growth in the manufacturing and other industries must be balanced with the need for clean air in Indonesia's provinces and cities.

Indonesia ranked eleventh among the world's major natural gas producing countries in 2006 and twenty-first among crude oil producing countries in 2007. The main coal deposit is located in Sumatra (50.1%) and Kalimantan (49.6%).¹⁴ In 2007, coal, crude oil and gas accounted for about 75% of primary energy supply in Indonesia. Biomass, geothermal and hydro power accounted for the remaining energy production.¹⁵

In 2007, petroleum fuel and coal comprised a large part of Indonesia's final energy consumption. In the final energy mix, petroleum fuel amounted to 52.2%, followed by coal (including briquette) at 20.3%, gas at 13.3%, electricity at 12.4% and LPG at 1.8%.¹⁶ In 2025, coal is expected to take 33% share of energy consumption, an increase by 65% from the current share.¹⁷ The industry sector, the largest energy consumer, accounted for 44.8% followed by the transportation (31.1%), household (15.2%), commercial (4.6%), and other sectors (4.3%) in 2007.¹⁸

Vehicle ownership in Indonesia is growing rapidly. In 1990, the total number of registered vehicles was 6 million, in 2007 this was 57 million, and in 2030 this is expected to reach 93 million. Two-wheelers are growing fastest and are the largest in number.¹⁹ Passenger cars, buses, trucks and motorcycles are the main types of transportation in Indonesia. The vehicle fleet is composed of 14.4% passenger cars, 3.1% buses, 7.7% trucks and 74.8% motorcycles.²⁰ The continued increase in motor vehicle use if unaccompanied by measures to tighten vehicle emission standards, provide cleaner fuels, manage travel demand, and promote non-motorized transport modes will adversely affect air quality.

2.2 Sources of Air Pollution

Potential air pollution sources differ for each province or city (Table 1). Very few cities in Indonesia have conducted an emission inventory of air pollution sources. Jakarta is one of these cities; it has three emission inventory studies (1992, 1997 and 2003) and will begin a new study this year. The 1992 study included the cities of Jakarta, Surabaya, Medan, Bandung and Semarang while the 1997 and 2003 studies focused only on

¹¹ Handbook of Energy and Economic Statistics of Indonesia 2008

¹² Coordinating Ministry for Economic Affairs. <http://www.ekon.go.id/content/view/453/1/>

¹³ BPS. Statistics Indonesia. <http://www.bps.go.id/sector/nra/gdp/table4.shtml>

¹⁴ Key indicator of Indonesia and Mineral Resources, 2008. <http://www.esdm.go.id/publikasi/statistik.html>

¹⁵ Handbook of Energy and Economic Statistics of Indonesia 2008

¹⁶ Key indicator of Indonesia and Mineral Resources, 2008. <http://www.esdm.go.id/publikasi/statistik.html>

¹⁷ Presidential Regulation No. 5/2006 concerning National Energy Policy

¹⁸ Handbook of Energy and Economic Statistics of Indonesia 2008

¹⁹ CAI-Asia. Indonesia Country Report 2008

²⁰ BPS. Statistics Indonesia. <http://www.bps.go.id/sector/transpor/land/yearly/table3.shtm>

Greater Jakarta.^{21, 22} The studies share these conclusions: (a) transportation is the main source of hydrocarbon (HC), carbon monoxide (CO), and nitrogen oxide (NO_x), (b) industry is the main contributor of sulfur dioxide (SO₂), and (c) transportation contributes to fine particulate matter (PM₁₀) [Annex 3]. It is interesting to note that the extent of transportation's contribution to PM₁₀ differed in the three studies. Compared with the 1997 and 2003 studies, the 1992 study found that domestic and waste burning combined and transportation contributed the same proportion to PM₁₀ loading; the 1997 and 2003 studies attributed a greater PM₁₀ contribution from transportation. The difference can be attributed to the fact that the 1992 inventory covered a wider range of sources: domestic sources, industry, transportation and waste burning; while the other studies covered only domestic, industry and transportation sources.²³

Table 1. Potential sources of air pollution in selected cities in Indonesia

City	Potential sources of air pollution
Balikpapan	Oil refinery
Bandar Lampung	Oil refinery, power plant
Bandung	Motor vehicles, waste burning, industry
Banjarmasin	Rubber, plywood
Batam	Chemicals
Jakarta	Motor vehicles, waste burning, industry
Jambi	Forest fires
Makassar	Steel, power plant
Medan	Motor vehicles, waste burning, industry
Padang	Cement, rubber
Palembang	Oil refinery, fertilizer, rubber glove, forest fires
Pekanbaru	Forest fires
Pontianak	Forest fires
Samarinda	Coal mining, plywood, forest fires
Semarang	Motor vehicles, waste burning, industry
Surabaya	Motor vehicles, waste burning, industry

Sources: PROPER Press Release, Ministry of Environment, 2007
Annual Environment Status Report, 2008
1992, 1997 and 2003 emissions inventory studies

2.3 Status of Air Quality

Information on the status of air quality in Indonesia is limited only to cities which monitor air quality. Air quality monitoring results for the cities of Jakarta, Surabaya, and Bandung, indicate that PM₁₀ in these cities

²¹ Soedomo, et al. (1992). *Status pencemaran udara Kota Jakarta, Bandung, Semarang, Surabaya dan Medan*. LPPM ITB – Bapedal.

²² Syahril, S., Resosudarmo, B.P., & Satriyo Tomo, B. (2002b). Study on air quality in Jakarta: Future trends, health impacts, economic value and policy options (Technical Assistance 5937). Manila: Asian Development Bank.

²³ Bappenas. 2006. National Strategy and Action Plan for Urban Air Quality Improvement.

and O₃ levels in Jakarta exceed the national or provincial ambient air quality standards and/or WHO air quality guideline (Figure 1).

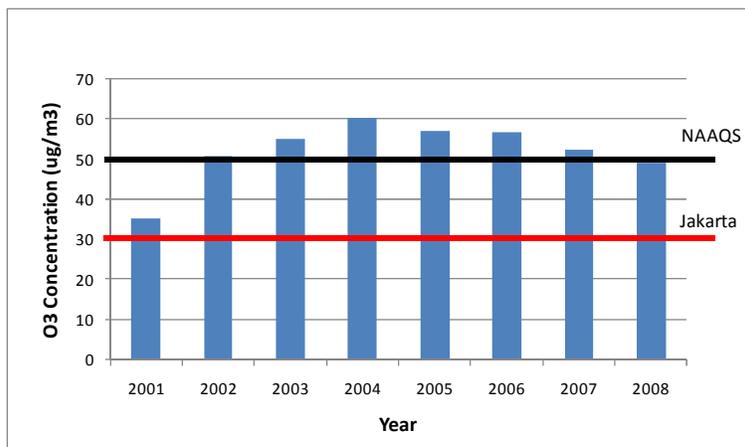


Figure 1. Annual O₃ average trend in Jakarta (2001-2008)

In 2008, the average PM₁₀, NO₂, and O₃ concentrations in Jakarta slightly decreased compared to previous years.²⁴ However, the opposite is for SO₂ concentration in 2008 in Jakarta which increased significantly compared to 2006-2007 (Annex 4). In Surabaya, the average SO₂ and NO₂ concentrations in 2008 decreased considerably compared to previous years, but the average PM₁₀ concentration increased and reached the record highest in 2001-2008.²⁵ In Bandung, the average PM₁₀, NO₂, and SO₂ concentrations tend to remain stable during 2001-2007²⁶ (Annex 4); HC is also considered as a critical parameter in Bandung because its concentrations frequently exceed the ambient standard.²⁷ In Semarang, during 2001-2004, the air quality showed a decreasing trend.²⁸

If the Pollutant Standard Index (PSI) reports are considered, the air quality in Surabaya shows some level of improvement. This is evidenced by the increasing number of “Good Days” in the last 2-3 years.²⁹ Similarly as in Jakarta, beginning from 2005 to 2008, the number of “Good Days” tends to increase.

Air Quality Monitoring

A few cities in Indonesia monitor ambient air quality. The national air quality monitoring network system (AQMS) was established by the Ministry of Environment (MoE) between 1999 and 2000 in ten cities through a loan from the Austrian government. The AQMS consists of thirty-three ambient air quality monitoring stations located in Jakarta (5), Medan (4), Bandung (5), Surabaya (5), Semarang (3), Pekanbaru (3),

²⁴ Environment Board of the Province of Jakarta. (2009). Air quality data 2001-2008.

²⁵ Environment Agency of Surabaya City, (2009). Air quality data 2001-2008.

²⁶ Environment Agency of Bandung City. (2009). Air quality data 2001-2008.

²⁷ Badan Perencanaan Pembangunan Nasional. (2006). *Strategi dan rencana aksi nasional peningkatan kualitas udara perkotaan*. ISBN 979-3764-13-9. Jakarta, Indonesia.

²⁸ CAI-Asia. Indonesia Country Report 2008

²⁹ Indicated by Mr. Togar Arifin, Head of Environment Agency, City of Surabaya during an interview on 10th May 2009.

Palangkaraya (3), Denpasar (3), Jambi (1) and Pontianak (1) (Figure 5). The system monitors CO, SO₂, NO_x, O₃, and PM₁₀.

Results of air quality monitoring from each station in the city are sent electronically to the Regional Air Quality Monitoring Center (RAQMC) in the city where data is verified, backed up, and reported. From the city RAQMC, the data is sent through frame relay to the Main Center at the Ministry of Environment. In the beginning (2001-2003), all stations were still operating well, but after a few years some stations degraded due to maintenance problems and/or some exceeded their useful life (Table 2).³⁰

Table 2. Status of Air Quality Monitoring in Selected Cities in Indonesia

City	Status of Air Quality Monitoring
Semarang ⁽¹⁾	<ul style="list-style-type: none"> • One out of three stations is still operating • In 2008, monitoring data from the single remaining station could not be verified • Air quality monitoring is done manually (using passive sampler) in all subdistricts • Results indicate that air quality tends to decline in some locations
Denpasar ⁽²⁾	<ul style="list-style-type: none"> • Monitoring has been discontinued since 2003 • The monitoring equipment has been returned to the Ministry of Environment (MoE) for a variety of reasons including city priorities and budget
Bandung ⁽³⁾	<ul style="list-style-type: none"> • Three out of five monitoring stations are still operating • Three parameters were measured instead of five parameters because the air pollutant analyzers for two other parameters were damaged • Results from the AQMS indicate that air quality is relatively stable during the period of 2006-2008. However, results from the manual monitoring show that air quality has worsened in several locations in Bandung
Surabaya ⁽⁴⁾	<ul style="list-style-type: none"> • Three out of five monitoring stations are still operating even though the PM₁₀ analyzer in two stations is not functioning • Results of monitoring using the Pollutant Standard Index (PSI) indicate improved air quality in Surabaya as shown by the increasing number of "good days" in the last two to three years
Jakarta ⁽⁵⁾	<ul style="list-style-type: none"> • From 2005 to 2008, the number of "good days" tends to increase • Of the five stations, only three stations are now operating in Jakarta
Batam, Bogor, Balikpapan ⁽⁶⁾	<ul style="list-style-type: none"> • Smaller cities such as Batam, Bogor and Balikpapan have already owned an automatic air quality monitoring station since 2007 • The air quality in these cities is still acceptable; pollutant concentrations meet the national ambient air quality standard values

Sources: (1) Personal interview with Mrs. Indah Wahyutrimurindah, Subdivision Head of Laboratory, *Badan Lingkungan Hidup* (Environmental Agency), City of Semarang on 23 April 2009, (2) Environmental Management Center of MoE (Pusarpedal), 2009 (Personal interview with Mr. Esrom Hamonangan) (3) Interview with Mrs. Ayu Sukenjah, Division Head of Environmental Rehabilitation, *Badan Pengelolaan Lingkungan Hidup* (Environmental Agency), City of Bandung on 23 April 2009, (4) Personal interview with Mr. Togar Arifin Silaban, Head of *Badan Pengelolaan Lingkungan Hidup* (Environmental Agency), City of Surabaya on 23 April 2009, (5) Air Quality Laboratory, Jakarta Environment Board, 2009, (6) See Annex 5 for city classification

³⁰ Indicated by Mr. Andono Warih, Division Head of Laboratory, *Badan Pengelola Lingkungan Hidup Daerah* (Environment Agency), the Province of Jakarta during an interview on 10th May 2009.

The trend of improved air quality in Jakarta and Surabaya needs to be further studied to verify the underlying factors. Analysis of air quality should consider both PSI and ambient concentration levels. The difference in the monitoring results using PSI and concentration data can occur because the PSI system converts the concentration data of each of the five pollutants measured from each monitoring station into an index, and retrieves the lowest index or the highest concentration of any of the five pollutants among those stations, to represent the PSI for the whole city.³¹ Therefore, if one or more pollutant is not measured or if the number of stations is reduced or if the data capture is less, the PSI indicator becomes less accurate.

Apart from the air quality monitoring conducted by MoE, several other local and national government agencies conduct their own air quality monitoring such as the local Environment Management Agencies, Environmental Health Laboratories (BTKL), the Climatological, Meteorological and Geophysical Board (BKMG), the National Atomic Board (BATAN), the National Aeronautical Board (LAPAN), Ministry of Health, Ministry of Transport, and the Road Development and Research Authority. The data collected is currently not being shared among these different agencies.

Air Quality Data

Complete yearly air quality monitoring data is available from 2001 to 2008 for Jakarta, Surabaya and Bandung for these pollutants - PM₁₀, SO₂, and NO₂. For this reason, the trends presented below use data from Jakarta, Surabaya and Bandung. Similar data for Bandung, Palangkaraya, Pekanbaru, Medan and Semarang are incomplete (Annex 4).

The SO₂ annual average trend in three cities (Jakarta, Surabaya and Bandung) is increasing (Figure 2). Among these three cities, Surabaya has the highest SO₂ average concentration; which corresponds to Surabaya's being one of the major industrial areas in the country.

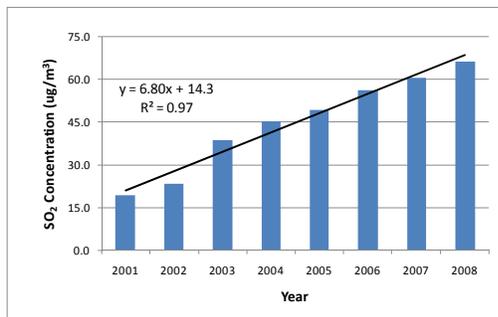


Figure 2. Annual SO₂ average trend in Jakarta, Surabaya and Bandung (2001-2008)

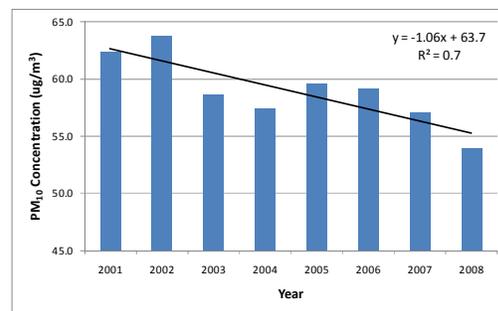


Figure 3. Annual PM₁₀ average trend in Jakarta, Surabaya and Bandung (2001-2008)

PM₁₀ is a significant pollutant in Indonesia. While the average annual PM₁₀ trend in Jakarta, Surabaya and Bandung is decreasing (Figure 3), in 2008, the annual average PM₁₀ level of about 50 µg/m³ based on data

³¹ Badan Perencanaan Pembangunan Nasional. (2006). *Strategi dan rencana aksi lokal Kota Bandung untuk peningkatan kualitas udara perkotaan*. ISBN 979-3764-16-3. Jakarta, Indonesia: BAPPENAS.

taken from 12 stations in 6 cities show PM₁₀ levels of four out of six cities exceeded the WHO guideline value of 20µg/m³ (annual) (Figure 4).



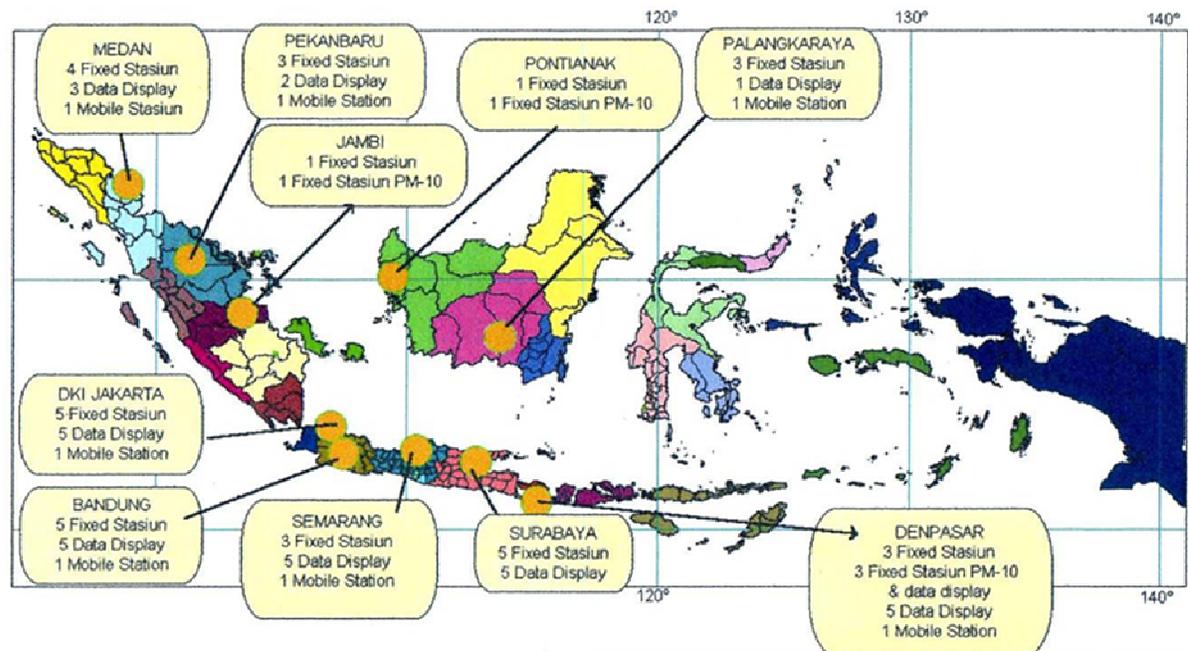
Figure 4. Annual PM₁₀ in 6 cities in 2008

Reporting and Use of Air Quality Information

The air quality monitoring data collected from the AQMS is analyzed by the MoE. MoE takes the previous day's results and converts these into PSI making use of the twenty-four hour data needed in order for the PSI to be calculated. While the PSI may not be a very effective tool to inform the public of the current state of the air, an analysis of PSI over several years could provide air quality trends. Information on the PSI can be accessed by the public through the MoE's Annual Environmental Status Report and the City Environmental Status Reports. The PSI is also displayed on the monitors installed in several locations in the city. However, most of these monitors are currently not working. Some cities (e.g. Jakarta) attempt to report the PSI through their website even though not frequently.

An analysis of air quality monitoring data could help ensure that government's pollution reduction efforts address the most important areas (e.g., hotspots or areas most exposed to air pollution). The 2006 National Strategy and Action Plan for Urban Air Quality Improvement (UAQI) highlights some of the challenges in conducting such an analysis:

- Limited funding for operation and maintenance of monitoring stations results in interrupted operation and lack of data;
- Limited coverage and spatial distribution of AQMS to a few cities;
- Lack of background concentration data as a reference to determine the level of air pollution caused by human activity; and
- Location of monitoring stations at roadsides does not capture other pollution sources.



Source: Bappenas. 2006. National Strategy and Action Plan for Urban Air Quality Improvement

Figure 5. Location of Air Quality Monitoring Stations

2.4 Impacts of Air Pollution

The health, environmental and economic impacts of air pollution in Jakarta and the public perception of the air pollution problem is documented in several studies.

A 2005 study by the University of Indonesia on the health risks of PM_{2.5} and CO in Jakarta showed high concentrations of air pollutants inhaled by respondents while traveling from their home to the office or school. The same report also indicated that air conditioned cars do not keep out the pollution; those traveling in these cars inhale the same level of pollution.³²

Studies show the substantial economic cost incurred by Indonesia from air pollution. A 1994 study by the World Bank estimated that the economic cost due to air pollution in Jakarta was IDR 500 billion from 1,200 premature deaths, 32 million respiratory problem cases, and 464,000 cases of asthma.³³ A 2002 study in Jakarta funded by the ADB estimated the economic cost due to PM₁₀ pollution in Jakarta at IDR 1.7 trillion in 1998 and expected the cost to increase to around IDR 4.2 trillion in 2015 if no action is taken.³⁴

³² University of Indonesia and U.S. Environmental Partnership. 2005. Health Risks of PM_{2.5} and CO in Jakarta.

³³ Shah, J.J., Nagpal, T., & Brandon, C.J. (1997). *Urban air quality management strategy in Asia: Jakarta report*. Washington, DC: World Bank.

³⁴ Syahril, S., Resosudarmo, B.P., & Satriyo Tomo, B. (2002b). *Study on air quality in Jakarta: Future trends, health impacts, economic value and policy options* (Technical Assistance 5937). Manila: Asian Development Bank.

A survey on the public's (i.e., government, civil society, and private sector) perception towards air pollution conducted in Jakarta, Bandung, and Surabaya yielded interesting results:³⁵

- While in the cities of Jakarta and Surabaya, about 80 to 90 percent of the respondents considered air pollution a serious problem; in Bandung, a majority of the respondents did not consider air pollution as a major issue.
- In Jakarta and Surabaya, while the level of understanding of air pollution issues is high, a considerable percentage of respondents were unwilling to commit to take measures to reduce air pollution such as paying more for cleaner fuel, paying for inspection and maintenance fee, and agreeing to be fined for non-compliance with emission regulations. Possible reasons for this low commitment could be limited information on ways to reduce air pollution and that some air pollution control measures such as vehicle inspection and maintenance are not mandatory.

³⁵ Clean Air Project, Swisscontact. (2005-2006) and Ministry of Environment. (2006).

3. LEGAL FRAMEWORK FOR AIR QUALITY MANAGEMENT

A country's seriousness in implementing a policy to provide better air quality for its people may be judged on whether: (1) the policy and its implementation details are reflected in laws, regulations and plans; (2) enough resources are provided to implement it; and (3) the laws, regulations and plans are actually implemented. This Chapter discusses the main laws, regulations, policies and plans that are the basis for air quality management in Indonesia; an overview of the management of pollution from motor vehicles, industries, and area sources; and the power and resources of smaller cities to develop and implement clean air action plans.

3.1 Air Quality Management

Indonesia does not have an Act that specifically regulates air quality management, but the Constitution and several relevant Acts, Government Regulations or *Peraturan Pemerintah* (PP) to implement the Acts, and other lower hierarchy of legal instruments such as ministerial regulations or technical guidelines to implement the PP can be used as a legal basis for addressing air quality management. The Constitution of Indonesia (Undang-Undang Dasar 45, Article 28 H 1), in general, protects the right of every person to enjoy a good and healthy environment. The main Acts, Regulations and Plans to manage pollution from motor vehicles, industries, and area sources are discussed below and summarized in Annex 6.

Act No. 23 of 1997 on Environmental Management³⁶ confers each individual the right to have a good and healthy environment and to obtain information related to the environment. It also gives each individual the obligation to preserve the environment and restricts activities that exceed environmental quality standards.

Government Regulation (PP) No. 41/1999 on Air Pollution Control is an implementing regulation to Act No. 23/1997 which relates to air quality management. This PP imposed several standards: ambient air quality standards, emission standards for industrial activities and motor vehicles, and Pollutant Standard Index (PSI). To implement the articles in this PP, the State Ministry of Environment (MoE) has issued several regulations and decrees specifically pertaining to the emissions standards. Local governments need these technical guidelines to develop and implement policies, strategies and action plans for air quality management in their respective areas.

On the authority of local governments to issue standards, the Government Regulation No. 41/1999 concerning Air Pollution Control and MoE Decree on emission standards allows provincial governments to set regional vehicle emission standards, industrial emission standards, and ambient air quality standards that are more stringent than or at least equivalent to the national standards. However, city governments have no authority to issue either emission standards or ambient air quality standards.

Some provinces have issued bylaws to prevent, control, monitor and mitigate air pollution. The provinces of Jakarta and Yogyakarta and Surabaya City are the first to have issued such a bylaw.³⁷ To implement the Bylaw, the Province of Jakarta issued a series of implementing regulations including: 1) Gas Fuel Usage for

³⁶ At time of writing was to be replaced by a new Act

³⁷ Act No. 2/2005 for the province of Jakarta, Act No. 5/2007 for Yogyakarta, and Act No. 3/2008 for Surabaya on Air pollution Control

Public Transport and Government Operational Vehicles,³⁸ 2) Vehicle Emission Test and Vehicle Maintenance,³⁹ and 3) Non-Smoking Areas.⁴⁰

Although not called the Bylaw on Air Pollution Control, the City of Bandung has also issued a Bylaw on Law and Order, Cleanliness and Aesthetic with air pollution measures such as: 1) control of air pollution from mobile sources including the supervision of vehicle emission standard compliance, on-road inspection for vehicle emissions, and monitoring of roadside ambient air quality; and 2) on-road vehicle emission testing and roadside ambient air quality monitoring by the city government at least once a year.⁴¹

Ambient Air Quality Standards

The National Ambient Air Quality Standards (NAAQS) cover SPM, PM₁₀, SO₂, NO₂, O₃, Pb, and CO. Cities are required to meet these standards. Compared with WHO Guidelines, Indonesia NAAQS are less stringent. A comparison of the NAAQS and WHO Guidelines is provided in Table 3.

Table 3. Indonesia's National Ambient Air Quality Standards and WHO Guidelines

Pollutant	Average Time	AAQS in Jakarta ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)	WHO Guidelines
SPM	24-hour	230	230	---
	1-year	90	90	---
PM10	24 hour	150	150	50 ^a
	1 year	---	---	20 ^a
SO2	1 hour	900	900	---
	24 hour	260	365	20 ^a
	1 year	60	60	---
NO2	1 hour	400	400	200 ^a
	24 hour	92.5	150	---
	1 year	60	100	40 ^a
O3	1 hour	200	235	---
	8 hour	---	---	100 ^a
	1 year	30	50	---
Pb	1 year	---	1	0.5
CO	1 hour	26,000	30,000	30,000 ^b
	8 hour	---	---	10,000 ^b
	24 hour	9,000	10,000	---

SPM = suspended particulate matter; PM₁₀ = particulate matter with diameter less than or equal to 10 micrometers; SO₂ = Sulfur dioxide; NO₂ = Nitrogen dioxide; O₃ = ozone; Pb = lead; CO = Carbon monoxide; WHO = World Health Organization

^a WHO Global Update 2005; ^b WHO 2000

Note: Values are based on the atmospheric conditions at 25°C and pressure 1 atm.

³⁸ Governor Regulation No. 141/2007

³⁹ Governor Regulation No. 92/2007

⁴⁰ Governor Regulation No. 75/2005

⁴¹ Article 22, Bylaw No. 11/2005

Management of Mobile Sources

The newly enacted Act No. 22/2009 which replaces the Act No. 14/1992 on Traffic and Road Transportation is the legal basis for the management of land transportation, including the control of vehicle emissions. The Act stipulates that the vehicle emission test is an integral part of the roadworthiness test. Hence, the responsibility for vehicle emission testing lies with the transportation office. The new important provisions in this Act relate to the road fund to be collected from road users which is managed by a unit in the Ministry of Public Works; inclusion of bicycle lanes, pedestrian pathways and crossings in road facilities; periodic roadworthiness and emission test being mandatory for public vehicles; provision of segregated lane for mass public transport; rights of pedestrians to pedestrian facilities (Annex 7). As a result of the enactment of the new Act, the implementing regulations to the outdated Act No. 14/1992 must be subsequently revised. Currently the revision process is underway and is expected to be completed within one year from the issuance date of the new Act No. 22/2009.⁴²

For new vehicles, government regulations mandate that new vehicles sold in Indonesia must comply with Euro 2 standard starting January 2005.⁴³ However, this regulation became effective in January 2007 with the phase out of leaded gasoline. According to the Chairman of the Association of Indonesia Automotive Industries (Gaikindo), all new gasoline vehicles and new motorcycles sold in Indonesia complied with the Euro 2 standard in 2007.⁴⁴ The poor quality of diesel fuel sold in the country hinders compliance by new diesel vehicles with Euro 2 standard which requires maximum of 500 ppm sulfur in diesel. The vehicle fuel specifications for gasoline and automotive diesel oil are provided in Annex 8 and the in-use vehicle emission standards in Indonesia are provided in Annex 9.

Act No. 22/2001 concerning Oil and Gas is the legal basis for the provision of cleaner fuel through the implementation of fuel specifications set by the Directorate General of Oil and Gas. This Act allows companies other than the state-owned oil company Pertamina to produce and distribute fuel. The opening of the downstream market, if followed with tightened fuel specifications, can push the production and distribution of cleaner fuel and enable the application of vehicle technology to further reduce vehicle emissions. The MoE conducts a fuel inspection program yearly to ensure that vehicle fuel specifications are complied with.⁴⁵

Exhaust gas emission test is part of vehicle roadworthiness test (Government Regulation No. 44/1993 currently being revised following the enactment of new Act. No. 22/2009 on Traffic and Road Transport). The question on which agency – environment or transport – has the authority to conduct emission test for in-use

⁴² The Government Regulations to be amended include: 1) Government Regulation No. 41/1993 on Road Transport regulating the transportation of goods and people, transportation route, route licensing, and transportation tariff; 2) Government Regulation No. 42/1993 on Road Inspection which regulates random on-road inspection to verify the result of the roadworthiness test conducted at fixed test centers; 3) Government Regulation No. 43/1993 on Road Facilities and Traffic which regulates traffic management and engineering; 4) Government Regulation No. 44/1993 on Vehicles and Drivers which regulates technical requirements and roadworthiness, motor vehicle testing, and driving license.

⁴³ MoE Decree No. 141/2003 concerning Emission Standard Limits for New Types of Motor Vehicles and Motor Vehicles in Current Production

⁴⁴ Association of Indonesia Motorcycle Industries (AISI) 2008

⁴⁵ <http://langitbiru.menlh.go.id/>

vehicles arose because of the different interpretations of the Government Regulation No. 44/1993 Article 148 which states that only certain vehicle categories such as bus, goods vehicle, specialized vehicle or commercial vehicle are required to undergo a periodic roadworthiness test every 6 months. While for other vehicle categories (passenger car and motorcycle), the need for a roadworthiness test will be covered by a separate Government Regulation which has yet to be issued.

Given that vehicle emission test for passenger car and motorcycles has not yet been regulated, several environmental agencies in the region (Jakarta, Surabaya, Yogyakarta, and Bandung) which consider it a priority to control air pollution from mobile sources, took the initiative by issuing a regional bylaw on I&M system for passenger cars and motorcycles. In this decentralized system, emission test will be carried out by the private sector in auto workshops. However, since the new legislation (Act No. 22/2009 on Traffic and Road Transport does not mandate emission testing (as part of the roadworthiness test) for private vehicles - pending the revision of Government Regulation No. 44/1993 – this could be interpreted that local government may possibly regulate emission test for passenger cars and/or motorcycles through local legislation for their respective area.

Some regions (provinces, regencies/cities) have issued laws and regulations which regulate traffic management and road transportation, and transport policy. For instance, the Province of Jakarta Bylaw No. 12/2003 concerning Traffic and Transportation and the Governor Decree No. 84/2004 concerning Macro Transportation Plan for 2007, 2010, and 2020. The macro transportation plan comprises of the development of Bus Rapid Transit (BRT) and feeder system, rail-based transportation system (train, mass rapid transit (MRT), monorail/light rail train), river transportation; and the introduction of transport demand management like traffic and parking restrictions.

The city of Surabaya has issued Bylaw No. 7/2006 on Provision of Road Public Transport. Some important provisions of this regulation are: 1) improving service-oriented public transport based on the hierarchy of roads and the quality of service (for example, on the main route, public transport should have a fixed schedule and stop at places that have been determined for pick-up and drop-off of passengers, and 2) age restriction of public transport to 15 years old.

Several state agencies and cities implement programs to reduce emissions from motor vehicles. A description of some of these programs and the challenges faces are provided in Table 4.

Table 4. Programs to Reduce Emissions from Motor Vehicles

Program	Program Details and Challenges
Blue Sky Cities Award	<ul style="list-style-type: none"> • Launched by MoE in 2007 to promote environmentally sustainable transport (EST) and support cities in implementing EST policies • A set of evaluation criteria has been established and applied. The evaluation criteria include ambient air quality, vehicle exhaust emissions, and transport management system. In 2008, 5 cities were among the first recipients of the Award. This program also aims to support the existing Adipura Awards Program (an evaluation of region/city performance in overall environmental management).
Wahana Tata Nugraha Award	<ul style="list-style-type: none"> • The program run by MoT encourages city government to manage transportation in a more environmentally sustainable manner. It evaluates traffic and road transport management performance by cities. The criteria include administrative (institutional arrangement, human

	resources, planning and program, and finance) and technical (facility, infrastructure, and traffic) aspects. The criteria emphasize the engineering aspect of transportation rather than EST. EST has potential to be included in the criteria to motivate cities to promote EST measures such as BRT, cycling, walking, etc. Lately, MoE and MoT have initiated a discussion to synergize Blue Sky Cities Award and Wahana Tata Nugraha Award to address, among others, budgetary and outreach issues.
Gas conversion	<ul style="list-style-type: none"> • As part of the national energy saving program, MoT distributed more than 2,000 gas converter kits since 2006 to taxi and public microbus operators in cities where CNG supply is available. The program promotes shift of high usage public vehicles from gasoline to gas. CNG has been used as a transport fuel in Jakarta and other cities since the 1980s, reaching its peak during 1997-2000 but then continuing to decline up to the present. • The program has so far not fulfilled the promise that it would replace gasoline and diesel. The main reason for the lack of success to date has been that the controlled price of compressed natural gas (CNG) has been too low (around 43% of that gasoline) to provide an adequate return to the CNG filling station operators. Customers complain of slow and incomplete refueling, carry-over of oil and water into the vehicle cylinder which leads to maintenance problems and presents a safety hazard.
Bus transit	<ul style="list-style-type: none"> • MoT promotes service-based bus transit system and provides technical assistance to cities (Yogyakarta, Bandung, Bogor, Makassar, Semarang, Solo, Pekanbaru, Manado, etc.) in developing the bus system to reduce congestion, traffic emissions and address energy conservation. MoT provides buses and coaching during implementation to priority cities. • In Yogyakarta and Bogor, the service-based bus system has been operating. There are still many technical obstacles to overcome such as the distance between one bus stop to the next (for instance in Yogyakarta, the distance between two adjacent stops can reach up to 2 kilometers), bus routes that are looped and not direct, elevated bus stop that is not user-friendly; but the transformation of public transportation from “lease-based” to “service-based” system where drivers are paid monthly is an important breakthrough and should be supported. The biggest social problem related to the program is the strong opposition from minibus/ medium bus operators due to competition.
Transjakarta Bus Rapid Transit (BRT)	<ul style="list-style-type: none"> • The Transjakarta Busway in Jakarta is a breakthrough to overcome traffic gridlock and provide co-benefits for air quality and climate change mitigation. The Transjakarta has 8 corridors of 120 kilometers, serviced by 335 CNG buses and 91 diesel buses. Anticipating increased demand and recognizing the need to provide high quality mass transit, Transjakarta has committed to expand its infrastructure and improve service. Albeit the network growth, TransJakarta faces complaints from the passengers mostly relating to convenience, safety and speed. The main areas of concern are long queues for passengers to board, lack of passenger information, insufficient bus frequency and the condition of stations. Long queuing times and insufficient bus frequency are caused by technical design and operational problems.
Scrappage of 2-stroke 3-wheelers	<ul style="list-style-type: none"> • More than 500 dated two-stroke three-wheelers (bajaj) of 14,000 targeted in Jakarta have been scrapped and replaced by new compressed natural gas (CNG) three-wheelers. The program was initiated by the city government of Jakarta in collaboration with the bajaj operators association and Bajaj Auto Ltd. which sell CNG bajajs on credit financing scheme to bajaj owners. To ensure the phase-out of old bajaj, the government only issues licenses for new bajaj. For bajaj owners, the conversion gives benefits, i.e. low fuel and maintenance costs and higher return. However, upgrading of old bajaj to CNG-powered ones has been slow. The main reason for the slow progress is the high taxation involved in acquiring a CNG bajaj which includes a 45% customs office tax and a 10% luxury tax. The tax regime in Indonesia is still not in favor of environmentally sustainable or energy efficient practices.
Car Free Day (CFD)	<ul style="list-style-type: none"> • To increase public awareness on the need to curb air pollution, a CFD has been held once a month on the busiest main road in the city center of Jakarta and Surabaya. The road is closed for motor vehicles for 6-8 hours starting in the morning on that day. CFD is mandated in the

	Air Pollution Control Bylaw of Jakarta, but it is voluntary for Surabaya. The Environment Agency, Traffic Police Department, Transportation Agency are the key organizations supporting the program. People take the advantage of roads being closed to do various activities such as cycling, walking, sports, etc. Other cities, such as Bandung and Palembang have also recently introduced CFD.
Inspection and maintenance (I&M)	<ul style="list-style-type: none"> • The government of Jakarta has been struggling to implement the decentralized I&M system for private vehicles as mandated in the Air Pollution Control Bylaw. The system is still voluntary because emission test is not associated with the extension of annual vehicle registration. As long as I&M is not mandatory, it cannot be considered an effective method to reduce air pollution. Other cities have followed Jakarta by issuing similar regulations, but are faced with practical enforcement problems, lack of capacity and enforcement strategy. • The policy and regulatory framework concerning vehicle registration is applicable nationwide and determined by the national government, so any decisions with regard to integrating an emission inspection procedure into the annual vehicle registration has to be made at the national level.
Bicycle program	<ul style="list-style-type: none"> • Bicycle program “<i>Sego Segawe</i>” or “Bicycle for School and Work” was recently launched in Yogyakarta by the Mayor of Yogyakarta City to revive the tradition of Yogyakarta as a bicycle city. Bicycle used for short distance transportation (3-5 kilometers), will also reduce emissions and curb motorization and lead to more humane city. Although not mandatory, the Mayor has instructed school principals to encourage schoolchildren to use bicycles.

Management of Stationary Sources

Although it does not specifically regulate air quality management, Act No. 5/1984 on Industrial Activities prohibits activities that damage the quality of the environment and ecosystem. The PP No. 13/1995 on Industrial Business License, one of the implementing regulations of this Act, binds industry to comply with environmental regulations as one of the requirements to obtain a business license. In addition, PP No. 27/1999 concerning Environmental Impact Analysis and its implementing guidelines require the proponents of activities to prepare and implement an environmental management and monitoring plan.

Industrial permits are granted by regency/city government if an activity is located in the respective regency/city. The industrial permit is associated with an Environmental Impact Assessment (EIA) or Environmental Management Plan and Environmental Monitoring Plan. The environmental agency at the respective level assesses the feasibility of planned activities and requires proponents to prepare an environmental management plan and environmental monitoring plan including emission standard compliance plan.⁴⁶ An activity permit will be granted by a relevant government agency responsible for supervising the activity after its environmental management plan is approved. For example, if it concerns industrial activities, the Industrial Agency at the respective government level grants the permit, and if it concerns building a hospital, then the Health Agency grants the permit. Enforcement of industrial emission regulations is conducted by the Environmental Agency in the region (province/regency/city).

Industrial emissions standard regulations are the most referred regulations in the industrial sector with regard to air pollution control. The regulations provide authority for local (provincial) government to set out emission and ambient air quality standards applicable for their area. Some provincial governments issued industrial emission standard limits that are either equal or more stringent (e.g., Jakarta) than the national

⁴⁶ Government Regulation No. 27/1999

limits regulated by MoE. If a provincial government does not issue the standard limits for industrial and/or vehicle exhaust emissions then the national standard applies. It should be noted that city governments do not have such authority.

Act No. 30/2007 concerning Energy requires energy management to be based on the principle of sustainability and environmental protection, among others. This Act regulates energy resilience, new and renewable energy, energy prices, and the establishment of National Energy Council (NEC). The NEC is led by the President along with members selected and chosen by the House of Representatives. NEC formulates energy policy, designs the overall national energy plan, determines the emergency response plan in the event of an energy crisis, and supervises the implementation of cross-sectoral policies by the relevant government institutions in the field of energy. This Act also stipulates that energy conservation is given incentives, while energy dissipation is imposed disincentives.

Presidential Regulation No. 5/2006 concerning National Energy Policy set the target for energy mix by 2025. The decree states that the contribution of fossil oil as a source of energy is targeted to be reduced from 52% in the year 2003 to 26.2% in the year 2025 of the total energy demand. While for other sources of energy, contribution of geothermal is targeted to increase from 3.1% to 3.8%, natural gas from 21.2% to 30.6%, coal from 19.7% to 32.7%, and renewable energy from 0.2% to 4.4%. On the other hand the contribution of hydropower is targeted to be reduced from 3.8% to 2.4%.

In response to the rising global oil prices and Indonesia's over reliance on fossil fuels, the President instructed the relevant line ministries and local government through Presidential Instruction No. 1/2006 to take necessary action to accelerate the production and utilization of biofuel as an alternative source of energy.

Presidential Instruction No. 10/2005 concerning Energy Conservation and Regulation of the Ministry of Energy and Mineral Resources No. 31/2005 on Energy Efficiency require government agencies to undertake energy conservation in offices, office equipment, and transportation, and for industries to undertake energy audits and promote the use of energy saving products or technology.

Management of Area Sources

Waste burning is another source of air pollution which requires attention. Cities face the challenge of efficiently managing solid waste. The waste collection capacity and disposal is generally insufficient to serve the city 100 percent. While in Jakarta, waste collection rate is at 97 percent, in the Bodetabek area (Bogor, Depok, Bekasi, Tangerang) the waste collection rate is only at 33 percent.⁴⁷ Unserved households often burn their garbage; very few compost and recycle solid waste.

Some cities (e.g., Pontianak and Bekasi) have initiated CDM projects for the city waste landfill and Jakarta plans to follow their example.

⁴⁷ Jakarta Environment Status Report. 2006.

Regional Governments Institutional Structure

Agencies and offices at the regency/city, provinces and national levels play different roles in managing air quality in smaller cities. In this report, regional governments refer to regency/city and province.

The Republic of Indonesia is divided into provinces, and each province consists of regencies and/or cities that have their own government and legislative body. A regency and city are at the same level of local government but they differ only in area and economic activity; the regency is larger in area than a city and a city only has non-agricultural economic activity. Additional information on Regional Government Structure is provided in Annex 9.

Regional governments enjoy a greater role in administering their government affairs except foreign policy, defense, judicature, monetary and fiscal, and religion. **In the utilization of natural resources**, the national government, provincial and regency/city government cooperate; they manage licensing together, and share the revenue. **In the provision of public services**, the national government sets a minimum service standard, assists funding and facilitates regional cooperation. **In financial matters**, the national government provides financial resources for local government to administer their own government affairs, allocates balanced fund and provides loan or grant to regional government. The relationship between provincial government and regency/city government in the field of finance among others are: sharing tax and non-tax revenue, and funding for government affairs that are of mutual responsibility.⁴⁸

The head of the region together with the regional House of Representatives pass regional legislation or bylaw. A bylaw must be consistent with the public interest and with higher legislation (National Acts and Government Regulations); if it is in conflict, the bylaw is annulled by the national government. A bylaw can impose a criminal sanction of confinement (maximum of 6 months or fine up to Rp. 50 million) or impose other sanctions. To implement a bylaw, the head of the region issues a regulation or decree.

The regional government (province or regency/city) develops a **regional development plan** which consists of: 1) Long Term Development Plan of 20 years that refers to the National Long Term Development Plan, 2) Mid-Term Development Plan of 5 years that refers to the National Mid-Term Development Plan, 3) Regional Development Work Plan of 1 year which is derived from the Mid-Term Development Plan. The Regional Mid- and Long-Term Development Plan is regulated through a bylaw. The government agency responsible for preparing the regional development plan is the Regional Development Planning Agency. Guided by the Regional Mid-Term Development Plan, regional technical agencies then prepare a **strategic plan** which defines vision, mission, goal, strategies, policies, programs, and activities in accordance with the duties and functions of the respective agencies.

The national government is required to assist the regional government in strengthening the capacity of the region for executing tasks and responsibilities that are in line with the authority of the regional government. Hence, a concerned minister for a related matter, for instance for environmental affairs, shall provide coaching to its counterpart at the regional level.

⁴⁸ Act No. 32/2004 on Regional Government

As an illustration, the role and function of a national government agency (Ministry of Environment) is described as follows: the MoE Regulation No. 1/2005 concerning Organization and Work Guidance for the Ministry of Environment states that the tasks of Assistant Deputy Minister for Mobile Source Emission Control are to: 1) formulate policies in the field of environmental impact control due to emission and noise pollution from motor vehicles; 2) monitor, analyze, and evaluate the implementation of policies; and 3) prepare policy implementation report in the field of emission control and noise pollution from vehicles. The description of this task indicates that the role of MoE and other ministries at the national level is to formulate policies; develop norms, standards, procedures and criteria; and provide support and coaching to the corresponding regional agencies. Meanwhile, technical agencies in the region play an important role in the preparation of regional policies and strategies and execution of the strategies and programs based on the policies, norms, and standards set by the ministries.

Regional governments can have their own initiatives to control air pollution. However, not all regions (provinces, regencies or cities) have sufficient capacity and resources to develop and implement air pollution programs. Assistance from national government (ministries) to help cities develop and implement an air quality strategy and action plan is needed. The national government also needs to encourage regions to take initiative to control air pollution in their respective regions. Programs such as car free day, bus rapid transit, three-wheelers gas conversion, and I&M are examples of regional initiatives.

Climate Change Mitigation

The **2007 National Action Plan (NAP) on Climate Change** is Indonesia's guiding document on climate change efforts. It guides various agencies in carrying out efforts to tackle climate change and sets the requirements for institutional coordination. It provides for immediate, short-, medium-, and long-term actions.

The **National Council for Climate Change** was established to coordinate the implementation of climate change mitigation efforts.⁴⁹ Headed by the President, the Council's tasks include the development of national policy, strategy, program and action plan for mitigating climate change. Besides the 2007 NAP developed under the coordination of MoE, the National Development Planning Agency (Bappenas) also issued the **National Development Planning Response to Climate Change**. This document aims to mainstream environmental and natural resource considerations into the development planning process. It also discusses funding mechanism for climate change mitigation and adaptation programs.

The MoE Decree No. 206/2005 on the establishment of *Komisi Nasional Mekanisme Pembangunan Bersih (Komnas MPB)* or the National Committee for the Clean Development Mechanism states that the Komnas MPB functions as Indonesia's Designated National Agency (DNA) and is responsible for assessing, evaluating, and monitoring clean development mechanism (CDM) activities in Indonesia. The Committee is led by a National Executive Board with representatives from nine national government institutions. The head of the Committee is MoE.

As Indonesia implements measures within the National Energy Policy to ensure self-sufficiency, it is important to ensure that new coal-fired power plants are state-of-the-art, energy efficient and use cleaner

⁴⁹ Presidential Regulation No. 46/2008

technologies. Existing coal-fired power plants' performance must also be assessed. Increasing biofuels production in support of this policy should also be considered with caution as its implications to land-use and food production may be economically and socially counter-productive in the long-term. Government should support research and development for biofuels production and use, especially for second generation biofuels.

3.2 Clean Air Action Plans in Smaller Cities

Since the implementation of regional autonomy in the year 1999 (Act No. 22/1999 on Regional Government which was then superseded by Act No. 32/2004), regional governments have the authority to manage their own affairs, except matters that fall under the authority of the national government. The development implementation of clean air action plans is within the regional governments' power.⁵⁰ Several regional governments have developed clean air action plans. The Province of Jakarta, City of Surabaya, City of Bandung, City of Semarang, and Province of Yogyakarta (collectively called the "UAQ-I provinces and cities") developed clean air action plans in 2006 as part of the Urban Air Quality Improvement (UAQ-i) Sector Development Program implementation. A participatory approach was used in the action plan development.

The action plan shall be used as reference and guideline for various institutions in the implementation of measures to improve air quality. For example, the Environmental Board of Jakarta which is currently developing its local emission inventory used the action plan document as reference.

Among the lessons learned from previous action planning include: 1) for the action plan to be implemented, there should be local ownership of the action plan achieved by active involvement by local stakeholders in its formulation; and 2) formulation of action plan requires an effective coordination among sectors; it is important for the lead agency to demonstrate sufficient capacity in inter-agency coordination and communication.

Planning for areas related to clean air (e.g., urban planning, transport, development and spatial planning) is also within the ambit of regional governments' authority. In terms of urban planning, regional governments (province and regency/city) have the authority to develop regional or city spatial planning, incorporate and oversee the implementation of spatial planning (Act No. 26/2007). Urban planning is governed by regional legislation and must be integrated with the national spatial planning thus it has to be approved by Minister of Public Works before the bylaw is enacted. Likewise the transport plan and regional or city development plan have to be integrated with the national spatial planning. The regional governments have full authority to develop regional or city transport plans. They can also grant franchises to public transport operators. Besides the spatial planning, other plans that determine the city development is Long Term Development Plan (20 years) and Medium Term Development Plan (5 years), which are regulated through legislation at the national and regional level. In the end, air quality management efforts and environmentally sustainable transport policies have to be integrated into the Spatial Planning and City Development Plan.

⁵⁰ The legal bases of the powers of regional government include: Act No. 32/2004 on Regional Government; Act No. 33/2004 on Fiscal Balance between National and Regional Government; Act No. 18/1997 on Regional Tax and Retribution; Act No. 4/2000 on Revision to Act No. 18/1997 on Regional Tax and Retribution; Government Regulation No. 38/2007 on Division of Government Affairs between National Government, Provincial Government, and Regency or City Government; Government Regulation No. 41/2007 on Regional Structure of Organization.

Regional government revenues and expenditures

Regional governments have several sources of income. The structure of revenue and expenditure is different from one region to another. Regional income is generated from: 1) regional direct revenue (regional tax and retribution, regional wealth management, and other regional income), 2) revenue sharing (**balanced fund** generated from revenue sharing between national and regional government, **general allocation fund** (DAU), and **special allocation fund** (DAK)), and 3) other revenues.

Act. No 18/1997 and Act No. 34/2000 concerning Regional Tax and Retribution, and Government Regulation No. 65/2001 on Regional Tax stipulate the following: Regional taxes that are regulated in the legislation include motor vehicle tax or road tax, motor vehicle fuel tax, hotel tax, restaurant tax, entertainment tax, advertisement tax, street lighting tax, tax concerning extraction of minerals from quarries, and parking tax. In addition to the types of tax specified in this legislation, through a bylaw, the regional government may impose other taxes in accordance with the criteria set in the legislation.

Motor vehicle tax is collected by the provincial government in the region where the vehicle is registered. Revenue from motor vehicle tax is shared between province and regency/city with the allocation of 70% for province and 30% for regency/city. City government does not collect motor vehicle tax. **Motor vehicle fuel tax** charged to the consumer amounts to 5% of the sale value of motor vehicle fuel. The tax is collected by the fuel provider (Pertamina) and distributed to the provincial government. Revenue sharing from motor vehicle fuel tax between province and regency/city is 30% for province and 70% for regency/city.

In addition to the three types of tax collected by the province (i.e. motor vehicle tax, motor vehicle fuel tax), **other local taxes** (hotel tax, restaurant tax, parking tax and others) are collected by regency/city. Revenues from these local taxes are not shared and accrue solely to the regional government. The regional taxes are specified in a bylaw. In the framework of supervision, local legislation has to be submitted to the Minister of Home Affairs and Minister of Finance. In the event that a local legislation is in conflict with the public interest and/or higher legislation, then the Minister of Home Affairs with recommendation from the Minister of Finance annuls the legislation.

Revenue sharing is generated from taxes including income and property tax, and from natural resources management such as, for instance, mining yields in the respective region. The last two sources of fund, DAU and DAK, are provided by the national government. DAU is allocated based on certain criteria that emphasize the even distribution and justice across regions. It is allocated following a certain percentage of state revenue as specified in the State Revenue and Expenditure (APBN). DAK is allocated from APBN to a particular region to finance specific activities in the region that are mandated by the national government on the basis of national priorities, and financing specific activities proposed by the regional government. Other sources of income include grants and emergency funds. Grants may come from the national government, community and private sector both domestically or abroad. Grants received from abroad are done through the national government.

Regional governments are not allowed to take a loan directly from parties outside of the country. However, they can take a foreign loan channeled through the Ministry of Finance on behalf of the national government after obtaining consideration from the Ministry of Home Affairs.

Regional expenditure is generally divided into: 1) state apparatus expenditure, 2) public expenditure, 3) financial assistance expenditure, and 4) contingency. Expenditure for environmental programs (particularly for air quality management program) is further divided into a direct and indirect spending of technical agencies that are associated with the management of air quality (environment agency, industry, transport, sanitation, and others). Thus, the expenditure for air quality program can be said as a total sum of expenditures related to air quality management incurred by all relevant agencies.

Table 5 is a summary of the structure of revenue and expenditure in 5 regions for the year 2004-2005. From the table it can be concluded that relatively low expenditure for air quality management program indicates a low priority for the program.

Table 5. Summary of revenue and expenditure in 5 regions for the year 2004-2005⁵¹

Province of Jakarta	<ul style="list-style-type: none"> • Revenue: 46% from regional direct revenue, 35% from revenue sharing and state fund, and 19% from others • Overall revenue breakdown: 40% from regional tax, 30% from tax and non-tax revenue sharing, and the remaining from others • Expenditure: 61% for public expenditure, 35% for apparatus expenditure (staff) • Environmental program expenditure: 6.1% of total expenditure • Air quality program expenditure: 2.8% of total expenditure
Surabaya City	<ul style="list-style-type: none"> • Revenue: 32% from regional direct revenue, 64% from revenue sharing and state fund, and 4% from others • Overall revenue breakdown: 18% from regional tax, 26% from tax and non-tax revenue sharing with national government, 24% from DAU, 15% from provincial tax revenue sharing and financial assistance, and the remaining is from others • Air quality program expenditure: 4.8% of total expenditure
Bandung City	<ul style="list-style-type: none"> • Expenditure: 50% for public expenditure • Air quality program expenditure: 8% of total expenditure or 15% of public expenditure
Semarang City	<ul style="list-style-type: none"> • Expenditure: 68% for public expenditure • Air quality program expenditure: 1.05% of total expenditure or 1.5% of public expenditure
Yogyakarta City	<ul style="list-style-type: none"> • Revenue: 20% from regional direct revenue, 60% from revenue sharing and state fund • Overall revenue breakdown: 18% from regional tax and retribution, 8% from tax and non-tax revenue sharing, 56% from DAU, 6% from subsidy from the Special Province of Yogyakarta • Expenditure: 65% for apparatus expenditure, 24% for public expenditure • Environmental program expenditure: 0.8% of total expenditure • Air quality program expenditure: 0.6% of total expenditure

⁵¹ Bappenas. 2006. Local Strategy and Action Plan for Urban Air Quality Improvement (Jakarta, Surabaya, Bandung, Semarang, and Yogyakarta).

4. STAKEHOLDERS

No less than the Constitution of the Republic of Indonesia recognizes the right of every person to enjoy a good and healthy environment. Laws and regulations support stakeholder participation in decision making on matters of the environment. This Chapter takes a look at whether stakeholders actively participate in air quality management especially in regional governments in Indonesia.

National government agencies

An important contribution by the national government agencies in air quality management by cities is in capacity building and technical guidance to cities in air quality policy and action plan implementation. While some cities have been proactive in passing bylaws to control air pollution (e.g., Bandung, Bogor, Batam Balikpapan, Jakarta, Surabaya, Yogyakarta), some cities require technical guidance and assistance from the national government. Lacking such technical guidance, some regional governments may find it difficult to implement national policies.

Regional government associations

There are several regional government associations which provide assistance to its members (Annex 12). The common aim of these regional government associations is to create synergies among their members and to build the capacity of members in different areas of concern. These associations would be important partners in promoting better air quality management in Indonesia's cities, regencies, and provinces:

- *Asosiasi Pemerintah Kabupaten Seluruh Indonesia* (APKASI - Indonesian Governmental Regencies Association). APKASI programs focus on advocacy, capacity building and regional cooperation. The association has also published some publications such as newsletters, best practices in various fields (one-stop public service, government information system, etc.)
- *Asosiasi Dewan Perwakilan Rakyat Daerah Kabupaten Seluruh Indonesia* (ADKASI - Association of Indonesian Regency Parliament) aims to achieve an effective legislative body by encouraging good governance towards sustainable development in the framework of regional autonomy and democracy
- *Asosiasi Pemerintah Provinsi Seluruh Indonesia* (APPSI – Association for Provincial Government of Indonesia) aims to build harmonious relationship between national and regional government, and to increase the capacity of regional government through education and training activities, research, seminars
- *Asosiasi Pemerintah Kota Seluruh Indonesia* (APEKSI - Indonesian Municipalities Association) aims to empower cities in implementing regional autonomy and create an amicable cooperation between city governments
- *Asosiasi DPRD Kota Seluruh Indonesia* (ADEKSI - Indonesian Municipal Councils Association) aims to improve quality of life through enhancing regional democracy

Nongovernment Organizations (NGOs)

The activities of NGOs related to air pollution issues can be grouped into three: (a) public awareness campaigns, (b) policy advocacy and reform, and (c) technical solutions. The most important contributions of NGOs in public awareness are in the phase out of leaded gasoline, establishment of stakeholder networks [e.g., Mitra Emisi Bersih (MEB), Asosiasi Emisi Bersih (AEB), and Gerakan Peduli Udara Bersih (GPUB)], setting up of call center or hotline to report polluting vehicles, and organizing the Car Free Day. In policy advocacy and reform, NGOs assist in the formulation of air pollution control legislation at the sub-national or regional government level; and phase out of leaded gasoline nationwide. NGOs also propose technical solutions and assist in implementing them such as ecodriving and cleaning up buses.

Media

The media coverage and public service advertisements have helped bring air pollution problems to the attention of national and regional agencies responsible for managing air quality. Media has helped shape the opinion of decision-makers in favor of better air quality management.

Universities and academe

Universities and academe have conducted scientific research in the field of air pollution. The main studies include:

- Personal exposure monitoring of CO and PM_{2.5} in Jakarta (University of Indonesia, 2005)
- Blood lead levels in school children in Jakarta and Bandung (University of Indonesia and ITB, 2004-2005)
- Blood lead levels in street vendors in Surabaya (University of Airlangga, 2004)
- Cohort study on the relationship between respiratory symptoms and air pollution in school children in Jakarta (University of Indonesia, 2001)
- Blood lead levels in public minibus drivers in Surabaya (University of Airlangga, 1999)
- Measurement of bio-diesel emission levels (ITB, 2006)
- Various sustainable transport studies (PUSTRAL - University of Gajah Mada, 2001-to date)

Development Agencies

Development agencies provide technical and financial support through projects aimed to improve air quality management. Some of the main air quality related projects in Indonesia supported by development agencies were:

- Indonesia country natural resource environment analysis and National development planning response to climate change (DANIDA, 2007)
- Integrated vehicle emission reduction strategy for greater Jakarta, Indonesia (ADB Regional Technical Assistance 5937 in 2002)
- National strategy and action plan for urban air quality improvement, and local strategy and action plan for 5 urban cities (ADB, 2005-2006)
- Urban air quality management strategy in Asia: Jakarta report (World Bank, 1995)

- Jakarta Clean Air Project (Swiss Agency for Development and Technical Cooperation, 1997 to 2007)
- The study on integrated transport master plan for JABODETABEK – SITRAMP (JICA, 2004)
- The study on the integrated air quality management for Jakarta metropolitan area (JICA, 1997)

5. FINDINGS

The findings of the report focus on the three main areas discussed in the previous chapters: (1) state of the air, (2) legal framework for air quality management, and (3) stakeholder participation in air quality management.

- **State of the air:** Determining the status of air quality in Indonesian cities, at the moment, is possible only for cities which monitor air quality. Air quality monitoring results for the cities of Jakarta, Surabaya, and Bandung, indicate that parameters PM₁₀ in these cities, and O₃ in Jakarta exceed the national or provincial ambient air quality standards and/or WHO air quality guideline. The SO₂ annual average trend from 2001-2007 in three cities (Jakarta, Surabaya and Bandung) is increasing. Among these three cities, Surabaya has the highest SO₂ average concentration; which corresponds to Surabaya's being one of the major industrial areas in the country. PM₁₀ is a significant pollutant in Indonesia. While the average annual PM₁₀ trend in Jakarta, Surabaya and Bandung is decreasing (Figure 3), in 2008, the annual average PM₁₀ level of about 50 µg/m³ based on data taken from 12 stations in 6 cities show PM₁₀ levels of four out of six cities exceeded the WHO guideline value of 20µg/m³ (annual). However, if Pollutant Standard Index (PSI) reports are considered, the air quality in Surabaya and Jakarta shows some level of improvement based on the increasing number of "Good Days" in the last 2-3 years for Surabaya and from 2005 to 2008 for Jakarta. However, the trend of improved air quality in Jakarta and Surabaya needs to be further studied to verify the underlying factors including the limitations of using the PSI to assess a city's air quality.
- **Legal framework for air quality management:** While some technical guidelines for air quality management have yet to be issued by national government agencies, the basic laws and regulations to guide air quality management in cities are in place (e.g., ambient air quality standards, fuel quality standards, emission standards for industrial and mobile sources). Cities are vested with power and authority to develop and implement air quality action plans and related plans (e.g., city development, transport, and spatial plans). With support from projects funded by development agencies, some of the larger cities have developed air quality action plans; smaller cities still require assistance for air quality action plan formulation. Revenue laws allow cities some access to sources of funding for air quality programs. However, from a study of selected cities, expenditure for air quality management currently constitutes a very small portion of total city expenditure.
- **Stakeholders:** An important lesson learned from previous action planning exercises is the need for local ownership of the action plan. This can be achieved by involving stakeholders in the formulation process from beginning to end. National government agencies (through technical guidelines and support), educational institutions and academe (through scientific studies), NGOs (through public awareness, policy advocacy and reform, and technical solutions), private sector (technologies and other support) and development agencies (technical and financial assistance) assist smaller cities in many aspects of air quality management. They should be involved in the action planning and action plan implementation. Regional government associations could play an important role in the systematic and wide dissemination of case studies (e.g., good practices, air quality policies and programs) and in capacity building on air quality management for their member local governments.

ANNEXES

Annex 1

Population and Population Density of Selected 22 Indonesia Cities

Cities	Province	City Population (As of June 2005) ¹	Area (km2) ²	Density (inh./km2)
Jakarta	DKI Jakarta	8,839,247	656.0	13,474
Surabaya	East Java	2,611,506	374.8	6,968
Pematangsiantar	North Sumatra	2,295,252	80.0	28,701
Bandung	West Java	2,288,570	167.7	13,649
Medan	North Sumatra	2,029,797	265.1	7,657
Bekasi	West Java	1,940,308	210.5	9,218
Tangerang	Banten	1,451,595	164.5	8,822
Semarang	Central Java	1,352,869	225.2	6,008
Depok	West Java	1,339,263	200.3	6,687
Makasar (Ujungpandang)	South Sulawesi	1,168,358	175.8	6,647
Bogor	West Java	891,467	21.6	41,348
Bandar Lampung (Tanjungkarang)	Lampung	790,057	169.2	4,669
Malang	East Java	773,174	252.1	3,067
Pekanbaru	Riau	730,956	632.3	1,156
Padang	West Sumatra	686,908	695.0	988
Batam	Riau Archipelago	587,227	715.0	821
Banjarmasin	South Kalimantan	576,413	75.0	7,686
Denpasar	Bali	574,610	124.0	4,635
Samarinda	East Kalimantan	562,463	167.0	3,368
Cimahi	West Java	546,879	40.3	13,587
Surakarta	Central Java	506,397	44.0	11,501
Pontianak	West Kalimantan	501,843	107.8	4,654

¹ http://www.citypopulation.de/Indonesia.html#Stadt_alpha

² Data from Wikipedia

Annex 2

Percent of Population Living in Urban Areas by province in Indonesia

Province	2000	2005	2010	2015	2020	2025
Nangroh Aceh Darussalam	23.6	28.8	34.3	39.7	44.9	49.9
North Sumatra	42.4	46.1	50.1	54.4	58.8	63.5
West Sumatra	29	34.3	39.8	45.3	50.6	55.6
Riau	43.7	50.4	56.6	62.1	66.9	71.1
Jambi	28.3	32.4	36.5	40.6	44.5	48.4
South Sumatra	34.4	38.7	42.9	47	50.9	54.6
Bengkulu	29.4	35.2	41	46.5	51.7	56.5
Lampung	21	27	33.3	39.8	46.2	52.2
Bangka-Belitung	43	47.8	52.2	56.5	60.3	63.9
DKI Jakarta	100	100	100	100	100	100
West Java	50.3	58.8	66.2	72.4	77.4	81.4
Central Java	40.4	48.6	56.2	63.4	68.9	73.8
DI Yogyakarta	57.6	64.3	70.2	75.2	79.3	82.8
East Java	40.9	48.9	56.5	63.1	68.9	73.7
Banten	52.2	60.2	67.2	73	77.7	81.5
Bali	49.7	57.7	64.7	70.7	75.6	79.6
West Nusa Tenggara	34.8	41.9	48.8	55.2	61	66
East Nusa Tenggara	15.4	18	20.7	23.5	26.4	29.3
West Kalimantan	24.9	27.8	31.1	34.8	39	43.7
Central Kalimantan	27.5	34	40.7	47.2	53.3	58.8
South Kalimantan	36.2	41.5	46.7	51.6	56.3	60.6
East Kalimantan	57.7	62.2	66.2	69.9	73.1	75.9
North Sulawesi	36.6	43.4	49.8	55.7	61.1	65.7
Central Sulawesi	19.3	21	22.9	24.9	27.3	29.9
South Sulawesi	29.4	32.2	35.3	38.8	42.6	46.7
Southeast Sulawesi	20.8	23	25.6	28.5	31.8	35.5
Gorontalo	25.4	31.3	37	42.8	48.2	53.2
Maluku	25.3	26.1	26.9	27.9	28.8	29.9
North Maluku	28.9	29.7	30.6	31.5	32.5	33.6
Papua	22.2	22.8	23.5	24.3	25.1	26

Source: Indonesia population projection 2000-2025, BPS, Bappenas, UNPF, 2005

Annex 3

Trends in emission loads in Greater Jakarta

SO₂

Emission fraction	Transport	Industry	Other sources
1992	26%	63%	11%
1995	23%	71%	6%
1998	21%	72%	7%

NO_x

Emission fraction	Transport	Industry	Other sources
1992	73%	16%	11%
1995	77%	29%	2%
1998	71%	26%	3%

HC

Emission fraction	Transport	Industry	Other sources
1992	89%	1%	10%
1995	100%	0%	-
1998	-	-	-

CO

Emission fraction	Transport	Industry	Other sources
1992	99%	0%	1%
1995	100%	0%	0%
1998	-	-	-

PM₁₀

Emission fraction	Transport	Industry	Other sources
1992	44%	15%	41%
1995	89%	11%	0%
1998	71%	25%	4%

Sources:

Japan International Cooperation Agency. (1997a). *The study on the integrated air quality management for Jakarta metropolitan area*. Japan: Nippon Koei Co., Ltd., & Suuri keikaku Co., Ltd.

Shah, J.J., Nagpal, T., & Brandon, C.J. (1997). *Urban air quality management strategy in Asia: Jakarta report*. Washington, DC: World Bank.

Soedomo, et al. (1992). *Status pencemaran udara Kota Jakarta, Bandung, Semarang, Surabaya dan Medan*. LPPM ITB – Bapedal.

Syahril, S., Resosudarmo, B.P., & Satriyo Tomo, B. (2002b). *Study on air quality in Jakarta: Future trends, health impacts, economic value and policy options* (Technical Assistance 5937). Manila: Asian Development Bank.

Annex 4

Air quality monitoring data

Annual Mean (ug/m3)								
SO2								
	Jakarta	Surabaya	Bandung	Palangkaraya	Pekanbaru	Medan	Semarang	
2000				3.22	7.66			
2001	15.17	16.99	25.99	13.93	3.77	1.84	8.04	
2002	22.91	30.44	16.38	13.03	2.92	5.05	9.45	
2003	53.58	44.54	17.81	27.08	11.25		11.65	
2004	53.24	56.19	26.96			33.12		
2005	33.96	94.17	20.16					
2006	27.59	128.21	13.17		9.31			
2007	27.93	128.01	25.65	5.21	1.46	59.51		
2008	52.65	79.69		5.58	7.12	92.48		

Annual Mean (ug/m3)								
PM10								
	Jakarta	Surabaya	Bandung	Palangkaraya	Pekanbaru	Medan	Semarang	
2000				21.14	63.67			
2001	64.33	62.73	59.98	36.64	29.28	40.92	52.57	
2002	80.31	64.62	46.57	138.83	68.41	71.22	55.63	
2003	72.81	57.72	45.24	40.51	46.86		57.00	
2004	77.15	41.58	53.38			84.08	58.86	
2005	70.23	52.52	55.98		14.19			
2006	73.93	53.12	50.41	169.41	24.32			
2007	60.08	51.73	59.41	17.06	5.75	61.3		
2008	42.56	68.67	50.61	14.99	11.34	111.09		

Annual Mean (ug/m3)								
NO2								
	Jakarta	Surabaya	Bandung	Palangkaraya	Pekanbaru	Medan	Semarang	
2000				4.09	11.42			
2001	34.95	26.61	24.89	2.6	6.04	15.63	20.67	
2002	49.76	27.29	20.17	4.51	7.68	19.78	21.84	
2003	35.63	26.22	16.94	4.18	2.79		22.34	
2004	36.97	21.35	22.25			4.82	23.36	
2005	48.9	16.67	25.13		0.97			
2006	34.53	13.99	35.7		4.5			
2007	25.64	9.05	23.2	1.78	6.02	10.11		
2008	18.47	4.63		1.88	2.93			

Annual Mean (ug/m3)	
O3	
	Jakarta
2000	
2001	35.2
2002	50.87
2003	54.99
2004	60.49
2005	56.98
2006	56.68
2007	52.6
2008	49.24

Sources: Environment Board of the Province of Jakarta. (2009). Air quality data 2001-2008; Environment Agency of Surabaya City, (2009). Air quality data 2001-2008. Environment Agency of Bandung City. (2009). Air quality data 2001-2008.

Annex 5

Indonesia City Classification (by population)

City Classification	Population Number
Metropolitan	> 1,000,000
Big	500,001 – 1,000,000
Medium	100,001 – 500,000
Small	20,001 – 100,000

Source: Kementerian Lingkungan Hidup (www.menlh.go.id)

Annex 6

Summary of National Laws, Regulations and Plans

These main laws, regulations, and plans issued on air quality, industry and establishments, transport, energy and climate change are listed below:

National laws and regulations

- 1) Act No. 23 of 1997 on Environmental Management
- 2) Government Regulation (PP) No. 41/1999 on Air Pollution Control
- 3) Act No. 5/1984 on Industrial Activities
- 4) Government Regulation No. 13/1995 on Industrial Business License
- 5) Government Regulation No. 27/1999 on Environmental Impact Analysis and its implementing guidelines
- 6) MoE Decree No. 13/1995 on Emission Standards for Stationary Sources
- 7) Act No. 14/1992 on Traffic and Road Transportation

- 8) Government Regulation No. 41/1993 on Road Transport
- 9) Government Regulation No. 42/1993 on Road Inspection
- 10) Government Regulation No. 43/1993 on Road Facilities and Traffic
- 11) Government Regulation No. 44/1993 on Vehicles and Drivers
- 12) Act No. 1/2009 on Aviation
- 13) Act No. 17/2008 on Sailing
- 14) Act No. 23/2007 on Railroad
- 15) Act No. 22/2001 on Oil and Gas
- 16) Act No. 30/2007 on Energy
- 17) Presidential Regulation No. 5/2006 on National Energy Policy
- 18) Presidential Instruction No. 1/2006 on Biofuels
- 19) Presidential Instruction No. 10/2005 on Energy Conservation
- 20) Regulation of the Ministry of Energy and Mineral Resources No. 31/2005 on Energy Efficiency
- 21) Act No. 6/1994 on ratification of UNFCCC
- 22) Act No. 17/2004 on ratification of Kyoto Protocol
- 23) Government Regulation No. 4/2001 on Forest Fire Prevention
- 24) Presidential Regulation No. 46/2008 on National Council for Climate Change
- 25) MoE Decree No. 206/2005 on the establishment of *Komisi Nasional Mekanisme Pembangunan Bersih (Komnas MPB)* or the National Committee for the Clean Development Mechanism

Plans

1. 2007 National Action Plan (NAP) on Climate Change
2. Bappenas National Development Planning Response to Climate Change
3. National Strategy and Action Plan for urban Air Quality Improvement

Laws and regulations

Air quality

1. Act No. 23 of 1997 on Environmental Management. The basic principles related to air quality in this Act are: 1) the right for each individual to have a good and healthy environment, 2) the right for each individual to obtain information related to the environment, 3) the obligation of each individual to preserve the environment, 4) restrictions for activities that exceed environmental quality standards, 5) environmental management has to be carried out in an integral way by government agencies in accordance with their duties and responsibilities, by the people, and by other development actors. The Act also mandates the development of integrated environmental management policies, including air quality management by inter-agency team. The policies must be mutually agreed by the relevant government institutions and are used as a reference for preparing and implementing action plan in accordance with the scope of duties for each government institution.

2. Government Regulation (PP) No. 41/1999 on Air Pollution Control is an implementing regulation to Act No. 23/1997 which relates to air quality management. This PP regulates the preservation of air quality through implementation of ambient air quality standard, emission standards for industrial activities and motor vehicles, and Pollutant Standard Index. To implement the articles in this PP, the State Ministry of Environment (MoE) has issued several regulations and decrees specifically pertaining to the emissions standards as listed below. It is the duty of the MoE to prepare guidelines/instructions for implementing law and regulations for local government.

- 1) MoE Regulation No. 21/2008 concerning Emission Standard for Thermal Power Generation Activities
- 2) MoE Regulation No. 7/2007 on Stationary Emission Standard for Boilers

- 3) MoE Regulation No. 5/2006 on Emission Standard Limits for In-use Motor Vehicles
- 4) MoE Decree No. 133/2004 on Emission Standard for Fertilizer Industry
- 5) MoE Decree No. 252/2004 on Mandatory Disclosure of Automotive Emissions Program
- 6) MoE Decree No. 141/2003 on Emission Standard Limits for New Types of Motor Vehicles and Motor Vehicles in Current Production (superseded by MoE Regulation No. 4/2009)
- 7) MoE Decree No. 129/2003 on Emission Standard for Oil and Gas Activities (superseded by MoE Regulation No. 13/2009)
- 8) MoE Decree No. 45/1997 on Air Pollutant Standard Index
- 9) MoE Decree No. 48/1996 on Noise Standard
- 10) MoE Decree No. 49/1996 on Vibration Standard
- 11) MoE Decree No. 13/1995 on Emission Standards for Stationary Sources (iron and steel, pulp and paper, coal-fired power plant, and cement)

Industry and establishment

3. Act No. 5/1984 on Industrial Activities does not specifically regulate air quality management but it prohibits activities that damage the quality of the environment and ecosystem.

4. PP No. 13/1995 on Industrial Business License is one of the implementing regulations of Act No. 5/1984. It binds industry to comply with environmental regulations as one of the requirements to obtain a business license.

5. PP No. 27/1999 concerning Environmental Impact Analysis and its implementing guidelines require the proponents of efforts or activities to prepare an environmental management and monitoring plan and implement the plan.

6. MoE Decree No. 13/1995 on Emission Standards for Stationary Sources (iron and steel, pulp and paper, coal-fired power plant, and cement). These industrial emissions standard regulations are the most referred regulations in the industrial sector with regard to air pollution control. The regulations provide authority for regional (provincial) government to set out emission and ambient air quality standards applicable for their region.

Transport

7. Act No. 14/1992 on Traffic and Road Transportation (amended in 2009) stipulates that vehicle emission test is an integral part of roadworthiness test. Hence the responsibility for vehicle emission test lies with the transportation institution. With the amendment of Traffic and Road Transportation Act, a series of its implementing regulations will be subsequently revised.

8. Government Regulation No. 41/1993 on Road Transport, an implementing regulation of Act No. 14/1992, regulates the transportation of goods and people, transportation route, route licensing, and transportation tariff

9. Government Regulation No. 42/1993 concerning Road Inspection, an implementing regulation of Act No. 14/1992, regulates random on-road inspection to verify the result of roadworthiness test conducted at fixed test centers

10. Government Regulation No. 43/1993 on Road Facilities and Traffic, an implementing regulation of Act No. 14/1992, regulates traffic management and engineering

11. Government Regulation No. 44/1993 on Vehicles and Drivers, an implementing regulation of Act No. 14/1992, regulates technical requirements and roadworthiness, motor vehicle testing, and driving license

In addition to the legislation on land transportation, there are other Acts on transportation. These are:

12. Act No. 1/2009 on Aviation

13. Act No. 17/2008 on Sailing

14. Act No. 23/2007 on Railroad

Energy

15. Act No. 22/2001 concerning Oil and Gas is the legal basis for the provision of cleaner fuel through the implementation of fuel specification set by the government (Directorate General of Oil and Gas). This Act also opens business opportunity for companies other than the state-owned oil company Pertamina to produce and distribute fuel.

16. Act No. 30/2007 concerning Energy requires energy management to be based on the principle of sustainability and environmental protection, among others. This Act regulates energy resilience, new and renewable energy, energy prices, and the establishment of National Energy Council (NEC). The NEC is led by the President along with members selected and chosen by the House of Representative. The task of NEC is to formulate energy policy, design the overall national energy plan, determine emergency response plan in the event of energy crisis, and supervise the implementation of cross-sectoral policies by the relevant government institutions in the field of energy. This Act also stipulates that energy conservation is given incentive, while energy dissipation is given disincentive. But the Act does not mention specifically the form of incentive/disincentive.

17. Presidential Regulation No. 5/2006 concerning National Energy Policy set the target for energy mix by 2025. The decree states that the contribution of fossil oil as a source of energy is targeted to be reduced from 52% in the year 2003 to 26.2% in the year 2025 of the total energy demand. While for other sources of energy, contribution of geothermal is targeted to increase from 3.1% to 3.8%, natural gas from 21.2% to 30.6%, coal from 19.7% to 32.7%, and renewable energy from 0.2% to 4.4%. On the other hand the contribution of hydropower is targeted to be reduced from 3.8% to 2.4%.

18. In response to the rising global oil prices and Indonesia's over reliance on fossil fuels, the president instructed the relevant line ministries and local government through **Presidential Instruction No. 1/2006** to take necessary action to accelerate the production and utilization of biofuel as an alternative source of energy.

19. Presidential Instruction No. 10/2005 and

20. Regulation of the Ministry of Energy and Mineral Resources No. 31/2005 require government agencies to undertake energy conservation in offices, office equipment, and transportation, and for industries to undertake energy audits and promote use of energy saving products or technology.

Climate change

21. Indonesia ratified the UNFCCC through **Act No. 6/1994**

22. Indonesia ratified the Kyoto Protocol through **Act No. 17/2004**.

23. Government Regulation No. 4/2001 on Forest Fire Prevention is one of the current basic laws in Indonesia being the most closely related to climate change.

24. Presidential Regulation No. 46/2008 concerning National Council for Climate Change stipulates that the establishment of Council is to coordinate the implementation of climate change mitigation efforts and to strengthen Indonesia's position in international fora for mitigating climate change. The Council is headed by the President, and has as its core task, among others, to develop national policy, strategy, program and action plan for mitigating climate change; formulate strategy and mechanism for carbon trade; and monitor and evaluate strategy implementation.

25. The MoE Decree No. 206/2005 concerning the establishment of *Komisi Nasional Mekanisme Pembangunan Bersih (Komnas MPB)* or the National Committee for the Clean Development Mechanism states that the Komnas MPB functions as Indonesia's Designated National Agency (DNA) and is responsible for assessing, evaluating, and monitoring CDM activities in Indonesia. The structure of the Committee consists of the National Executive Board with representatives from nine national government institutions. The head of the Committee is MoE.

Plans

1. 2007 National Action Plan (NAP) on Climate Change. Indonesia's main guiding document in relation to climate change is the 2007 NAP on Climate Change. The NAP provides guidance for various agencies in carrying efforts to tackle climate change and sets out requirements for institutional coordination. The NAP provides for immediate action between 2007-2009, short-term action between 2009-2012, medium-term action between 2012-2025, and long-term action between 2025-2050.

2. National Development Planning Response to Climate Change. Besides the 2007 NAP developed under the coordination of MoE, State Ministry for National Development Planning/National Development Planning Board (Bappenas) also issued the National Development Planning Response to Climate Change. This document aims to mainstream environmental and natural resource considerations into the development planning process. It also discusses funding mechanism for climate change mitigation and adaptation program.

3. The National Strategy and Action Plan for urban Air Quality Improvement published in 2006 by an inter-agency team led by Bappenas is an example of an integrated cross-sectoral policy document.

4. Regional development plan is developed by regional governments and comprises of: 1) **Long Term Development Plan** of 20 years that refers to the National Long Term Development Plan, 2) **Mid Term Development Plan** of 5 years that refers to the National Mid Term Development Plan, 3) **Regional Development Work Plan** of 1 year which is derived from the Mid Term Development Plan. The government agency responsible for preparing the regional development plan is the Regional Development Planning Agency. Guided by the Regional Mid Term Development Plan, regional technical agencies then prepare a **strategic plan** which defines vision, mission, goal, strategies, policies, programs, and activities in accordance with the duties and functions of the respective agencies.

5. Regional or city spatial plans are developed by regional governments (province and regency/city) (Act No. 26/2007). Urban planning is governed by regional legislation and must be integrated with the national spatial planning and has to be approved by Minister of Public Works before the bylaw is enacted.

6. Transport plans and regional or city development plans have to be integrated with the national spatial planning. Regional government has its full authority to develop regional or city transport planning.

Annex 7

Summary of Relevant Provisions of the Amended Traffic and Road Transportation Act

The **road fund** is collected by the Ministry of Public Works for the maintenance, rehabilitation and reconstruction of roads. The source of the road fund may come from road users. Provisions concerning the management and organization of the road fund shall be defined through presidential regulation.

Road facilities shall include bicycle lane, pedestrian pathway and crossing, and special facilities for persons with disability. Further provisions shall be defined through government regulation.

Periodic roadworthiness test (including emission test) is mandatory for public vehicles, but not private cars.

Non-motorized transport. The Government must provide easy access to bicyclists. Bicyclists have a right to safety, security, orderliness, and smooth mobility (Article 62). The local government may set out types and use of non-motorized vehicles in accordance with the characteristic and demand of the city, and shall be defined further through local legislation (Article 63).

Traffic management and engineering is done by: 1) giving priority to mass public transport (provision of segregated lane), 2) giving priority to pedestrian safety and comfort, 3) providing easy access for people with disability, 4) segregating traffic flow based on land use, mobility and accessibility, 5) integrating transport modes, 6) maintaining traffic control at intersections, 7) maintaining traffic control on road segments, 8) preserving the environment.

Road orderliness and safety. Motorists must give a priority to safety of pedestrians and bicyclists (Article 106 (2)).

Right and obligation of pedestrians. Pedestrians have a right to facilities such as pedestrian pathway, crossing and other facilities. Pedestrian is given a priority when crossing the road at pedestrian crossing (Article 131). An obligation of pedestrians is to use part of the road which is dedicated for pedestrians or use the far edge of the road, use pedestrian crossing (Article 132 (1)). If a pedestrian crossing does not exist, pedestrians must take care of their own safety when crossing the road. People with disabilities must wear special signs that are visible to motorists (Article 132 (3)).

Annex 8

Fuel specifications following the decrees of Directorate General of Oil & Gas No. 3674 K/24/DJM/2006 for gasoline and No. 3675 K/24/DJM/2006 for diesel

Gasoline

Item	Unit	RON 88				RON 91		RON 95	
		Leaded		Unleaded		Min	Max	Min	Max
		Min	Max	Min	Max				
Research Octane Number	RON	88.0	-	88.0	-	91.0	-	95.0	-
Sulfur content (S)	% m/m	-	0.05	-	0.05	-	0.05	-	0.05
Lead content (Pb)	g/L	-	0.3	-	0.013	-	0.013	-	0.013
Reid Vapor Pressure (RVP)	kPa	-	62	-	62	45	60	45	60

Automotive Diesel Oil (ADO)

Item	Unit	ADO 48		ADO 51	
		Min	Max	Min	Max
Cetane Number	CN	48.0	-	51.0	-
Cetane Index	CI	45.0	-	48.0	-
FAME content (Methyl Esther)	% v/v	-	10	-	0.05
Sulphur content (S)	% m/m	-	0.35	-	0.05

Annex 9**In-Use Vehicle Emission Standards****A. VEHICLE CATEGORY L**

Category	Production year	Parameter		Test method
		CO (%)	HC (ppm)	
Motorcycle 2-stroke	< 2010	4.5	12000	Idle
Motorcycle 4-stroke	< 2010	5.5	2400	Idle
Motorcycle 2- and 4-stroke	>2010	4.5	2000	Idle

B. VEHICLE CATEGORY M, N AND O

Category	Production year	Parameter			Test method
		CO (%)	HC(ppm)	Opacity (% HSU)*	
Gasoline-powered	< 2007	4.5	1200		Idle
	≥ 2007	1.5	200		
Diesel-powered					Free acceleration
	- GVW ≤ 3.5 ton	< 2010		70	
		≥ 2010		40	
	- GVW > 3.5 ton	< 2010		70	
	≥ 2010		50		

* or equivalent % bosch

Note:**For gasoline-powered category M, N and O**

- < 2007: valid until 31 December 2006

- ≥ 2007: valid from 1 January 2007

For diesel-powered category

- < 2010: valid until 31 December 2009

- ≥ 2010: valid from 1 January 2010

Source: MoE Regulation No. 5/2006 concerning Emission Standard Limits for In-use Motor Vehicles

Annex 10

Regional Government Organization Structure

The head of a regional government may be a governor (province), regent (regency) or a mayor (city). The head of a regional government is assisted by a deputy. Both the head and deputy head are elected by the people in the respective region every 5 years. The tasks and responsibilities of the head of region are to: 1) administer government affairs based on policies mutually agreed upon by the legislative body, 2) propose regional bills, 3) issue legislation that has been approved by legislative and executive bodies, 4) prepare and propose a regional bill on the regional budget to the legislative body, discuss the bill and finally issue the bylaw, and 5) ensure that regional mandate is fulfilled. Besides having the obligations of improving the welfare of the people, abiding by and enforcing laws and regulations, and promoting good governance, the head of regional government also has the responsibility to present an **annual accountability report** on the execution of the regional development plan to the national government (to President through the Minister of Home Affairs for a governor, and to Minister of Home Affairs through the governor for a regent/mayor). The head of regional government also submits the report to the regional House of Representatives.

The organizational structure of regional government consists of: regional executive secretariat, regional legislative secretariat, inspectorate, regional development planning agency, regional technical agencies, and district and sub-district governments. All the heads of these organizations are responsible to the head of the regional government.

Environmental affairs, public works, transportation, development planning, and spatial planning are part of mandatory government affairs that must be addressed by a regional government according to the Government Regulation No. 38/2007 concerning Division of Government Affairs between National Government, Provincial Government and Regency/City Government. A list of mandatory and optional regional government affairs is presented in Annex 11.

The organization of these government affairs is guided by a minimum service standard defined by the national government and is implemented in stages. The respective ministers set out norms, standards, procedures, and criteria for the implementation of mandatory and optional government affairs by the regional government. The Minister of Home Affairs coordinates the provision of such norms, standards, procedures and criteria. However, in the event that norms, standards, procedures and criteria have not been established for two years since the enactment of this Government Regulation, the regional government continues to execute its authority without referring to any standards, procedures, etc. but in accordance with the current legislation.

Annex 11

List of mandatory local government affairs (province and regency/city)

- a. Education
- b. Health
- c. Environment
- d. Public works
- e. Spatial planning
- f. Development planning
- g. Housing

- h. Youth and sports
- i. Investment
- j. Cooperative and small medium-sized enterprises
- k. Demography and civil record
- l. Employment
- m. Food security
- n. Women's empowerment and child protection
- o. Family planning and prosperous family
- p. Transportation
- q. Communication and informatics
- r. Land affairs
- s. Nation Unity and domestic political affairs
- t. Regional autonomy, general governance, financial administration
- u. Organizational structure, personnel and security
- v. Community development and villages
- w. Social
- x. Cultural
- y. Statistics
- z. Archives
- aa. Library

List of optional regional government affairs (provincial and regency/city):

- a. Marine and fishery
- b. Agriculture
- c. Forestry
- d. Energy and mineral resources
- e. Tourism
- f. Industry
- g. Commerce
- h. Transmigration

Source: Government Regulation No. 38/2007 concerning Division of Government Affairs between National Government, Provincial Government and Regency/City Government

Annex 12

Information about Regional Government Associations in Indonesia

1) *Asosiasi Pemerintah Kabupaten Seluruh Indonesia (APKASI-Indonesian Governmental Regencies Association)*. Website <http://www.apkasi.or.id>

APKASI was officially established by 26 heads of regencies on May 2000. The main function of APKASI is to facilitate the creation of synergized and mutually beneficial relationship among APKASI members as well as harmonious relationship between regency government, provincial government and national government. The general meeting for members consists of: 1) National Convention organized every four

year and 2) National Work Meeting organized at least once in four years. APKASI organization consists of: 1) Honorary Board, chaired by the Minister of Home Affairs and members comprise of governors, 2) Executive Board, chaired by the chairman (head of a regency), 3) Regional Coordinator, and 4) Executive Director. APKASI programs focus on advocacy, capacity building and regional cooperation. Source of funding includes members' compulsory fee, members' voluntary contribution, unbinding third party's contribution and legal APKASI business revenue. The association has also published some publications such as newsletters, best practices in various fields (one-stop public service, government information system, etc.)

2) *Asosiasi Dewan Perwakilan Rakyat Daerah Kabupaten Seluruh Indonesia (ADKASI- Association of Indonesian Regency Parliament)*. Website <http://www.adkasi.org>

ADKASI was established on August 2001 by Parliament of Regencies in Indonesia. ADKASI aims to achieve an effective legislative body by encouraging good governance towards sustainable development in the framework of regional autonomy and democracy. Its mission is to improve the capacity of member institutions and the legislative body, to advocate policies that are in line with the interest of the regency and the community, and to create synergies between the legislative body and stakeholders in order to strengthen local autonomy and local democracy. To ensure the fair representation of women in politics, ADKASI holds trainings and annual meeting for women who are in the Regency Parliament. Other key program includes improving the capacity of legislative members in regulatory impact assessment and formulation through training workshop. The organization provides relevant information to members and the public through a talk show program on TV Swara. The organization has implemented "Musyawarah Nasional II" (National Convention) in Jakarta on July 2005 for the period of 2005-2009.

3) *Asosiasi Pemerintah Provinsi Seluruh Indonesia (APPSI – Association for Provincial Government of Indonesia)*. Website: <http://www.appsi-online.com>

APPSI was officially established by provincial government of Indonesia on June 2000. It aims to support the successful execution of regional autonomy. The organization purpose and goal is to foster cooperation among various other organizations within the scope of local autonomy as partner. To achieve its goal, APPSI aims to encourage the people to maintain national diversity as part of the effort to strengthen national unity, to build harmonious relationship between national and regional government, and to increase the capacity of regional government through education and training activities, research, seminars. The chairman of APPSI for the period of 2007-2011 is the Governor of Jakarta. APPSI strives to advocate fiscal decentralization, provincial autonomy for the management of government employees following a clear competence standard and norm, good governance and improved mechanism for governor's accountability towards the provincial legislative body.

4) *Asosiasi Pemerintah Kota Seluruh Indonesia (APEKSI- Indonesian Municipalities Association)*. Website <http://www.apeksi.or.id>

APEKSI was established on May 2000 for the purpose of helping members to accelerate the implementation of regional autonomy and to create an amicable cooperation between city governments. The organization mission is to empower cities in implementing regional autonomy. While its mission is seeking to be an organization that is trusted, professional in the field of urban studies and supporting the effort of mayors through the development of democratic, and transparent autonomy. To reach its goal and mission, APEKSI holds a yearly national meeting. The organizational structure consists of board of

supervisors, board of management, and executive director. It has published documentation such as city best practices.

- 5) Asosiasi DPRD Kota Seluruh Indonesia (ADEKSI- Indonesian Municipal Councils Association).** Website: www.adeksi.or.id

ADEKSI is an autonomous and independent organization consisting of 90 municipals. ADEKSI was established on June 2001 as part of the decentralization program also known as regional autonomy. The organization has three main activities; these are 1) increasing the capacity of its members, 2) implementing advocacy activities, 3) provision of information and publication. The organization mission is to improve quality of life through enhancing regional democracy.