



Philippines 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
AIP	Annual Investment Programs
AQI	air quality index
AQMF	Air Quality Management Fund
EMB	Environmental Management Bureau
CAA	Clean Air Act
CAR	Cordillera Administrative Region
CFCERT	Committee on Fuel Conservation and Efficiency in Road Transport
CNG	compressed natural gas
DA	Department of Agriculture
DECS	Department of Education, Culture and Sports
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
DOE	Department of Energy
DOH	Department of Health
DOTC	Department of Transportation and Communication
DOST	Department of Science and Technology
DTI	Department of Trade and Industry
EST	Environmentally Sustainable Transport
GB	Governing Board
LDC	local development council
LDIP	Local Development Investment Programs
LGC	Local Government Code
LGU	local government unit
LTO	Land Transportation Office
MO	Manila Observatory
MVIS	Motor Vehicle Inspection System
NAAQGV	National Ambient Air Quality Guideline Value
NCR	National Capital Region
NEECP	National Energy Efficiency and Conservation Program
NGO	non-government organizations
NGVPPT	Natural Gas Vehicle Program for Public Transport
PETC	Private Emission Testing Centers
PIA	Philippine Information Agency
PNRI	Philippine Nuclear Research Institute
RA	Republic Act
SUV	sports utility vehicles
SVPCF	Special Vehicle Pollution Control Fund
USEPA	US Environmental Protection Agency
WHO	World Health Organization

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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 (GTZ) 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 the Philippines.

2.1 General Information

The Philippines is an archipelago of 7,107 islands, with a land area of 299,764 km². The country is bounded by the Pacific Ocean on the east, the Celebes Sea on the south and the South China Sea on the west and north. It groups in three geographical areas from North to South: Luzon, Visayas and Mindanao (Philippine official website, 2009). As of September 2009, there are 17 regions, 80 provinces and 120 cities. Metro Manila, the country's capital, is situated in west coast of Luzon and is classified as the National Capital Region, composed of 16 cities and one municipality (NSCB, 2009).

The Philippines is located in a tropical climate zone and has two distinct seasons: the rainy and the dry. The rainy season is from June to November. Heavy rain is usually from August to October, caused mainly by typhoons. The dry season is from December to May. The temperature remains fairly high throughout the year in range of 25.5°C in January to 28.3°C in May (PAGASA, 2009).

Reducing air pollution in Philippine cities to levels which meet the ambient air quality standards is a must because of the large number of people living in these areas. As of 1 August 2007, the Philippine population was 88.57 million with 2.04% growth per year from 2000. The population is projected to grow by 85.2% in 40 years from 76.5 million in May 2000 to 141.7 million in 2040 (NSO, 2006). Forty-eight percent of people live in the urban areas (NSO, 2009). About 13% of the Philippine population lives in the National Capital Region (NCR) with at least ten thousand people per square kilometer. For purposes of this Country Profile, the term "smaller cities" refers to city municipalities with population of 200,000 to 1.5 million. The population densities vary widely in a sample of 20 cities and range between 522 to 25,855 inhabitants per square kilometer (Annex 1).

In terms of economic growth, the Philippines' gross domestic product (GDP) grew by 5.5% from 2005 to 2006; 7.1% from 2006 to 2007; and 6.2% from 2007 to 2008. In 2008, the service sector contributed the most to the economy at 49.2%, followed by the industry sector (32.7%) and agriculture, fishery and forestry (18.1%) (NSO, 2009). Economic growth brings increased demand for mobility, energy, goods and services which may result in increased air pollution, if policies and measures are not in place to manage this adverse impact.

In 2006, the primary sources of energy consumption totaled 272.87 million barrels of fuel-oil equivalent. The indigenous energy comprised of 152.33 Million barrels of fuel oil equivalent (55.8%) and the imported energy of 120.54 Million barrels (44.2%). Oil is the main primary energy source (33.9% of total) followed by geothermal energy (22.8%) and other sources such as coal, gas, hydropower and others (NSO, 2009).

Figure 1 shows the distribution of power generation in 2008 for the country. In 2008, the total power generation was 60,820,985 MWh. Natural gas contributed 32%, followed by coal (26%), geothermal (18%), hydro (16%), oil (8%), and wind and solar energy (less than 1%). The share of coal-generated power to total generated power decreased by 7%

(33% in 2002 to 26% in 2008) while the share of natural gas-generated power increased by 14% (18% in 2002 to 32% in 2008).

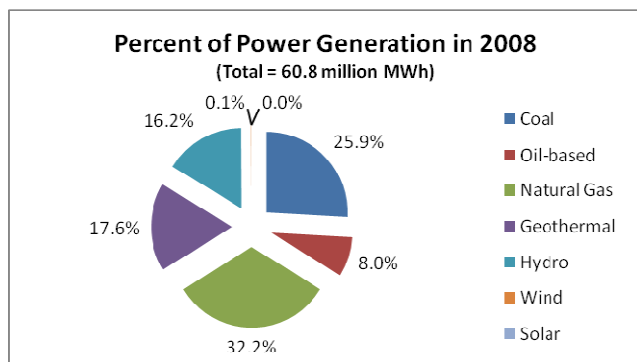


Figure 1

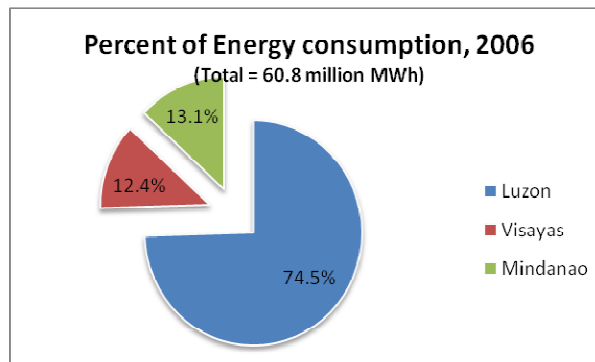


Figure 2

In terms of energy consumption, Luzon region consumed almost 75% of energy while Visayas and Mindanao regions almost equally consumed the rest (Figure 2). In the Philippines, 79% of energy is consumed almost equally by residential, commercial and industrial sectors, 13% is attributed to system loss including distribution utilities losses and transmission losses, 6% of energy is used by distribution utilities companies and power plants, and 2% by public buildings, street lights, and others.

In 2007, the total number of registered motor vehicles in the Philippines was 5.53 million. Twenty-nine percent of these vehicles are registered in the NCR. Motorcycles and tricycles are the most in number (47.9%), followed by utility vehicles including jeepneys (29.0%) and others including cars, trucks, sports utility vehicles (SUVs), buses and trailers (NSO, 2009). The number of registered motor vehicles grew by 3.7% on average from 2006 to 2007. In this period, SUVs and motorcycles/tricycles (MC/TC) grew the most; sports utility vehicles (SUVs) by 11.7%, and motorcycles and tricycles by 9.9% from 2.4 million to 2.65 million (Figure 3).

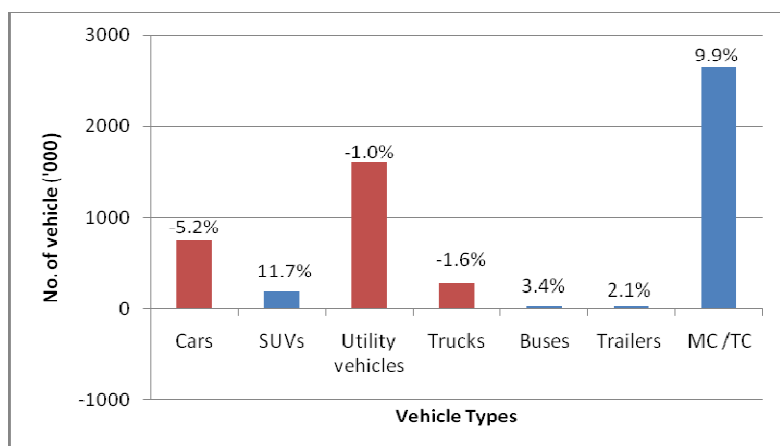


Figure 3. Number of registered vehicles by type (2007) and growth rate in 2006-2007

The high percentage share of motorcycles and tricycles and utility vehicles in the national vehicle registration numbers is mirrored by smaller cities. These vehicles typically comprise about 65-80% of a city's vehicle fleet (Table 1).

Table 1. Percent Share of Different Vehicle Types in Selected Cities in the Philippines

City	Total No. of Registered Vehicles (as of 2008)	Utility Vehicles (% of total)	Motorcycles /Tricycles (% of total)	Other vehicles (% of total)
Iloilo City	46,268	42	30.6	27.4
Cagayan de Oro City	73,151	27.5	52.7	19.8
Baguio City	31,206	56.7	9.3	34

Source: City Presentations of Iloilo, Cagayan de Oro and Baguio Cities, 2009

2.2 Sources of Air Pollution

The Philippine Department of Environment and Natural Resources (DENR) conducted a national emissions inventory of air pollution sources in 1990. Updates to the inventory were made in 2001-2004 and then in 2006. The Philippine Clean Air Act of 1999 (Republic Act 8749) requires an emissions inventory to be conducted once every three years. The emissions inventory includes criteria pollutants such as particulate matter (PM), sulfur oxides, nitrogen oxides, carbon monoxide, and volatile organic compounds. Based on the 2006 National Emissions Inventory, the transport sector is the major source of air pollution in many regions of the country. It was estimated that 65% of the pollutants came from mobile sources, 21% from stationary sources, and the remaining 14% from area sources (DENR, 2009).

Motor vehicles and open burning are identified by several cities as major sources of air pollution (Table 2).

Table 2. Sources of air pollution in selected cities in the Philippines

City	Major sources of air pollution
Antipolo	Motor vehicles, open burning
Baguio	Motor vehicles, open burning of solid waste (due to the current solid waste problem in the city), construction activities, burning of agricultural waste
Cagayan de Oro	Motor vehicles, open burning, industry
Cebu	Motor vehicles
Davao	Motor vehicles
Iloilo	Motor vehicles
Cities in Metro Manila	Motor vehicles
Puerto Princesa	Motorcycles, tricycles
San Fernando	Motor vehicles, open burning, industry

Sources: ADB (<http://www.adb.org/Documents/Periodicals/Impact/PHI-Impact-Stories/PHI-Impact-Stories-02.asp>); ADB, 2005 (<http://www.adb.org/Documents/Studies/air-noise-pollution/>); CAI, 2006 Country Synthesis Report on Urban Air Quality Management – Philippines; World Bank, 2004. Philippine Environment Monitor 2004; City Presentations of Antipolo, Baguio, Cagayan de Oro, Iloilo, San Fernando Cities, 2009.

2.3 Status of Air Quality

Air quality monitoring stations are located throughout the country. The Department of Environment Natural Resources (DENR) operates a network of 44 air quality monitoring stations in 15 regions. The Manila Observatory (MO), a private scientific institution, and the Philippine Nuclear Research Institute (PNRI) of the Department of Science and Technology (DOST) also monitor air quality. PNRI monitors PM₁₀ and PM_{2.5} using the Gent sampler at three sites in Metro Manila. MO monitors PM_{2.5} using air samplers at New Year's Eve since 2003 in Metro Manila.

While recent research shows that finer species of particles (PM₁₀ and PM_{2.5}) have more serious health impacts (World Bank, 2002), the majority of air quality monitoring in the Philippines still focus on TSP. While TSP levels are monitored by 39 monitoring stations in 13 regions (EMB, 2006), very few sites monitor particulates and gaseous pollutants. Only 4 stations measure PM₁₀ and 7 stations measure gaseous pollutants. Only four regions (e.g., Region 7, Region 10, Region 11, Cordillera Autonomous Region (CAR)) have continuous automatic ambient air quality monitoring stations which measure SO₂, NO₂, and O₃. Annex 2 shows the distribution of air quality monitoring stations by region and provides an overview of the parameters monitored in the Philippines by the DENR, PNRI and MO.

Under the Metro Manila Air Quality Improvement Sector Development Program (MMAQISDP), an Asian Development Bank (ADB) loan-financed program implemented by various national government agencies headed by the DENR, a network of ten automated continuous stations within the Metro Manila Airshed capable of measuring criteria pollutants (i.e., PM₁₀, SO₂, NO₂, CO and O₃) and meteorological data was put in place (EMB, 2006; EEID, [undated]). Two of the ten stations could also measure non-criteria pollutants (PM_{2.5}, methane, non-methane hydrocarbon, benzene, toluene, and xylene) (ADB and CAI-Asia, 2006). The stations were operational from 2004 to 2005. Operations were then halted because of contractual disputes between the DENR and the contractor. The DENR and the contractor then agreed that the latter would make the stations operational and turn the stations over to DENR by September 2009 (ADB, 2008). The status of turn-over of monitoring stations has yet to be confirmed; however, EMB planned to run the monitoring stations by the end of 2009 (AQMS-EMB, 2009b).

Among the challenges faced by the country in air quality monitoring are: intermittent monitoring of PM₁₀ and gaseous pollutants in Metro Manila and in some major cities; only partial compliance with the required minimum TSP sampling of 16 hours a day (for daily average) and 48 days a year (for annual average) in some monitoring stations because of power failure, inclement weather, and equipment breakdown (ADB and CAI-Asia, 2006); and inadequate financing for operation and maintenance of monitoring instruments (ADB and CAI-Asia, 2006).

Air Quality Data

While annual TSP levels show a decreasing trend, these levels are still above the annual National Ambient Air Quality Guideline Value (NAAQGV). Annex 3 shows the annual average TSP trends in NCR and nationwide from 2004 to 2008.

Figure 4 shows the mean regional TSP levels in 12 regions in 2008. Seven regions (NCR, III, IV, V, VI, VII, IX) failed to comply with the 24-hour average (short term) NAAQGV TSP standard of 90 µg/m³ in 2008. The highest TSP value of 695µg/m³ was observed at the roadside station located near the Epifanio delos Santos Avenue (EDSA) in NCR.

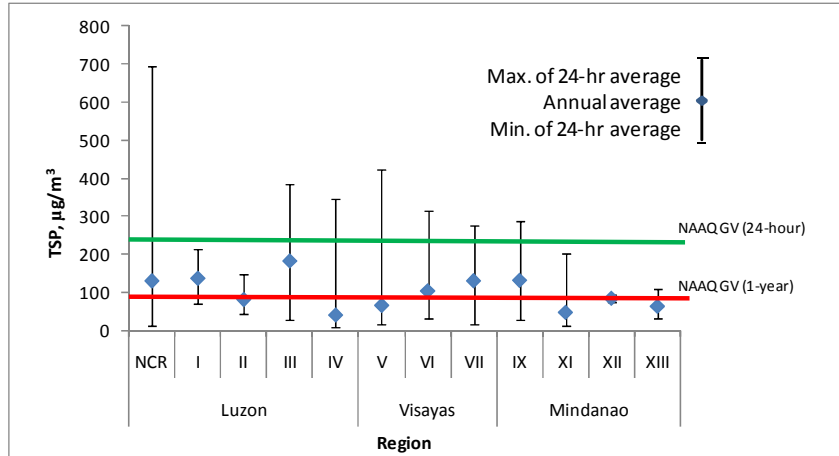
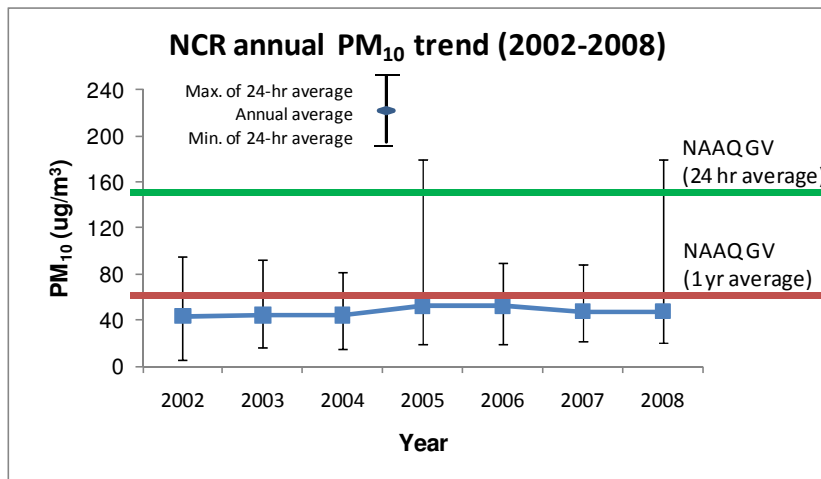


Figure 4. Mean regional annual TSP level in 2008
Source: EMB, 2008

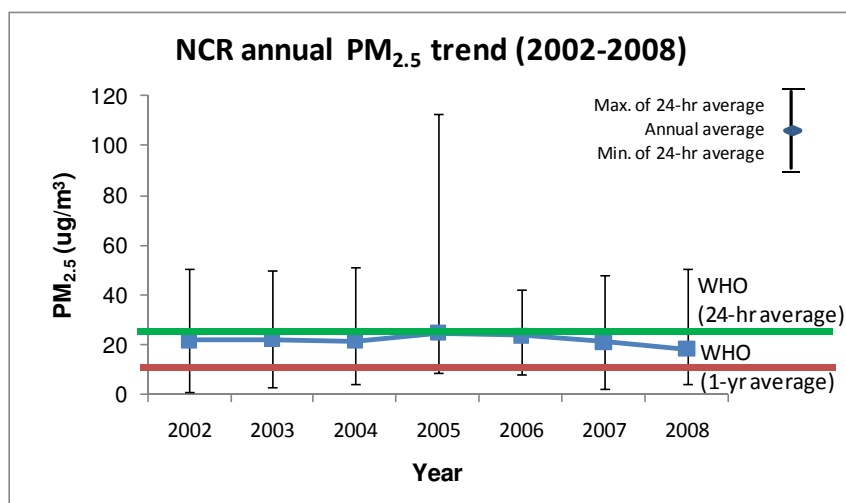
Figure 4 also shows the geometric annual mean of TSP in 12 regions. Six regions (NCR, I, III, VI, VII, IX) failed to meet the 1-year (long term) NAAQGV TSP standard. All TSP monitoring sites were located near the main roads, thus, capturing mostly emissions from mobile sources.

With respect to PM₁₀ and PM_{2.5}, analysis of monitoring data collected by PNRI from 2002 to 2008 in Metro Manila shows that PM₁₀ annual mean levels in the sampling sites did not exceed the NAAQGV of 60 µg/m³ except for one site (i.e., Valenzuela) in 2006 (not shown) and the PM₁₀ annual mean levels show a slightly decreasing trend from 2006 to 2008 (Figure 5). However, the PM_{2.5} annual mean levels in all the PNRI sampling sites in Metro Manila exceed the WHO long term guideline value of 10µg/m³ (Figure 6).



Source: PNRI

Figure 5. PM₁₀ Annual Mean Levels at the PNRI Metro Manila Sampling Sites 2001 to 2008



Source: PNRI

Figure 6. PM_{2.5} Annual Mean Levels at the PNRI Metro Manila Sampling Sites

The 24-hour average PM_{2.5} measurement during the New Year's Eve in Metro Manila collected by MO is shown in Annex 4. PM_{2.5} readings reach very high levels on this day.

With respect to other pollutants, SO₂ and NO₂ levels are below the NAAQGV while limited monitoring of O₃ shows levels exceeding the one-hour guideline of 140µg/m³ in seven out of eight months monitored at one station in Quezon City, Metro Manila between 2001 and 2002 (World Bank, 2002). In other regions, however, the annual mean levels of O₃ recorded are relatively low.

In 2003, the MO monitoring station reported 24-Hr concentrations of NO₂ well below the NAAQGV (ADB and CAI-Asia, 2006). The same report was received from Cebu and Cagayan de Oro which had relatively low annual NO₂ levels. However, in the Cordillera Administrative Region in 2007 and 2008, monitoring reports show annual NO₂ levels exceeding the WHO Guidelines.

Reporting and Use of Air Quality Information

The public is informed of the status of the air they breathe in several ways. The air quality monitoring results are published in national air quality status reports which cover sources of air quality, air quality management programs, civil society and international development projects, public awareness initiatives, best practices and lessons learned. However, release of the reports is often delayed. The most recent national air quality status report released by the DENR in 2009 was for the years 2005-2007.

Quarterly and annual reports are submitted by the various EMB regional offices to the EMB Central Office which consolidates and publishes them. The Governing Board of each airshed is also expected to publish an annual airshed air quality status report. On a regional level, the pollutant concentrations are reported as hourly and daily concentrations, along with the corresponding air quality indices (AQI). Annex 5 presents the AQI provided in the implementing rules and regulations (IRR) of the Philippine Clean Air Act (Republic Act No. 8749). The AQI, however, has not been actively used in the Philippines as a means to advise the public to protect themselves from the potential health impacts of air pollution.

The EMB website also provides information on TSP monitoring results at <http://www.emb.gov.ph/air/air1.htm>

2.4 Impacts of Air Pollution

The health, environmental and economic impacts of air pollution in the Philippines and the public perception of the air pollution problem are documented in several studies. Most of the impact studies are focused only in Metro Manila. Previous studies reported that poor air quality adversely affects the national economy from losses due to premature deaths and chronic respiratory illnesses; and PM is the largest contributor to these effects (CAI-Asia, 2006).

The National Air Quality Status Report (2003-2004) (EMB, 2006) presented the key results of the 2004 study by the Department of Health (DOH) on Public Health Monitoring: A Study under the Metro Manila Air Quality Improvement Sector Development Program (MMAQISDP). The study reported that in 2002, better air quality would have prevented considerable morbidity and mortality caused by respiratory and cardiovascular diseases in Metro Manila.

The Philippines Environment Monitor: Environmental Health Report (World Bank, 2007) also highlighted that the costs associated with treatment of air pollution-related cardiovascular and respiratory diseases amounts to about US\$19 million per year. In addition, lost income of US\$134 million was estimated from air pollution-related deaths. It was also estimated that 5,000 premature deaths yearly due to respiratory and cardiovascular diseases results from exposure to poor air quality in Metro Manila.

A more recent World Bank study (2009) provides more alarming estimates - more than 1 million people get sick and about 15,000 people die prematurely every year due to outdoor air pollution in urban areas in the Philippines. The cost of disease from outdoor air pollution is estimated at more than US\$20 million yearly; considering income lost from deaths would bring the cost to more than US\$120 million annually (World Bank, 2009).

A survey by Synovate in December 2004 showed that 98% of Manila residents are affected by urban air pollution and 71% believed that air quality has worsened over the past year. Eighty-two percent of the respondents indicated that they were experiencing irritation to their eyes, nose, and throat; 57% experienced breathlessness or had difficulties in breathing; and 27% attributed skin problems to pollution (Synovate, 2005).

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 the Philippines; 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

The Philippine Clean Air Act (Republic Act (RA) 8749 or the Act Providing for a Comprehensive Air Pollution Control Policy and For Other Purposes) was signed into law on 23 June 1999. RA 8749 specifically regulates air quality management. The law recognizes the primary responsibility of local government units to deal with environmental problems. It also recognizes the right of citizens to breathe clean air, to participate in the formulation, planning and implementation of policies, and to bring action in court to compel responsible agencies or private entities to implement and follow the law. Implementing Rules and Regulations (IRR) of RA 8749 and supporting department administrative orders have been issued to implement the law. The main provisions of RA 8749, other related laws, the rules and regulations and administrative orders to manage pollution from motor vehicles, industries, and area sources are discussed in the succeeding paragraphs.

RA 8749 puts in place a system to manage the main sources of air pollution (i.e., stationary, mobile, and other sources) in an integrated manner. It mandates the designation of "airsheds" which are defined as areas with similar climate, meteorology and topology or areas which share common interest or face similar development programs, prospects or problems. To date, 18 airsheds have been designated and 5 of them are classified as geothermal airsheds. The list of designated airsheds is provided in Annex 6.

Each airshed would be governed by a Governing Board (GB). The Secretary of the DENR serves as chairman of all the GBs. The members of each GB comprise of: provincial governors and city or municipal mayors from areas covered by the airshed, a representative from each concerned government agency, representatives from nongovernment organizations and private sector. The GB would perform the following functions: formulate policies, prepare a common action plan, coordinate functions among members, and submit and publish an annual Air Quality Status Report for the airshed. While the broad membership of the GB ensures representation of interested stakeholders, getting all the members to meet has become a challenge for many of the GBs.

The activities of the GB and its technical secretariat are to be funded by the Air Quality Management Fund sourced from air emission charges, fines and penalties, grants, and fees. The DENR Memorandum Circular No. 10 on the Criteria in the Selection and Implementation of Qualified or Eligible Projects and Activities to be Supported by the Air Quality Management Fund lists possible projects that can be considered for funding by the EMB-DENR:

- air quality monitoring, reporting or management including purchase and maintenance of equipment;
- public awareness and information-education-communication campaigns on air quality;
- research on air pollution-related issues such as health, alternative fuels and fuel additives, emission control technologies (stationary and mobile sources), verification technology, etc;

- capacity building on air quality management;
- roadside apprehension/emission testing; and
- administration and management of the GB and other support groups such as Executive Committee, Technical Working Group and Technical Secretariat.

The roles of national government agencies and local government units (LGUs) in managing air quality are set out in the Clean Air Act (CAA). The DENR is the lead agency responsible for the implementation of the CAA. EMB, one of the six staff sectoral bureaus under DENR, functions as the policy-making and standard-setting body and provides technical services related to air quality management. Local government units share in the responsibility of managing air quality within their territorial jurisdiction. The CAA envisions that the LGUs, in the future, would be responsible for the “full administration of the air quality management and regulation within their territorial jurisdiction” (Section 38, CAA).

The Department of Transportation and Communication (DOTC), Department of Energy (DOE), Department of Trade and Industry (DTI), Department of Science and Technology (DOST), Department of Education, Culture and Sports (DECS), Department of Interior and Local Government (DILG), Department of Agriculture (DA) and the Philippine Information Agency (PIA) are among the other national government agencies which play important roles in implementing the CAA (Table 3).

Table 3. Role of national government agencies in implementing the Clean Air Act

Lead national government agency	Role/s in implementing the Clean Air Act
DENR	<ul style="list-style-type: none"> -Review and revise the National Ambient Air Quality Guideline Values -Set emission standards for stationary sources of pollution -Set emission standards for motor vehicles -Provide local government units with technical assistance, training, and capacity building program
DOTC	<ul style="list-style-type: none"> -Enforce compliance with emission standards for motor vehicles -Deputize other law enforcement agencies to enforce vehicle emission standards -Ensure compliance by private emission testing centers with DOTC/LTO guidelines (e.g., connectivity of test results with DOTC/LTO information technology system)
DOE	<ul style="list-style-type: none"> -Set specifications for fuel and fuel-related products. Clean fuels and fuel quality policy are jointly mandated by DOE and DENR as co-chair of the Technical Committee on Petroleum Products and Additives (TCPPA). -Specify allowable content of additives in all types of fuels and fuel-related products -Register fuel or additives before they are imported, sold or introduced commercially in the country
DTI	<ul style="list-style-type: none"> -Ensure the compliance of private emission testing centers for motor vehicles of quality standards (e.g., quality of services, expertise and facilities are consistent with international standards of testing laboratories) -Promulgate necessary regulations prescribing the useful life of

	vehicles and engines
DOST	-Establish a National Research and Development Program for the prevention and control of air pollution
DECS, DILG, DA	-Conduct continuing multisector air quality information and education campaign

Source: Philippine Clean Air Act; DTI website

Ambient Air Quality Guideline Values

The National Ambient Air Quality Guideline Values (NAAQGV) set forth in the CAA comprise of PM₁₀, total suspended particulates (TSP), Sulfur dioxide (SO₂), Nitrogen dioxide (NO₂), Carbon monoxide (CO), ozone (O₃), and lead (Pb). Compared with the World Health Organization (WHO) Guidelines, the NAAQGV for PM₁₀ (24-hour and annual) and SO₂ (24-hour) are more lenient (Table 4). On the other hand, the 8-hour NAAQGV for O₃ is relatively more stringent than the WHO Guideline whilst the CO and Pb NAAQGVs are generally comparable with the WHO Guidelines. There are currently no plans to revise the standards.

Table 4. NAAQGV vs. WHO Guidelines ($\mu\text{g}/\text{m}^3$)

Pollutant	Average Time	NAAQGV	WHO Guidelines
PM ₁₀	24-hour	150	50 ^a
	Annual	60	20 ^a
TSP	24-hour	230	—
	Annual	90	—
NO ₂	1-hour	—	200 ^a
	24-hour	150	—
	Annual	—	40 ^a
SO ₂	10-minute	—	500 ^a
	1-hour	—	—
	24-hour	180	20 ^a
	Annual	80	—
O ₃	1-hour	140	—
	8-hour	60	100 ^a
	24-hour	—	—
CO	1-hour	35,000	30,000 ^b
	8-hour	10,000	10,000 ^b
Pb	3-month	1.5	—
	Annual	1.0	0.5

Guidelines refer to the safe level of a pollutant, for a given average time, to protect the public from acute health effects.

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

Source: ^aWHO, 2006, ^bWHO 2000

Management of Mobile Sources

Several measures at the national and local levels are being undertaken to manage air pollution from motor vehicles in the Philippines.

- Vehicle Emissions and Fuel Quality Standards

The programs of the Land Transportation Office (LTO) to reduce pollution from motor vehicles are: Motor Vehicle Inspection System (MVIS), Private Emission Testing Center (PETC) Program, Roadside Smoke Emission Apprehension and Testing. To promote the use of cleaner vehicles, the DENR issued Administrative Order No. 2007-27 on Revised the Emission Standards for (new and in-use) Motor Vehicles Equipped with Compression- Ignition and Spark-Ignition Engines.

Under the MVIS project, motor vehicle inspection centers are being constructed. The centers shall be situated in areas with high motor vehicle density such as the National Capital Region (NCR), Metro Davao, and Metro Cebu, and in urban areas with satellite city/townships as clusters. Upgrading and rehabilitation of the existing six LTO MVIS (NCR-North and South, Regions III, IV-A, VII and XI) is being prioritized.

As of July 2007, all new motor vehicles introduced in the market beginning January 1, 2008 must comply with EURO 2 emission limits as specified in DENR Administrative Order 2007-27. Stakeholder discussions on a roadmap for moving to EURO 4 emission standards in the next 2 to 4 years are ongoing.

In-use vehicles, as a requirement prior to annual vehicle registration, are tested at Private Emission Testing Centers (PETCs) to determine conformity with vehicle emissions standards. Annex 7 provides details of both type approval and in-use vehicle emissions standards. To prevent the practice of some PETCs of issuing Certificates of Emission Compliance (CEC) without conducting a vehicle test, DENR, DOTC and DTI jointly monitor and audit the performance of PETCs. This concerted effort has resulted in the LTO's suspension or cancellation of the authorization of erring PETCs. According to LTO (as of December 2008), 573 PETCs were authorized, 6 PETCs were suspended and 1 PETC's authorization was cancelled. LTO's PETC Interconnectivity Project implemented in 2007 aimed to reduce the proliferation of fraudulent CEC; the system involves the online, real-time uploading of emission test results to the LTO main database.

The LTO is also prioritizing the intensification of the Anti-Smoke Belching Operations. With funding from the Special Vehicle Pollution Control Fund (SVPCF), it aims to sustain roadside smoke-belching operations by providing sufficient anti-smoke belching equipment and personnel training. The SVPCF receives a small part (7.5%) of the Motor Vehicle User's Charge (MVUC) collected from vehicle owners annually. The SVPCF is earmarked solely for air pollution control (RA 8794 An Act Imposing a Motor Vehicle User's Charge on Owners of All Types of Motor Vehicles and For Other Purposes).

The critical vehicle fuel properties under the CAA are provided in Table 5 below. Improved fuel quality is also being discussed in line with plans to move to EURO 4 vehicle emission standards.

Table 5 Critical Fuel Properties under CAA

Fuel	Parameter	Level
Gasoline	Aromatics	35% by vol. (maximum)
	Benzene	2 % by vol. (maximum)
	AKI	87.5 (minimum)
	Reid Vapor Pressure	9 psi (maximum)
Automotive Diesel	Sulfur	0.05% by wt (maximum)
	Cetane index	48 (minimum)

Source: DENR, 2009

- Alternative Fuels Program

The Biofuels Act of 2006 signed into law by the President in January 2007 mandates that all fuels sold in the country contain locally-sourced biofuels components (between 5-10% bio-ethanol blended gasoline and between 1-2% biodiesel). Since May 2007, biodiesel blend of 1% (B1) by volume is available nationwide. Bio-ethanol blend of 10% (E10) is distributed and sold by some oil companies/dealers in the country.

In addition to promoting the use of biodiesel and bioethanol, the government also implements a Natural Gas Vehicle Program for Public Transport (NGVPPT) and an Autogas program.

- Environmentally Sustainable Transport (EST)

A National EST Strategy and Action Plan for the Philippines was formulated with participation from different sectors. The overall goals of the strategy are to: reduce the annual growth rate of energy consumption and associated greenhouse gas emissions from the transport sector in urban areas in the country and mainstream EST which involves, among others, the promotion of transportation systems of low carbon intensity and shift towards the use of more sustainable transport modes.

During the Clean Air Month (November 2009), the DOTC gave out awards to the cities of Marikina; San Fernando, La Union; Cebu; and Cagayan de Oro for their outstanding work in Building Environmentally Sustainable Transport (BEST).

- Local Government Efforts

Local governments have been proactive in initiating efforts to reduce pollution from motor vehicles (Table 6).

Table 6. Local Programs to Reduce Emissions from Motor Vehicles and Other Source of Pollution

Program	Program Description
Reducing Tricycle Emissions	<ul style="list-style-type: none"> • In September 2009, Mandaluyong City Government, the Partnership for Clean Air and other partners purchased 20 units of 4-stroke tricycles for the Mandaluyong Federation of Tricycle Associations. Tricycle drivers will pay a small amount weekly to a microfinance cooperative to cover the full cost of the 4-stroke tricycle; it is expected that the cost of the tricycles will be fully paid back within 1.5 to 2 years. The funds collected will form part of a “revolving fund” to be loaned to tricycle

	<p>drivers who want to replace their 2-stroke tricycles with 4-strokes. The local university will monitor and report on the viability and sustainability of the program. The project is funded by the Petroleum Institute of the Philippines.</p> <ul style="list-style-type: none"> • San Fernando City, La Union converted 2-stroke tricycles to 4-stroke tricycles by providing tricycle owners with interest-free loans payable in 1 year in the amount of P9,000 for the downpayment on the purchase of 4-stroke tricycles. Within a period of 5-6 years, conversion to 4-stroke was almost complete. As of November 2006, there were 1,269 units of 4-stroke tricycles and 331 units of 2-stroke tricycles. A policy to phase out 20-year old tricycles was enforced. A limit of 1,600 units of motorcycles for hire was set. Information campaigns on the health hazards of smoke from ill-maintained 2-stroke engines were conducted. • To reduce air pollution and congestion, Puerto Princesa City instituted a one day a week of rest for tricycle drivers in 2002. Through these measures, traffic congestion decreased in the urban area, CO₂ emissions decreased by 650kg, and PM₁₀, CO, and NO_x reduced by 16%
Anti Smoke Belching	<ul style="list-style-type: none"> • Several cities have passed their own local ordinance to apprehend smoke belchers. There are six LGUs in Metro Manila who are very active in road side apprehensions. In Makati City, three teams can apprehend about 50-150 smokebelching vehicles daily. This is also the case for Pasig City, Mandaluyong City, Muntinlupa City, San Juan City and Quezon City. Cities outside of Metro Manila are preparing similar ordinances (e.g., Iloilo City). • There continues to be lack of clarity on whether cities have the power to implement their own anti-smoke belching programs, particularly on whether they can collect and keep the penalties. This uncertainty has hampered the anti-smoke belching efforts of some cities. The Implementing Rules and Regulations of the Clean Air Act of 1999 state that the national government takes the lead in anti-smoke belching efforts while the Local Government Code states also allows local governments to pass ordinances provided they are not inconsistent with national laws.
Electric Jeepneys	<ul style="list-style-type: none"> • In 2009, the Makati City Government operates ten electric jeepneys at the heart of the Central Business District (CBD), servicing mostly office workers for FREE. The electric jeepney can carry 14 passengers. With an eight-hour charge costing less than P200, the electric jeepney can run 55 kilometers, at the speed of 35 kilometers per hour. A locally-built electric jeepney costs P625,000.
Bikeways and Cycling	<ul style="list-style-type: none"> • The bikeways program of Marikina City is a holistic social and advocacy campaign that promotes cycling as a non-polluting means of transport. It is holistic because it not only creates the physical requirements for the adoption of bicycling, but also provides an opportunity for people to own bicycles, educates the public on the social dimension and safety of riding the bicycle, and puts in place policies that make this program a sustainable one. In 2006, Marikina City had constructed 46.6 km of bikeways (out of the 66 km target) which connects residential areas to major transport terminals, markets, schools, commercial and industrial establishments. The Bikeways program is partly funded by the GEF/World Bank grant of USD1.1 million. It has been reported that 55% of Marikina households have bicycles and 22% use them to get to work. • San Fernando, La Union started a Bike-Loan Program for its employees. Interested city employees are given the privilege to purchase a bicycle through a loan amounting to P2,500-P3,000. The loan is payable for one year.
Bus Rapid Transit System	<ul style="list-style-type: none"> • The Cebu City council approved the plan for a Bus Rapid Transit system in the city. World Bank and DOTC are providing funding for several studies on the BRT.

Management of Stationary Sources

A permitting, adjudication and reporting system is in place to ensure companies comply with environmental laws including the CAA. EMB regional offices monitor compliance by industries with these laws.

A person may file a complaint against a company for violations of the Clean Air Act. The DENR may, even without a formal complaint by a third party, initiate action by issuing a Notice of Violation if, based on inspection or monitoring reports, it is found that air pollution discharge would constitute an immediate threat to life, public health or greatly exceed the standards. In the latter cases, a Cease and Desist Order may be issued by the Pollution Adjudication Board (PAB) in order to prevent or cease a pollution incident.

According to the 2005-2007 National Air Quality Status Report of the DENR, a total of 18,697 firms were monitored and a total of 1,676 Notices of Violation and 24,391 Permits to Operate were issued from 2005-2007. Most of the Notices of Violation were issued to companies in the NCR. Most permits to operate were issued by Region IVA, where most industries are located.

Self monitoring reports (SMR) with information on air pollutants emitted by each company are submitted by the industries to EMB. The EMB regional offices also conduct stack sampling to validate the information provided in the SMRs. Power plants and cement plants and other major industrial facilities are required to install continuous emissions monitoring systems.

The EMB accredited third party source emission testing firms to ensure the reliability of the source emission test results submitted by industries (DAO 2007-25). As of November 2009, 14 source emission testing firms have been accredited after undergoing tests including oral and written exams and on-site demonstrations.

Local Government Units

Agencies and offices at the barangay, municipality or city, province and national levels play important roles in managing air quality in smaller cities. In this report, “local government units” refer to barangays, municipalities or cities and provinces. Table 7 explains the relationship between the local government units.

Table 7. Local Government Units (LGU)

Province	-Largest unit in the political structure of the Philippines -Consists of municipalities and in some cases, component cities. Its functions in relation to component cities and municipalities are coordinative and supervisory
City	There are 3 classes of cities: -highly urbanized -independent component cities which are independent of the province -component cities which are part of the provinces where they are located and subject to their administrative supervision
Municipality	It is a subsidiary of the province. It consists of several barangays within its territorial boundaries.
Barangay	The smallest political unit and the basic unit of the Philippine political system. It consists of less than 1,000 inhabitants residing within the territorial limit of a city or municipality and administered by a set of elective officials headed by a barangay chairman.

Source: NSO

Cities and municipalities differ in their income, population and area. These are indicators of viability in which a municipality can be converted into a city. Municipalities have an average annual income for the last 2 years of at least P2,500,000, a population of at least 25,000 inhabitants, and a contiguous territory of at least 50 sq. kilometers

(Section 442, Local Government Code (LGC)). Cities are classified into component cities or highly urbanized cities. Component cities have a minimum population of 150,000, contiguous territory of at least 100 sq. kilometers, and an average annual income for the last 2 years of at least P20,000,000. Highly urbanized cities have a minimum population of 200,000 inhabitants, at least an annual income of P50,000,000 (LGC).

The political structure of the LGUs is not unlike that of corporations. Each LGU is headed by a “chief executive.” For provinces, they are called governors. For cities and municipalities, they are called mayors. For barangays, they are called barangay captains or punong barangay.

Local laws or ordinances are enacted by local boards or councils. For provinces, they are called provincial boards or Sangguniang Panlalawigan. For cities and municipalities, they are called city or municipal councils or Sangguniang Panlungsod or Sangguniang Bayan. For barangays, they are called barangay councils or Sangguniang Pambarangay. Ordinances shall be presented to the Chief Executive of the LGU for approval. If the city or municipal ordinance approves a local development plan and public investment program, the provincial board shall review them to ensure they do not go beyond the power of the city or municipal council.

While the national government exercises general supervision over local government units to ensure that their acts are within the scope of their prescribed powers and functions, the local government units enjoy “local autonomy to enable them to attain their fullest development as self-reliant communities and make them more effective partners in the attainment of national goals” (Section 2, LGC). The Local Government Code has given the local government units these powers to generate and apply resources, among others:

- To be responsible for the efficient and effective implementation of their development plans, program objectives and priorities;
- To create their own sources of revenue and to levy taxes, fees, and charges which shall accrue exclusively for their use and disposition and which shall be retained by them;
- To have a just share in national taxes which shall be automatically and directly released to them without need of any further action.

Development planning is done by the LGU’s Local Development Council (LDC). The LDC is the body mandated by law to assist their respective Sanggunian or Council in setting the direction of economic and social development, and coordinating development efforts within their respective territorial jurisdictions. There are LDCs at the barangay, city or municipality, and province. The composition of the LDCs varies slightly depending on the LGU.

In the case of the City or Municipal Development Council, it is headed by the mayor and its members include all barangay captains in the city or municipality, chairman of the committee on appropriations or the city or municipal council, the congressman or his representative, and representatives from nongovernment organizations who shall constitute not less than ¼ the members of the fully organized council. Local development councils are mandated to meet at least once every six months.

Each local government unit shall have a comprehensive multi-sectoral development plan to be initiated by its development council and approved by its City or Municipal Council. The local development plans approved by their respective Councils may be integrated with the development plans of the next higher level of local development council. The approved development plans of provinces, highly-urbanized cities, and independent component cities

shall be submitted to the regional development council, which shall be integrated into the regional development plan for submission to the National Economic and Development Authority (Section 114, LGC).

All LGUs prepare their comprehensive development plans, Local Development Investment Programs (LDIPs), Annual Investment Programs (AIPs), Annual and Supplemental Budgets in the context of and in harmony with national and regional policies, goals and strategies. See Table 8 below for a definition of these different documents.

Table 8. LGU Planning Documents

<p>Annual Budget refers to the financial plan embodying the revenue and expenditures for one fiscal year.</p> <p>Annual Investment Program constitutes the annual slice of the Local Development Investment Plan, referring to the indicative yearly expenditure requirements of the LGUs' programs, projects and activities (PPAs) to be integrated into the annual budget.</p> <p>Comprehensive Development Plan is the multi-sectoral plan formulated at the city/municipal level which embodies the vision, sectoral goals, objectives, development strategies and policies within the term of LGU officials and the medium-term.</p> <p>Local Development Investment Program (LDIP) is a basic document linking the local plan to the budget. It contains a prioritized list of PPAs which are derived from the Comprehensive Development Plan in the case of cities and municipalities, and the Provincial Development and Physical Framework Plan (PDPFP).</p> <p>Provincial Development and Physical Framework Plan (PDPFP) is the plan document formulated at the provincial level that contains the long-term vision of the province, and identifies development goals, strategies, objectives/targets and corresponding PPAs which serve as primary inputs to provincial investment programming and subsequent budgeting and plan implementation.</p>

Source: DILG, NEDA, DBM, DOF Joint Memorandum Circular No. 1, Series of 2007

Climate Change Policies

In May 1991, even before it signed and ratified the UN Framework Convention on Climate Change (UNFCCC), the Philippines created the Inter-Agency Committee on Climate Change (IACCC). It signed and ratified the UNFCCC in 1992 and 1994, respectively, and the Kyoto Protocol in 1998. The IACCC was established by Presidential Administrative Order No. 220 with DENR Secretary as the Chair. The IACCC comprised of about 15 government agency and nongovernment organization representatives. It was created to coordinate climate change related activities, propose climate change policies and prepare the country position to the global discussions on climate change.

In 1997, the **National Action Plan on Climate Change** was formulated. The action plan provides guidance on mitigation measures to be prioritized. In 2007, the Presidential Task Force on Climate Change was created chaired by DENR and later transferred to DOE. In September 2008, a Presidential Adviser on Climate Change was appointed. The Presidential Task Force on Climate Change was then reorganized and chaired by the President in January 2009.

The Philippines **National Energy Efficiency and Conservation Program (NEECP)** aims to contribute towards the achievement of 60% energy self-sufficiency by 2010 and the avoidance of 50.9 million tons of CO₂ emissions for the period 2005 to 2014.

In October 2009, the President signed the **Climate Change Act of 2009** which mandates the creation of a Climate Change Commission, to be headed by the President. The members of the Commission would include heads of the relevant national government departments, heads of the Leagues of Provinces, of Cities, Municipalities and Barangays, representatives from academe, business sector, NGOs and civil society. When the Climate Change Commission is organized, the existing Presidential Task Force on Climate Change and the Inter-Agency Committee on Climate Change shall be abolished.

The Commission shall formulate a Framework Strategy on Climate Change to serve as the basis for a program for climate change planning (based on an integrated adaptation-mitigation) approach, research and development, extension, and monitoring of activities to protect vulnerable communities. Mainstreaming of climate change consideration in the national, sector and local development plans and programs would be one of the functions of the Commission. It would also formulate and implement a National Climate Change Action Plan. Local government units shall formulate their own Local Climate Change Action Plan and be in the frontline in implementing the plan in their respective areas.

Examples of local commitment to address climate change is the Albay Provincial Declaration on Climate Change Adaptation (Province of Albay, 2007) which presents a plan of action to, among others, work for the passage of a policy prioritizing climate change in the national agenda, promote “climate-proofing” development, promote mainstreaming through the DILG, the leagues of local government units the adoption of local policy and programs for climate change adaptation.

3.2 Clean Air Action Plans in Smaller Cities

It is within the power of local government units (LGUs) in the Philippines to initiate their own air pollution control projects. The Philippine Clean Air Act (CAA) recognizes LGUs role in implementing the CAA provisions within their territorial jurisdiction. The Local Government Code (LGC) confers to LGUs the power to enact ordinances that would benefit their community and people; environmental management is considered one of the basic services that LGUs should provide to its inhabitants.

Some LGUs have implemented air pollution control projects (e.g., anti-smoke belching, bus rapid transit, tricycle emission reduction, ban on smoking in public places, bikeways). These efforts are usually ad hoc activities and do not fall under a framework for air quality management. Assistance from national government agencies to LGUs in developing and implementing an air quality action plan is needed. In preparing an action plan for a city or a specific LGU, care must be taken to link the city action plan with the air quality action plan of the airshed which the city or LGU is a part and with the city development plan.

Financing for clean air projects, programs and activities may be taken from the LGUs usual funding sources: (a) LGUs share in the national internal revenue taxes, (b) share in the national wealth (e.g., proceeds from the development and utilization of national wealth in the LGUs area), (c) credit financing, (d) local taxes and revenues (including revenues raised from the air pollution project itself such as fines from apprehending smoke belchers).

Other sources of funds for local clean air projects that could be explored are the Air Quality Management Fund (AQMF) and the Special Vehicle Pollution Control Fund (SVPCF).

The Air Quality Management Fund (AQMF) was established as a special account in the National Treasury to be administered by the DENR to finance “clean-up” operations of the Government in air pollution cases; guarantee restoration of ecosystems and rehabilitate areas affected by the acts of CAA violators; and support research, enforcement and monitoring activities and capabilities of the relevant agencies pursuant to Section 14 of the CAA. The AQMF also funds activities of the Airshed Governing Boards.

Sources of the AQMF include: (1) air emission charges from industrial and mobile sources; (2) fines and penalties for non-compliance with environmental standards; (3) grants, donations and endowments from both private sector and donor organizations; (4) fees collected from the processing of permit; and (5) fines and penalties for violation of the other provisions of the Act and its Implementing Rules and Regulations. Only the Environmental Management Bureau of the Department of Environment and Natural Resources (EMB-DENR) and the Land Transportation Office of the Department of Transportation and (LTO-DOTC) have been remitting to the AQMF. The latter’s collection of fines largely comes from the Anti-Smoke Belching operations. The AQMF amounted to a total of Php 184,994,118.00 as of December 2007 (DENR, 2009). See previous discussion in Section 3.1 on eligible projects to be funded by the AQMF.

The SVPCF is one of the funds created under Republic Act No. 8794 (not to be confused from the Clean Air Act which is RA 8749). RA 8794 imposes a motor vehicle user’s charge on all motor vehicles and paid for by the owner. All the proceeds collected under this law will be used for: road maintenance and improvement of road drainage, installation of traffic and road safety devices, and air pollution control. The collections shall be divided as follows: 80% for the special road fund, 5% for special local road fund, 7.5% for special road safety fund, and 7.5% for special vehicle pollution control funds. The SVPCF has been used to fund national projects such as the improvements of the Motor Vehicle Inspection System, anti-smoke belching efforts of LTO, information and education campaigns, among others. The DOTC expressed willingness to receive project proposals to be funded out of the SVPCF.

RA 8794 also created the Road Board to efficiently manage the fund. Members of the Board are the Secretaries of the Department of Public Works and Highways, Department of Finance, Department of Budget and Management, and Department of Transportation and Communication. Three members shall also come from transport and motorist organizations.

4. STAKEHOLDERS

The right of every person to breathe clean air is recognized in the Philippine Clean Air Act (CAA). In many provisions, the CAA recognizes the important role that stakeholders play in developing and implementing plans and programs to achieve better air quality. This Chapter takes a look at whether stakeholders actively participate in air quality management in the Philippines.

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 implementing projects to control air pollution, some cities lack the capacity to manage their air quality effectively. The DENR holds, on an ad hoc basis, several workshops to raise awareness of LGUs on air pollution issues.

Local government associations

There are several local government associations which provide assistance to its members (Annex 8). The common aim of these local government associations is to create synergies among their members and to build their capacity in different areas of concern. These associations would be important partners in promoting better air quality management in Philippine municipalities, cities and provinces:

- League of Provinces of the Philippines
- League of Cities of the Philippines
- League of Municipalities of the Philippines
- Liga ng mga Barangay or League of Barangays

Nongovernment Organizations (NGOs)

The activities of NGOs related to air pollution issues can be grouped into four: (a) public awareness campaigns, (b) policy advocacy and reform, (c) technical solutions and training, and (d) strengthening the air quality community. The most important contributions of NGOs in public awareness are in the phase out of leaded gasoline and the establishment of the stakeholder network called the Partnership for Clean Air. In policy advocacy and reform, NGOs assist in the formulation of air pollution control legislation at the national and local government level (e.g., draft citizen suit guidelines for DOTC and DENR, anti-smoke belching ordinance, anti-smoking ordinance, promotion of cycling as a mode of transport); and phase out of leaded gasoline nationwide through the Lead Free Coalition. NGOs also propose technical solutions and assist in implementing them such as the shift from 2-stroke to cleaner technologies for tricycles, ecodriving. They also provide training to LGUs (e.g., Air Quality Management Training Program for the Philippine Cities by the Partnership for Clean Air and League of Cities of the Philippines)

To strengthen the air quality community, the Partnership for Clean Air together with the DOTC, DENR, Department of Education and other stakeholders organized the Clean Air 10 Workshop with about 300 participants from all over the country. The participants drafted the Clean Air 10 Declaration (Annex 9); each declaration represented a priority action which the air quality community would implement in the coming years.

Universities and academe

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

- Integrated Environmental Strategies' Metro Manila Report focusing on the transport sector (Manila Observatory, 2004)
- Public Health Monitoring: A Study under the Metro Manila Air Quality Improvement Sector Development Program (DOH, 2004)
- Particulate Matter Monitoring and Source Apportionment by Nuclear and Related Analytical Techniques (PNRI, 2007)
- Improving Air Quality in Asian Developing Countries Philippines Study determining the source of particle pollution at a selected site (Manila Observatory, 2008)
- Technology Options for Two-stroke Powered Tricycles (Miriam ESI, 2008)
- Various sustainable transport studies (NCTS- University of the Philippines)

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 the Philippines supported by development agencies were:

- Metro Manila Air Quality Improvement Sector Development Program (MMAQISDP) (1998-2007), an Asian Development Bank (ADB) loan-financed program implemented by various national government agencies led by the DENR. Its general objective was to “promote policy reforms to improve air quality through the abatement of mobile and stationary sources of air pollution.”
- Vehicle Emission Reduction Program. In 2002, Infinite Progression Foundation, Inc. (IPFI) with funding from the United States Agency for International Development (USAID) implemented a two-year project that promoted public awareness and actions to reduce vehicle emissions in Metro Manila. The project focused on addressing the poorly maintained public utility vehicles in Metro Manila through preventive maintenance. At least 1,300 jeepney drivers and operators were trained on preventive maintenance (http://philippines.usaid.gov/ee_success_stories10.html)
- USAID-Energy and Clean Air Project (ECAP). The USAID-ECAP (2004-2009) provided technical assistance to government agencies and selected civil society partners that are working on power sector reforms and cleaner air. ECAP operated in four project sites, namely: Metro Manila, Baguio, Cebu and Davao by partnering with key academic institutions as ECAP's project offices. Some of its initiatives included strengthening local governance for clean air; strengthening motor vehicle inspection and maintenance; enabling public utility transport sector compliance with emission standards in the Clean Air Act; and sustaining constituencies for clean air reforms.

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:** While annual TSP levels show a decreasing trend, these levels are still above the annual National Ambient Air Quality Guideline Value. PM₁₀ annual mean levels show decreasing trends in several sampling sites in Metro Manila. However, the PM_{2.5} annual mean levels in all the PNRI sampling sites in Metro Manila exceed the WHO long term guideline value of 10µg/m³. PM₁₀ annual mean levels show a slightly decreasing trend from 2006 to 2008. With respect to other pollutants, SO₂ and NO₂ levels are below the NAAQGV while limited monitoring of O₃ shows levels exceeding the one-hour guideline of 140µg/m³ in seven out of eight months monitored at one station in Quezon City, Metro Manila between 2001 and 2002 (World Bank, 2002). In other regions, however, the annual mean levels of O₃ recorded are relatively low.
- **Legal framework for air quality management:** The Clean Air Act and its implementing regulations guide air quality management in the Philippines. The CAA recognizes the important role that local government units play in air quality management. Cities have the power and authority to develop and implement air quality action plans and related plans (e.g., city development). Even in the absence of a framework policy such as a local clean air action plan, several cities have implemented air pollution control projects. Cities may fund air quality programs through the usual funding sources (e.g., internal revenue allotment, local taxation, credit financing). Other sources of funding may also be accessed such as the Air Quality Management Fund (AQMF) and the Special Vehicle Pollution Control Fund (SVPCF).
- **Stakeholders:** Involving stakeholders in the formulation of an air quality action plan ensures buy-in from them; the action plan would likely be implemented if stakeholders have local ownership. National government agencies (through technical guidelines and support), educational institutions and academe (through scientific studies), NGOs (through public awareness, policy advocacy and reform, technical solutions and training, networking), 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. Local 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.

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ANNEXES

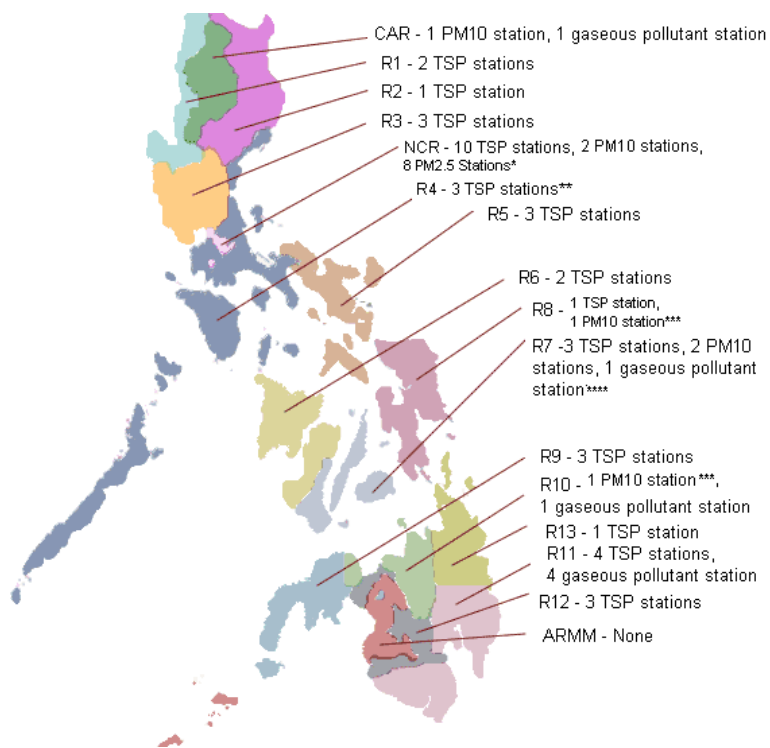
Annex 1

Population and Population Density in Selected 20 Philippine Cities

City	Region	Population (1 Aug, 2007)	Area (km ²)	Population density (people per km ²)
Quezon	NCR	2,679,450	161.2	16,622
Manila	NCR	1,660,714	38.6	43,079
Caloocan	NCR	1,378,856	53.3	25,855
Davao	Region 11	1,363,337	2443.6	557
Cebu	Region 07	798,809	291.2	2,743
Zamboanga	Region 09	774,407	1483.4	522
Antipolo	Region 04-A	633,971	306.1	2,071
Pasig	NCR	628,381	31.0	20,270
Taguig	NCR	613,343	48.9	12,535
Valenzuela	NCR	568,928	45.8	12,422
Makati	NCR	567,349	26.3	21,564
Cagayan de Oro	Region 10	553,966	488.1	1,135
Parañaque	NCR	552,660	47.7	11,589
Las Piñas	NCR	532,330	32.7	16,284
General Santos	Region 12	529,542	492.9	1,074
Bacolod	Region 06	499,497	161.5	3,094
Muntinlupa	NCR	452,943	46.7	9,699
San Jose del Monte	Region 03	439,090	148.68	2,953
Marikina	NCR	424,610	34.0	12,500
Iloilo	Region 06	418,710	56.1	7,470

Annex 2

Distribution of Air Quality Monitoring Stations by Region (2008)



*2 PM₁₀ and 3PM_{2.5} stations were operated by the Philippine Nuclear Research Institute (PNRI), 5 PM_{2.5} station was operated by the Manila Observatory (MO)

** One of three TSP stations was operated in January, June, July, September and October 2008 only

*** One of PM₁₀ and gaseous pollutants station was not operational between May and October 2008

**** PM instrument was not operational in 2008

Sources: EMB region reports, 2008; PNRI, MO, and DENR

Summary of the Parameters Monitored in the Philippines (2008)

Region	Parameters									
	DENR					CO	PNRI		MO	
	TSP	PM ₁₀	NO ₂	SO ₂	O ₃		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
I	√									
II	√									
III	√									
IV	√									
V	√									
VI	√									
VII	√	√	√	√	√					
VIII	√	√								
IX	√									
X			√	√	√					
XI	√		√	√	√					
XII	√									
XIII	√									
CAR		√	√	√	√	√				
ARMM										
NCR	√						√	√		√

Region I – Ilocos Region; Region II – Cagayan Valley; Region III – Central Luzon; Region IV-A – Calabarzon; Region V – Bicol Region; Region VI – Western Visayas; Region VII – Central Visayas; Region VIII – Eastern Visayas; Region IX – Zamboanga Peninsula; Region X – Northern Mindanao; Region XI – Davao Regaion; Region XII – Soccsksargen; Region XIII – Caraga; Region CAR – Cordillera Administrative Region; Region ARMM – Autonomous Region in Muslim Mindanao; Region NCR – National Capital Region

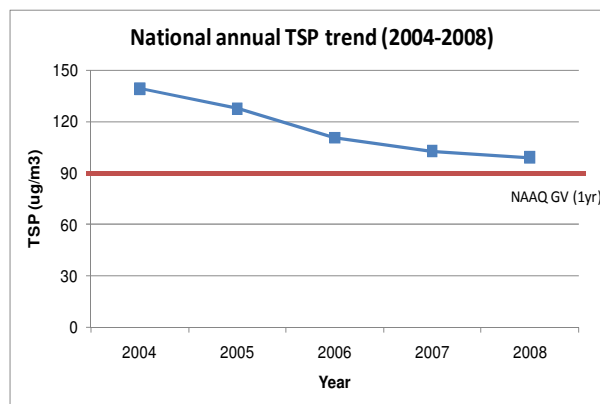
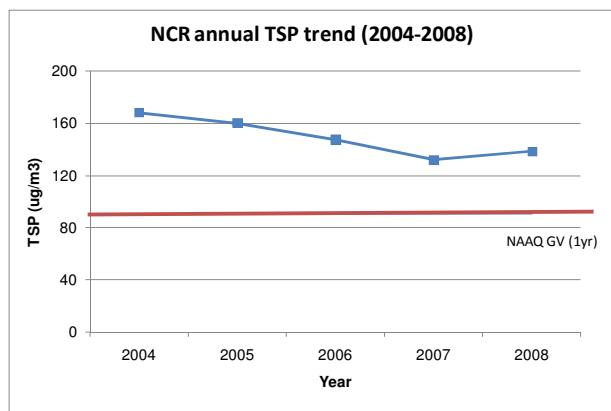
DENR – Department of Environment Natural Resource

PNRI – Philippine Nuclear Research Institute

MO – Manila Observatory

Annex 3

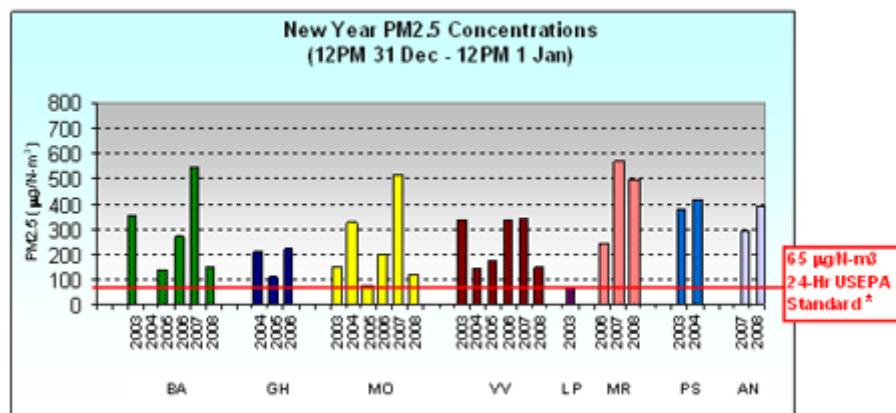
Annual average TSP trends in NCR and nationwide (2004 to 2008)



Source: EMB

Annex 4

PM2.5 levels in Manila during the New Year, 2003-2009



* 24-hour USEPA standard was tightened from 65µg/m³ to 35µg/m³ in 2006.

BA – Baragka, Marikina City; GH – Greenhills, San Juan; MO – Manila Observatory, QC; VV – Valle Verde 5, Pasig City; LP – BF Almanza, Las Pinas City; MR – Nangka, Marikina City; PS – Chason Southville, Pasig; AN – Antipolo

Source: Manila Observatory

Annex 5

Philippine Air Quality Index (AQI)

Pollutant Index	Good	Fair	Unhealthy for Sensitive Groups	Very Unhealthy	Acutely Unhealthy	Emergency
µg/m ³ TSP (24-Hr Ave)	0-80	81-230	231-349	350-599	600-899	900-above
µg/m ³ PM ₁₀ (24-Hr Ave)	0 – 54	55 – 154	155 - 254	255 – 354	355 – 424	425 – 504
ppm SO ₂ (24-Hr Ave)	0.000-0.034	0.035-0.144	0.145-0.224	0.225-0.304	0.305-0.604	0.605-0.804
ppm CO (8-Hr Ave)	0.0 – 4.4	4.5 – 9.4	9.5 – 12.4	12.5 – 15.4	15.5 – 30.4	30.5 – 40.4
ppm O ₃ (8-Hr Ave)	0.000-0.064	0.065-0.084	0.085-0.104	0.105-0.124	0.125-0.374	See Note ¹
ppm O ₃ (1-Hr Ave) ²	-	-	0.125 – 0.164	0.165 – 0.204	0.205 – 0.404	0.405 – 0.504
ppm NO ₂ (1-Hr Ave)	See Note ³	See Note ³	See Note ³	See Note ³	0.65 – 1.24	1.25 – 1.64

Note:

¹When 8-hour O₃ concentrations exceed 0.374 ppm, AQI values of 301 or higher must be calculated with 1-hour O₃ concentrations

²Areas are generally required to report the AQI based on 8-hour ozone values. However, there are a smaller number of areas where an AQI based on 1-hour ozone values would be more precautionary. In these cases, in addition to calculating the 8-hour ozone index value, the 1-hour index value may be calculated and the maximum of the two values is reported.

³NO₂ has no 1-hour term NAAQG.

Source: RA 8749 Implementing Rules and Regulations (IRR)

Annex 6

Designated Airsheds in the Philippines

- Metro Manila (NCR, Regions III & IVA)
- Northeastern Pangasinan (Region I)
- Metro Tuguegarao (Region II)
- Baco-Naujan-Calapan (Region IVB)
- Naga City (Region V), Metro Iloilo (Region VI)
- Metro Cebu (Region VII)
- Zamboanga City (Region IX)
- Cagayan de Oro (Region X)
- Davao City (Region XI)
- Agusan del Norte-Butuan City (Region XII)
- South Cotabato (Region XIII)
- BLIST: Baguio, La Trinidad, Itogon, Sablan, Tuba (CAR)
- Southern Negros Geothermal (Region VI)
- Bacod-Manito Geothermal (Region VIII)
- Leyte Geothermal (Region VIII)
- North Cotabato Geothermal (Region XII)
- Makiling-Banahaw Geothermal (Region IVA)

Annex 7

Emission standards for in-use motor vehicles

Type of Engine	Vehicle Registration	CO (% by volume)	HC (ppm as hexane)	Light absorption coefficient, m ⁻¹ ,k
Spark-ignition (gasoline), except motorcycles ¹	Registered for the first time on or before December 31, 2002	4.5	800	
	Registered for the first time on or after January 1, 2003 but before January 1, 2008	3.5	600	
	Registered for the first time after December 31, 2007	0.5	250	
Spark-ignition (gasoline), in-use motorcycles ¹	Registered for the first time on or before 31 December 2002	6.0	Urban center: 7800	
	Registered for the first time after 31 December 2002	4.5	Rural area: 10,000	
Compression- ignition (diesel)	Registered for the first time on or before 31 December 2002			2.5 3.5 (turbocharged) 4.5 (1,000m increased in elevation)
	Registered for the first time on or after 1 January 2003 but before 1 January 2008			2.5
	Registered for the first time after 31 December 2007			2.0

1 – at idle

2 – using the free acceleration test

Sources:

http://www.lto.gov.ph/dao-2007-27_137.pdf[http://www.emb.gov.ph/air/laws&policies\(air\)/dao2003-25.pdf](http://www.emb.gov.ph/air/laws&policies(air)/dao2003-25.pdf)www.cleanairnet.org/baq2003/1496/articles-58102_resource_1.doc

Approval Emission Limits for Passenger/Light Commercial Vehicles (effective on 1 January, 2008)

Type of Engine	Class of vehicle	CO (g/km)	HC + NOx (g/km)	PM (g/km)
Spark-ignition	Category M1 (Light Passenger Vehicles) (≤ 2,500 kg)	2.2	0.50	---
Spark-Ignition	Category N1 (Light Commercial Vehicles) Class 1 (< 1,305 kg)	2.2	0.50	---
	Category N1 (Light Commercial Vehicles) Class II (1,350 – 1,760 kg)	4.0	0.65	---
	Category N1 (Light Commercial Vehicles) Class III) (> 1,760 kg)	5.0	0.80	---
Compression-Ignition	Category M1 (Light Passenger Vehicles) (≤ 2,500 kg)			
	Euro 2, IDI	1.0	0.70	0.08
	Euro 2, DI	1.0	0.90	0.10
	Category N1 (Light Commercial Vehicles) Class I (≤ 1,305 kg)			
	Euro 2, IDI	1.0	0.70	0.08
	Euro 2, DI	1.0	0.90	0.10
Category N1 (Light Commercial Vehicles) Class II (1,305 – 1,760 kg)				
	Euro 2, IDI	1.25	1.00	0.12
Euro 2, DI	1.25	1.30	0.14	
Category N1 (Light Commercial Vehicles) Class III (> 1760 kg)				
	Euro 2, IDI	1.5	1.20	0.17
Euro 2, DI	1.5	1.60	0.20	

Approval Emission Limits for Heavy Duty Vehicles (effective on 1 January, 2008)

Type of engine	Class of Vehicle	CO (g/kWh)	HC (g/kWh)	NOx (g/kWh)	PM (g/kWh)
Compression-Ignition	Heavy Duty Vehicles	4.0	1.10	7.0	0.15 (less than 700 cc per cylinder and with a rated power speed greater than 3000 RPM may comply with a limit of 0.25 g/kWh)

Annex 8

Local Government Associations in the Philippines

League of Provinces of the Philippines (www.lpp.gov.ph) primarily aims to ventilate, articulate, and crystallize issues affecting provincial and metropolitan government administrations. It also serves to secure solutions to problems confronting the locales. The specific objectives of the League are to:

1. Foster unity and cooperation among all provinces of the country;
2. Provide a cohesive force that embodies the sentiments and aspirations of member provinces;
3. Serve as a forum of discussion and feedback mechanism on policies affecting local governments;
4. Collaborate with national and other local government agencies in attaining efficient and effective inter-governmental relations to provide development programs that will enrich and upgrade the capabilities of local government units;
5. Engage in continuing programs for the development of local government units; and
6. Involve League officers and members in international associations, conventions, seminars and congresses.

League of Cities of the Philippines (www.lcp.org.ph) is an organization of all cities for the primary purpose of ventilating, articulating and crystallizing issues affecting city government administration, and securing solutions thereto. The mission of the League of Cities:

1. To foster unity and cooperation among all cities in the country
2. To promote the interest and welfare of its members
3. To provide a cohesive force that embodies the sentiments and aspirations of its members and advocates the principles, among others, of enhanced devolution and decentralization, integrated development planning, coordination of basic services between the national government and the cities as well as between cities, and democratization of participation, representation and resources in local governance
4. To serve as a forum of discussion and a feedback mechanism on policies affecting city governments
5. To collaborate with national and other local government agencies in attaining efficient and effective inter-government relations to provide development programs that will enrich and upgrade the capabilities of city governments
6. Develop and implement both as bodies of governance and development entities

League of Municipalities of the Philippines (lmp.org.ph) is an organization of all municipalities for the primary purpose of ventilating, articulating and crystallizing issues affecting municipal government administration, and securing solutions thereto. Its mission is to enable members to reinvent their advocacy and mobilization strategies and delivery of social, economic and environmental services to benefit their constituents and the future generation. Its vision is: LMP - the heart and soul of all municipalities collectively achieving effective governance, timely delivery of services and strengthened institutional capacity. The League of Municipalities shall:

1. Assist the national government in the formulation and implementation of the policies, programs and projects affecting municipalities as a whole;
2. Promote local autonomy at the municipal level;

3. Adopt measures for the promotion of the welfare of all municipalities and its officials and employees;
4. Encourage people's participation in local government administration in order to promote united and concerted action for the attainment of country-wide development goals;
5. Supplement the efforts of the national government in creating opportunities for gainful employment within the municipalities;
6. Give priority to programs designed for the total development of the municipalities in consonance with the policies, programs and projects of the national government;
7. Serve as a forum for crystallizing and expressing ideas, seeking the necessary assistance of the national government, and providing the private sector avenues for cooperation in the promotion of the welfare of the municipalities; and
8. Exercise such other powers and perform such other duties and functions as the league may prescribe for the welfare of the municipalities.

Liga ng mga Barangay or League of Barangays (www.barangay.gov.ph) is an organization of all Barangays (more than 42,000 throughout the country) for the primary purpose of ventilating, articulating and crystallizing issues affecting Barangay government administration and securing solutions thereto. The Liga ng mga Barangay shall:

1. Give priority to programs designed for the total development of the Barangays and in consonance with the policies, programs and projects of the national government;
2. Assist in the education of Barangay residents for people's participation in local government administration in order to promote united and concerted action to achieve country-wide development goals;
3. Adopt measures to promote the welfare of Barangay officials;
4. Serve as a forum of the Barangays in order to forge linkages with government and non-governmental organizations and thereby promote the social, economic and political well-being of the Barangays; and
5. Exercise such other powers and perform such other duties and functions which will bring about stronger ties between Barangays and promote the welfare of the Barangay inhabitants.

Annex 9

Clean Air 10 Declaration

June 24, 2009

We the delegates to the “National Conference on Empowering LGUs to Clean the Air and Address Climate Change through Partnerships,” representing national government agencies, local government units (LGUs), non-governmental organizations (NGOs), academe, private sector, civil society and concerned individuals:

Recognize that the Philippine Clean Air Act (CAA) of 1999 is now ten years old.

Acknowledge that various organizations have started to implement air quality measures and programs focusing mostly on fuel quality and mobile sources; that while these initiatives have reaped initial gains the quality of air in major cities and municipalities continue to degrade; that air pollution has serious impacts on

public health; that there are still areas in the CAA provisions and implementation that require immediate attention such as indoor air pollution and area sources.

Realize the need to continue the initiative of the 5 million stakeholders who signed the petition to enact this legislation; consolidate stakeholder efforts in the next years; renew commitments and reinvigorate efforts to finally achieve clean air; build on initial gains and existing organization networks; propose measures that take into account the close linkage of air pollution with other environmental and social problems such as climate change, tobacco smoke, solid waste, deforestation, vehicular traffic and including poverty.

Do hereby commit to uphold the values of the *Ligtas Hangin* campaign:

Recognize our common right to breathe clean and healthy air;

Believe that open, transparent and peaceful dialogue can effect real change;

Acknowledge that win-win solutions do exist;

Align activities that support better air quality in the Philippines;

Thereby declare the following ten-point actions (Clean Air 10):

1. We urge the Department of Science and Technology (DOST) to create a multi-stakeholder committee to improve information dissemination on clean air technologies by creating and maintaining a database of the technologies verified by relevant government agencies which is readily accessible to the public.

2. We urge the Department of Environment and Natural Resources (DENR), Department of Transport and Communications (DOTC), Department of Education (DepEd), Department of Health (DOH), Philippine Information Agency (PIA), Department of Interior and Local Government (DILG), DOST, other concerned government agencies, and media to come up with a general direction and strategy including core messages to be communicated nationwide (e.g., the quality of air that people breathe, all sources and impacts of air pollution, solutions to reduce air pollution) and a scientific, systematic, target-specific and sustainable monitoring and evaluation system for the clean air and climate change campaign.

3. We urge the heightened collaboration of the private sector, particularly multi-media groups, malls/stores, mass transit systems, to provide free avenues for promoting the clean air and climate change campaigns, as well as professional groups, academe and church-based organizations, to volunteer technical skills for information dissemination and capacity-building aspects of the campaign.

4. We urge the DILG, the League of Cities of the Philippines (LCP), the League of Municipalities of the Philippines (LMP), and the League of Provinces of the Philippines (LPP), in the short-term, to encourage local government units (LGU)s to designate Environment and Natural Resources Officers (ENROs) and establish Anti-Smoke Belching Units (ASBUs) or other positions to implement clean air and climate change programs and projects and, in the long-term, to support the amendment of the Local Government Code to make the ENRO position mandatory.

5. We urge the DENR, DOTC, DILG, Technical Education and Skills Development Authority (TESDA), Local Government Academy (LGA), LGUs, the academe and other expert groups, to organize technical trainings (e.g., assessing air quality status of the airshed, determining appropriate policy measures to reduce air pollution, engaging stakeholders in planning, regular reporting to the public, translating these measures at the barangay level), and provide logistical support (e.g., emission testing equipment) to airshed governing boards and LGUs.

6. We strongly request the TESDA, the LGUs, engine manufacturers (e.g., Motorcycle Development Program Participants Association, MDPPA), NGOs, and local experts to institutionalize technical training of operators,

drivers and mechanics/service centers on emission control measures (e.g., preventive maintenance, eco-driving) and explore with other concerned government agencies the possibility of providing an incentive and penalty system that will encourage clean air compliance and discourage smoke belchers (e.g., mandating preventive maintenance training as requirement for issuance of permit to operate).

7. We urge all national government agencies and LGUs to strengthen implementation by strictly enforcing the provisions of the Clean Air Act, especially anti-smoke belching campaign, ban on smoking in public places and incineration ban and the provisions of RA 9003 (Ecological Solid Waste Management Act) on open burning; to issue the appropriate executive orders and enact the necessary ordinances to address the policy gaps (e.g., control of tricycle franchises issued by LGUs, widen and strengthen roadside apprehensions (on smoke-belching) of Land Transport Office (LTO)-deputized groups, penalizing idling of vehicles, encourage non-motorized and non-polluting modes of transport) and to make regular reports to the public of these actions taken.

8. We urge the Department of Budget and Management (DBM) and Department of Finance (DOF) to hasten the release of funds intended for clean air programs and encourage the LGUs to tap existing government funds already provided by law such as:

a) The Road Users' Tax, which mandates a 7.5 percent allocation for road transport pollution control programs like the current Special Vehicle Pollution Control Fund (SPVCF) with the DOTC. Tap the same road users' to create a proposed TricyCLEAN fund for the tricycle sector which also contributes substantially to the fund.

b) Extended Value Added Tax (EVAT) share of LGUs, of which 15 percent is mandated to be spent on environmental projects as it is provided under Section 21-D of R.A. 9337, also known as the EVAT law)

9. We urge Local Government Units (LGUs) to create their own local or counterpart "Air Quality Management Fund" (AQMF), which they may call as the Clean Air Fund for the Environment (CAFÉ). This fund can easily be computed based on corresponding health impact cost over fuel consumption per locality. We also urge both Houses of Congress to amend the CAA provision on the AQMF to make it a revolving fund which is more readily accessible for use to implement clean air programs and projects and to also strengthen their oversight function.

10. We urge the oil companies and related industries, which directly or indirectly contribute to air pollution and greenhouse gas emissions, to institutionalize their support to clean air and climate change actions by committing to the following:

a) In consultation with the transport sector, redirect the fuel price discounts, which they already grant voluntarily to the transport sector, into a special fund to finance various clean air initiatives and programs of the transport sector;

b) Support a carbon tax or environmental tax on their fuel and other products to fund clean air programs, research and GHG-reduction initiatives such as adoption of clean technologies, reforestation, mangroves and coral reef rehabilitation, and clean air enforcement and monitoring projects (i.e., smoke belching, Motor Vehicle Inspection System (MVIS), emission testing, empowering Airshed Governing Boards, checking other pollution sources like pesticide etc.) Support for these economic instruments is in line with globally-accepted principles such as the Polluters' Pay Principle (PPP), Extended Producers' Responsibility (EPR), and the Corporate Social Responsibility (CSR).

We further commit to the monitoring and evaluation (M&E) of the Clean Air 10 actions; to urge relevant organizations to regularly report their progress; and, to disseminate these M&E reports; as well as to urge other government agencies, organizations, sectors, communities, and individuals to sign this Declaration and implement their own sector/area-specific or personal Clean Air 10 actions.