

The Philippine Information Agency (PIA) of the Philippines conducted a knowledge awareness and practice (KAP) survey for the DENR in 2001. A total of 1,600 people representing four groups – general public, public utility vehicle (PUV) drivers, PUV owners/operators, and industry owners/managers – were surveyed. Figure 21 compares concerns about air pollution, awareness of programs to control air pollution, and awareness about CAA, among the four groups. The survey findings to some extent conform to previous survey results of the Social Weather Station (SWS) in 1995, which concluded that air pollution is among the top three environmental concerns of Metro Manila residents.

A large majority is alarmed about air pollution. Nearly three-quarters of the general public believe that air pollution is an alarming problem. This concern is also shared by a large majority of PUV drivers and owners.

Low-level of awareness about control efforts. Just over a quarter of the general public is aware of programs that are being implemented by institutions and individuals to control air pollution. While the level of awareness among polluters (industry and PUV) is high (at 38 to 44 percent), a greater majority of the general public (72 percent) is still unaware of CAA activities.

Few know about CAA. Only one in three among the general public are aware of CAA. This is surprising given that the draft law was discussed extensively and over a long period of time. Only a third to half of the surveyed PUV drivers and owners are aware of the Act.

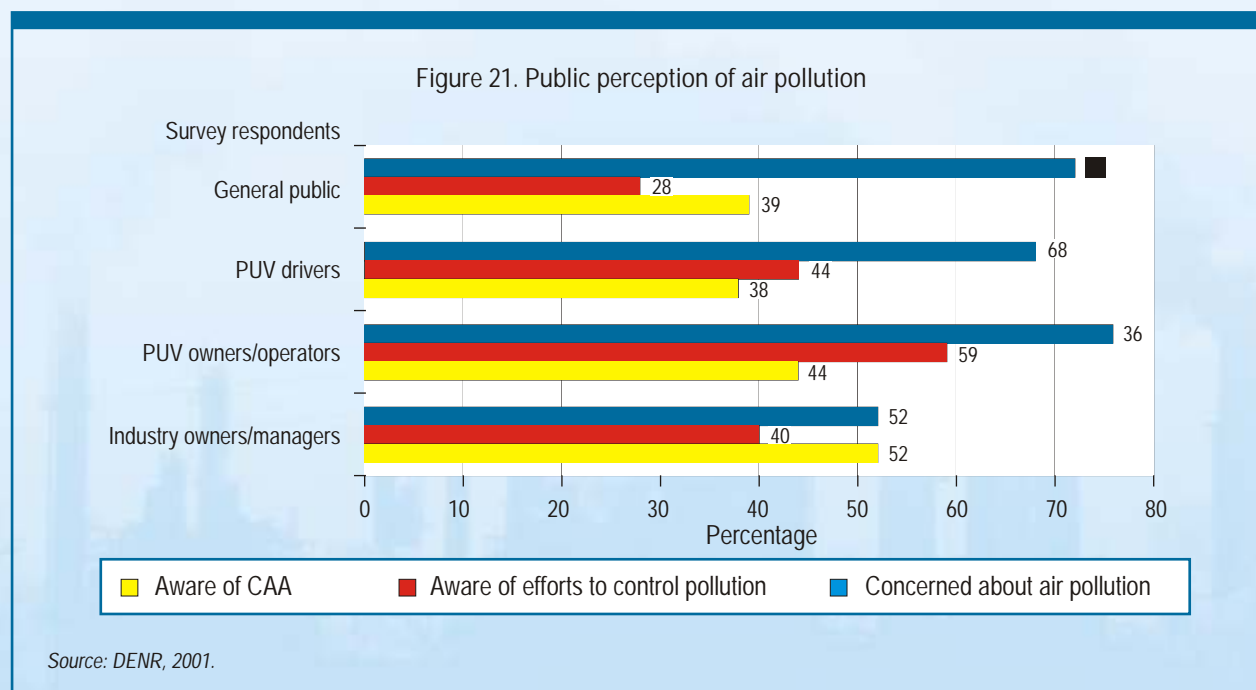
Roadside enforcement has wide support. The four groups were nearly unanimous (96 percent) that there should be roadside apprehension of smoke-belching vehicles.

Most believe that air pollution is primarily caused by motor vehicles.

- Motor vehicles – 98 percent (public); 96 percent (PUV drivers); 92 percent (industrial owners/managers)
- Factories – 51 percent (public); 49 percent (PUV drivers); 44 percent (industrial owners/operators)

Over half the PUV owners/drivers do regular checks on their vehicles.

- 62 percent of PUV owners/operators take their vehicles to commercial shops for maintenance check ups.
- 53 percent of PUV drivers bring their vehicles to the Land Transportation Office (LTO) for emission testing.



With the common goal of achieving clean air, the government, private sector, and civil society have initiated several policies, programs, and projects that address air pollution.

Enacting CAA. The most comprehensive policy to date is CAA. Among the key policy shifts incorporated in CAA are the use of market-based instruments and the expanded role of the private sector (see section on Management and Box 4). Studies are ongoing for the development of an emission charge system for stationary and mobile sources. Progressive improvements in gasoline and diesel fuel are planned by 2004.

Implementing anti-smoke belching campaigns. Roadside enforcement of smoky vehicles, especially in Metro Manila, is being strengthened. The enforcement teams of the MMDA, implement as well as coordinate the anti-smoke belching efforts of local government units (LGUs). The program has resulted in the decreased number of smoke-belching vehicles on Epifanio de los Santos Avenue (EDSA) from more than 20 percent to less than 10 percent over a five month period (April-August 2001).

Enforcing vehicle emission standards. The Department of Trade and Industry (DTI) issued regulations requiring importers to submit a certificate that the imported vehicles have passed the emission standards of the country of origin or the Philippines, whichever is higher. Once in use, these vehicles are subject to annual emissions testing prior to renewal of registration. The Land Transportation Franchising and Regulatory Board (LTFRB) has also adopted the policy of canceling the franchise of vehicles proven to be repeat offenders of emissions standards.

Promoting cleaner fuels. Renewable and indigenous cleaner fuels such as natural gas, solar energy, hydro, geothermal, and wind power are being promoted. The Government is developing capacity to produce renewable energy applications through a UNDP/GEF US\$6 million grant. This will be followed up by a WB/GEF-supported rural electrification program.

Advancing cleaner production. The DENR and the Laguna Lake Development Authority (LLDA) have adopted a policy to shift the focus from pollution control or end-of-the-pipe solutions to pollution prevention and

cleaner production. Technical assistance in the forms of training and support to conduct plant level environmental audit is provided.

Box 4. Programmatic approach and partnership to clean-up Metro Manila's air quality

The Government and the ADB have launched a major effort through the Metro Manila Air Quality Improvement Sector Development Program/Project (MMAQISDP) to reduce air pollution in the metropolis. The four-year US\$200 million project supported by ADB since 1999, aims to reform policies, strengthen institutions, and implement specific actions to improve the air quality by abating pollution from mobile and stationary sources. MMAQISDP activities include:

- establishment of a motor vehicle inspection system (by the DOTC/LTO);
- implementation of a program of industrial air emission abatement (DENR);
- introduction of vehicular emissions technology measures and the review of policies on second-hand vehicles and engines and the setting up of an age limit on public transport vehicles;
- traffic engineering and management and roadside enforcement in Metro Manila (MMDA);
- strengthening and upgrading of existing ambient air quality monitoring system and the improvement of the air quality reporting system (DENR, DTI, PIA, DOTC/LTO, private sector, NGOs); and
- establishment of an effective public awareness program; and capacity building and institutional development programs of various stakeholders, and studies of health impact.

Broadening education and communication. The DENR/EMB and other agencies have launched several information, education, and communication campaigns to raise public awareness about air pollution.

Expanding private sector role. The private sector has also taken proactive action to address air pollution. Noteworthy is the initiative of the San Miguel Corporation (SMC) that started an emissions testing program in 1993 in one of its breweries. Vehicles that failed emissions tests were prohibited from entering the premises of the Polo Brewery and in transacting business. Since then, SMC and other establishments have adopted emissions testing as a corporate policy and implemented it in all their facilities throughout the country.

Continuing involvement of civil society. Civil society has been an important partner in environmental protection programs in the Philippines, and successive governments have recognized its role.

- *Concerned Citizens Against Pollution (COCAP)* is active in advocacy work, including public demonstrations. COCAP has raised public awareness about air pollution, lobbied for the passage of CAA and for its implementation.
- *Bantay Kalikasan* gathered five million signatures nationwide to push for the passage of CAA. It is the first NGO deputized to conduct roadside enforcement. It is also implementing a Bantay Usok project to encourage people to report gross polluters using text messaging, email, fax or phone.
- A recent program called “Schools for Clean Air”, led by *Miriam Public Education and Awareness Campaign for the Environment (Miriam PEACE)* supported other NGOs, government agencies, and the private sector, to raise awareness about air quality management among schools of Metro Manila.
- *The Green Forum* and the *Firefly Brigade* have taken the lead in highlighting the need for more sustainable transport.

Advancing multi-sectoral cooperation. Recognizing the fact that improving air quality requires concerted efforts by different stakeholders, several multi-sectoral initiatives, including the following, have recently been undertaken:

- The *Sustainable Transport Network* aims to identify and develop policies and action plans needed to make transportation more sustainable. Composed of NGOs under the leadership of Green Forum, the private sector and DOTC, it advocates for more non-motorized transport (see Box 5), more pedestrian areas, and extensive mass transit systems.
- The *Partnership for Clean Air (PCA)*, building on the success of the Lead Free Coalition, serves as the facilitator, coordinator, and discussion forum for various awareness-raising activities to improve air quality. It maintains a website (www.hangin.org) which serves as the comprehensive information center for laws, rules, regulations, and clean air news.

- Government agencies and trade associations are undertaking pilot initiatives such as the *Green Vehicle Program and Jeepney Engine Remanufacturing and Reconditioning Project* to reduce air pollution caused by the transport sector.

Box 5. Pedal power in Marikina!

Recent traffic counts reveal that a third of the trips undertaken in the metropolis are shorter than two kilometers (1.2 miles) in distance, which contribute significantly to both congestion and pollution. This short distance is ideal for travel by bicycles. Many residents of Metro Manila are becoming biking enthusiasts, but lack of facilities and bicycle lanes keep many more off the roads.

The City of Marikina in Metro Manila is pioneering non-motorized transport with the participation of citizens groups like the Firefly Brigade. With part funding provided by the Global Environmental Facility (GEF) through The World Bank, the city is implementing a US\$1.3 million project to construct 66 kilometers of bicycle lanes. The first phase was recently commissioned, and this innovative approach should serve as a model for other LGUs in the metropolis and elsewhere to replicate. This would enable local governments in the Philippines to contribute to the country's commitment to contain local and global pollution, by encouraging a shift to an environmentally friendly mode of transport.

In the two cities where The World Bank has supported non-motorized transport (NMT) investments—Lima, Peru and Leon, Nicaragua—the modal share of NMT is reported to have increased.

Source: Communication with Marikina City Government and Project Appraisal Document of the Metro Manila Urban Transport Integration Project, 2001.



LEGISLATION

The Philippine Constitution (Article II Section 16) of 1986 stipulates that the State shall protect and advance the people's right to a balanced and healthful ecology. The Philippines has an extensive body of environmental legislation, and regulations that provide the legal bases for policies and programs related to air quality management.

Presidential Decree 984, Pollution Control Law (1976). Provides guidelines for the control of air and water pollution from industrial sources and sets penalties for violations. It requires all polluters to secure permits from the environmental agency.

Presidential Decree 1151, Environmental Policy (1978). Recognizes the right of the people to a healthy environment.

Presidential Decree 1152, Philippine Environmental Code (1978). Provides guidelines on land use, air quality, water quality, waste management and natural resources management.

Presidential Decree 1586, Environmental Impact Statement System (1978). Mandates that environmental impact statements be issued for all new investments undertaken by the government and the private sector.

Executive Order 192 (1987). Established the Department of Environment and Natural Resources

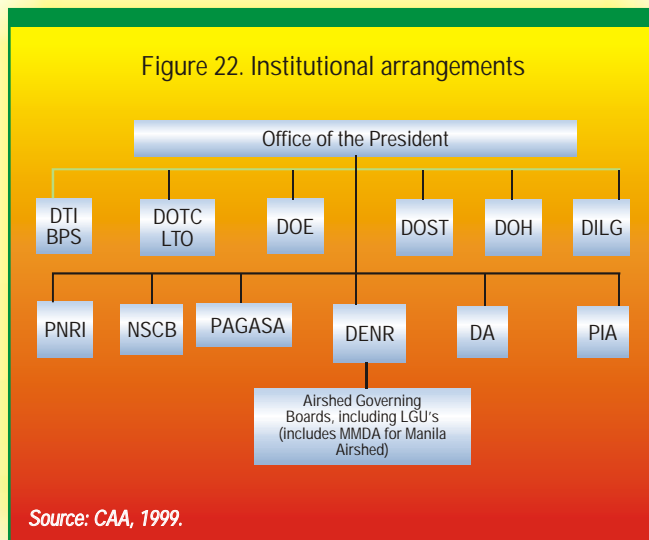
Republic Act 7160, Local Government Code (1991). Devolves functions of some national agencies to local government units. One of these is the roadside enforcement of vehicular emissions standards.

Republic Act 8749, Clean Air Act of 1999. A comprehensive air pollution management and control program aimed to achieve and maintain a healthy air as described in Box 6. This Act repeals Presidential Decree 1181, and partly modifies Presidential Decrees 1152, 1586, and 984.

INSTITUTIONS

Several laws and regulations have assigned responsi-

lities for air quality management to specific agencies (Figure 22). These responsibilities are further clarified by CAA. A description of core agencies and their functions follow. However, cooperation among different agencies remains low.



Department of Environment and Natural Resources (DENR). The lead agency responsible for air quality management in the country. Its responsibilities are set out in CAA. A governing board for each designated airshed formulates policies and standards subject to national laws. It is responsible for publishing an annual Air Quality Status Report for the airshed. The board is headed by the DENR Secretary and composed of representatives from local governments (governors, mayors), each concerned government agency, people's organizations, and the private sector. The *Environmental Management Bureau (EMB)* serves as the technical arm of DENR.

Department of Transportation and Communication (DOTC). Responsible for implementing emissions standards for motor vehicles, set by the Act. DOTC can deputize other law enforcement agencies and LGUs for this purpose. It also authorizes private emissions testing centers duly accredited by DTI, implements the motor vehicle inspection system, and imposes and collects emission fees. It carries out emissions testing for vehicle type approval with LTO and under the supervision of DENR.

Box 6. Implementation progress of the Clean Air Act, 1999

The Clean Air Act was passed by the House of Representatives and the Senate in May 1999, and signed into law by the President on June 23, 1999, with the aim of providing a comprehensive air pollution control policy for the country. The Implementing Rules and Regulations (IRR) were published on November 10, 2000 and the law thus became effective on November 25, 2000. The scorecard below assesses the progress made to date.

1 - no action; 2 - initial steps; 3 - actions formulated; 4 - actions formulated and being implemented; 5 - outcome evident

Provision/objective	1	2	3	4	5	Status
<i>Appropriations:</i> Initially, PhP750 million will be appropriated for the implementation of the Act, of which PhP300 million will go to DENR, PhP200 million to DTI, PhP150 million to DOTC, and PhP100 million to DOE. Thereafter, the amount needs to be included in the General Appropriations Act.	●					None allocated so far.
<i>Strategic Planning Framework:</i> To formulate an <i>Integrated Air Quality Improvement Framework</i> , which will set emissions reduction goals using permissible standards and control strategies within a specified period. Within six months DENR and LGUs are required to prepare Air Quality Action Plans.			●			National Framework and Action Plan was prepared by DENR and publicized in Nov. 2000 together with the IRR. The Action Plan was updated after a year. No LGU plan at the local level.
<i>Air Quality Management:</i> DENR will designate airsheds. Each airshed will be managed by a multi-sectoral governing board, which is tasked with formulating policies, preparing common action plans, and publishing <i>Annual Air Quality Status Report</i> of the airshed. Areas where ambient levels of specific pollutants are exceeded may be declared non-attainment areas by DENR. In these areas, new pollution sources would be prohibited unless there is a corresponding reduction from existing sources.		●				Four airsheds (Metro Manila, Cebu, Cagayan de Oro, and Davao) have been initially designated. Governing Boards for these airsheds have not been established.
<i>National Air Quality Status Report:</i> DENR will prepare an annual report on the extent of pollution in the country, analyze and evaluate current trends and projections, identify critical areas, activities, or projects, and make recommendations for necessary action and other information on the extent of air pollution and air quality performance of industries.	●					No National Air Quality Status Report has been published yet.
<i>Ambient Air Quality Guideline Values and Standards:</i> The Act establishes national ambient air quality guidelines for criteria pollutants, and air quality standards for source specific air pollutants from industrial sources. These may be reviewed and revised by DENR, in consultation with concerned agencies.			●			Previously issued Guideline Values and Standards have been adopted.
<i>Emission Charge System:</i> DENR and DOTC can collect emission fees from industrial and vehicular dischargers, based on the volume and nature of pollutants.		●				No emission fees collected yet. Study to establish a fee system has been commissioned by DENR.
<i>Incentives:</i> Incentives such as tax credits and/or accelerated depreciation deductions will be granted to industries that install pollution control devices or those that retrofit their facilities.		●				Incentives provided only for those registered with the Board of Investments and covered by the Incentives Priorities program.
<i>Pollution from Stationary Sources:</i> DENR is authorized to issue permits for the prevention and abatement of air pollution. These permits will serve as management tools for LGUs in the development of their action plan.		●				Permits being issued.
<i>Pollution from Motor Vehicles:</i> DOTC will implement motor vehicle emissions standards established by the Act. The Act also mandates that DTI, DOTC and DENR, formulate and implement a national Motor Vehicle Inspection and Maintenance Program to ensure a substantial reduction in emissions from motor vehicles.			●			Standards not yet published. Privatization of Motor Vehicle Inspection System (MVIS) was recently approved by NEDA.
<i>Air Quality Management Fund:</i> An Air Quality Management Fund, administered by DENR, will be established as a special fund in the National Treasury. This Fund will support a variety of activities aimed at improving air quality		●				Guidelines for the Fund drafted.
<i>Ban Incineration:</i> Incineration, which is defined as the burning of municipal, bio-medical and hazardous wastes that emit poisonous and toxic fumes, is banned under the Act.				●		Ban will take effect in November 2003. But no alternatives have been found for disposal of infectious medical waste.

Land Transportation Office (LTO) of the DOTC. Responsible for roadside inspection, emissions tests for type approval and renewal of registration.

Department of Energy (DOE). Sets specifications for all fuel types and fuel-related products, which are then established by the Bureau of Product Standards as Philippine National Standards. DOE is also responsible for the exploration and development of clean and alternative energy.

Department of Trade and Industry (DTI). Responsible for certifying institutions to train individuals in vehicle and industrial emissions control technologies. It is also responsible for maintaining national motor vehicle standards, and regulations for second hand vehicles.

Department of Health (DOH). Monitors indoor pollution and conducts studies on the health impacts. The Department chairs the Inter-agency Committee on Environmental Health.

Department of Science and Technology (DOST). Conducts research and development program with DENR for the prevention and control of air pollution. DOST is also responsible for funding research on air pollution control technologies.

Philippine Atmospheric, Geophysical and Astronomical Service Administration (PAGASA). Responsible for monitoring meteorological factors affecting environmental conditions.

Local Government Units (LGUs). Share responsibility for the management and maintenance of air quality within their territory. LGUs are also responsible for issuing franchises to tricycles in their areas of jurisdiction and enforcement of emissions standards (See Box 7).

Metropolitan Manila Development Authority (MMDA). Responsible for environmental considerations, including air quality, that impact across LGU territorial boundaries in Metro Manila.

BUDGET

The budget for air quality management at the national

and local government levels is difficult to estimate as all activities are aggregated. For 2002, the Government has appropriated PhP5,433 million (US\$110 million) for DENR. This is about 0.009 percent of the total national budget. From this budget, EMB, which is tasked to handle brown issues pertaining to air, water, solid and toxic waste pollution, has been allocated PhP362 million (US\$7 million and 6.6 percent of total DENR budget). EMB's central office and its 15 regional offices share this budget.

Box 7. LGU initiative for motorcycles

Recently, LGUs have undertaken the following initiatives to reduce motorcycle pollution:

- Moratorium on registration of two-stroke tricycles the City of Makati has been successful in promoting cleaner and fuel efficient four-stroke motorcycles for tricycles
- Financing and limiting vehicle age, the Mayor of San Fernando City, Province of La Union has convinced 200 drivers to convert to four-strokes without any financial assistance from the city. May ban 1970s model by 2003, and 1980s models by 2004.
- Information dissemination – the Clean Air Initiative in Asia (CAI-Asia) held a regional workshop. The Partnership for Clean Air in Manila has organized a technical working group to investigate the extent of the problem and find technical and financial alternatives.
- Through the Partnership for Clean Air, a large group of stakeholders is testing the feasibility of liquefied petroleum gas (LPG) as fuel and converting the fuel delivery system to direct injection to address the problem of two-stroke engines.

Of the 1,176,022 regular employees of the national government, 1.8 percent works in DENR. EMB has 599 technical and administrative staff at the central and regional levels. There are 113 technical and administrative staff at EMB in Metro Manila responsible for environmental management. In other regions, the total technical and administrative EMB personnel range from 11 to 29 staff per region.

MMDA is implementing an anti-smoke belching program and coordinating the efforts of all the 17 LGUs in the metropolis. For 2002, MMDA has allocated PhP38 million (US\$760,000) specifically for its air quality management activities. This is about 2.3 percent of the entire MMDA budget.¹⁰

¹⁰Budget of MMDA for 2001 PhP2,003,516,000.

The Philippines needs to improve its air quality management record. CAA, and pre-existing laws and regulations need to be implemented immediately. Poor air quality in urban centers, (e.g., Metro Manila), not only harms human health and productivity, but also deters tourism and foreign investment. Based on the foregoing analysis and feedback received during discussions and consultations carried out for the preparation of this Monitor, the following key challenges emerged. These include actions needed in the immediate to short-term to arrest the problem in hotspots like Metro Manila; and longer-term reforms required for improving the functioning of institutions and instruments.

1 Targeting particulate matter reduction in Metro Manila. Ambient lead levels are down, and SO₂ levels are on the decline, but PM levels continue to exceed guidelines at most locations in Metro Manila. Therefore, controlling PM pollution should be the country's immediate priority. This action will bring immediate benefits to over a fifth of the country's 70 million people. Many Asian capitals such as Bangkok, Kuala Lumpur, Seoul, and Taipei have successfully reduced ambient PM levels in recent years. Political will, resulting from growing public pressure, has forced national governments to introduce tough measures, which are beginning to have public health pay-offs. Similarly, the Philippines can introduce a number of low-cost measures, but these would require sustained political commitment. An initial listing of such control measures follows.

- *Inspection and maintenance (I/M) of high use vehicles.* Stricter inspection and maintenance requirements for diesel vehicles (especially the high mileage commercial fleet) are a cost-effective way of reducing PM emissions. DOTC already has plans to establish I/M centers through long-term concessions to private sector operators at an estimated cost of PhP8.6 (US\$160 million). Initially, there will be 28 inspection lanes, which will be expanded to 100 lanes, with the capacity to inspect 6.7 million vehicles by 2007. This ambitious plan should focus on high-use and diesel vehicles first.
- *Gasoline and diesel fuels standards need to be reviewed and revised.* The proposed limits in CAA

for aromatics and benzene are high by international standards, and specification for other compounds like olefins are yet to be established. Similarly, the sulfur content of automotive diesel is currently 2,000 ppm, and CAA requires that this level be reduced to 500 ppm by 2004, the norm widely used by many countries currently.

- *Four-stroke motorcycles.* The Philippines lags behind most of its neighbors in the shift toward cleaner and fuel-efficient four-stroke motorcycles (Table 9). Two-stroke motorcycles dominate the market in the Philippines, and there are few incentives to change consumer preference to four-strokes which are priced similarly. Regulations and incentives could include stricter emissions standards for new and in-use vehicles, age limits, limiting new registrations to cleaner motorcycles, and improving access to financing schemes for poor tricycle owners (Box 7).

Table 9. Share of new four-stroke motorcycles

Country	New 4-stroke motorcycles (%)
Vietnam	100
China	85
Thailand	82
India	60
Philippines	25

Source: Clean Air Initiative, 2002.

- *Garbage disposal.* A large portion of the municipal solid waste is currently burned. As noted in the *Philippines Environment Monitor 2001*, there is an urgent need for the government to promote waste recycling, composting, and sanitary land filling of municipal solid waste along with public education to prevent open burning.
- *Using catalytic converters in motor vehicles.* In Metro Manila, CO, NO_x and O₃ levels are at times above the guidelines and are on the rise. Experience worldwide

has shown that using catalytic converters in gasoline cars drastically and most cost-effectively, reduces CO, HC, and NO_x. Even though lead has been completely phased out, setting the stage for the introduction of catalysts, current vehicle emissions regulations are lax and do not require the use of catalytic converters. A catalytic converter for a gasoline car costs approximately US\$200 per unit, while the environmental benefits of emissions reductions outweigh this cost, and more importantly, shift the burden to the polluters.

3 Improving Public Transports and Traffic Management. A ride through Metro Manila traffic is a challenging experience that tests one's patience. Traffic snarls, undisciplined motorists, and belching vehicles are a common site, together with overflowing bus stops. Daily traffic jams are indicative of the inefficiency of public transport and the explosive growth of private vehicles in the metropolis. It is estimated that daily motorized trips will nearly double between 1996 and 2015 (Table 10).

Table 10. Daily motorized trips between 1996-2015

Mode	Trips (million/day)	
	1996	2015
Public	18.5 (79%)	28.9 (66%)
Private	4.7 (21%)	14.8 (34%)
Total	23.2	43.7
Increase (%)	88	

Source: Metro Manila Transportation and Traffic Situation Study, 1996.

The use of private vehicles, is expected to increase by nearly three-fold, while the share of public transport is anticipated to shrink to 66 percent from the current 80 percent. If these projections hold, then the implications for air pollution are very serious. Even though targeted actions to reduce emissions will lead to gains in the immediate- to short-term, in the long-term, Metro Manila needs to improve the coverage and efficiency of its public transport system to ensure sustained improvements in air quality. In addition, with ever-larger numbers of vehicles on the road, traffic management should become an immediate priority. The Government may be able to focus on easing congestion and increasing vehicle

speeds, thus reducing pollution, and providing safe road space for pedestrians and those using non-motorized transport.

- *Priority lanes in traffic management.* Streamlining traffic management and introducing solutions proven to work in other countries should be an immediate priority for MMDA's traffic planners. The introduction of bus, jeepney and public transport priority lanes; the use of high occupancy vehicle (HOV) lanes; and the provision of adequate sidewalks and bicycles lanes (see Box 5 for details), will encourage people to use public transport, carpool, bicycle or simply walk shorter distances. Some capital cities like Santiago, Chile have successfully introduced such measures, and seen a reduction in pollution by as much as 10 percent for some pollutants.
- *Light Rail Transit (LRT).* Two LRT lines are currently operating, while another one is under construction. The two are operating at capacity and recorded 550,000 daily users in 2001. However, LRT accounts for less than five percent of the trips made daily in Metro Manila. The Government should consider introducing measures that will increase LRT capacity to increase ridership.

4 Implementation of the Clean Air Act. The enactment of CAA after eight years of debate and discussion is the first building block in the long-term integrated approach to air quality management. The challenge now is its implementation. Thus far, actions have been slow and scattered, and have not met expectations. Government agencies lack the capacity and the budget to implement the law and numerous regulations. Many strategic plans have been drafted but not implemented.

- *Stakeholder commitment.* The consultative process and political commitment that was employed during the preparation of CAA should be continued through its implementation. There is clearly a need to improve awareness about CAA, since two-thirds of the population is not even aware of the Act.
- *Staffing and capacity.* There is an urgent need to strengthen the capacity of core agencies responsible for air quality management. The main agencies -

SEVEN CHALLENGES

EMB/DENR, DOH, and DOE - must overcome the shortages of personnel, equipment, and technical know-how. The problem is more acute at the regional and local levels. The private sector is similarly understaffed, with nearly 70 percent of the enterprises which participated in the KAP survey indicating that they have not appointed a Pollution Control Officer, as mandated by law.

- **Outsourcing.** A potential solution that is being tried is the outsourcing of some technical functions to the private sector and universities. This is being implemented for selected programs with the statutory agencies maintaining overall control of the activities. Results of these activities may create a new partnership for environment management, and also enable the achievement of some of the immediate goals of CAA.
- **Funding.** The full cost of implementing CAA is yet to be compiled. An initial estimate has been made for implementing some actions (Box 8). A rough extrapolation from these estimates indicates that the country will need to spend at least PhP25 billion (US\$500 million) over the next 10 years to realize the goals of CAA. Although PhP750 million (US\$15 million) has been set aside for the initial implementation of CAA, the amount is yet to be allocated in government budget appropriations. Adequate annual appropriations are needed to ensure the sustainability of actions.

5 Strengthening enforcement through incentives and penalties. Three-fourths of the general public is alarmed at air pollution and a clear majority supports enforcement of rules. There is a need to design and pilot creative policies for enforcement as current practices are ineffective. Effective implementation may require tougher penalties not just for the offenders but also for the regulators. Options that could be considered include: (i) public disclosure of known polluters, polluted areas and performance of regulators; (ii) funding sanctions for LGUs not acting to control polluters in their jurisdictions; and (iii) application of market-based economic instruments. These approaches have proven effective in other countries.

Despite years of anti-smoke belching campaigns, a solution is yet to be found for the problem of pollution

Box 8. Costing the implementation of the Clean Air Act

No attempt has so far been made to fully cost the implementation of CAA or the associated economic benefits. However, "project-mode" estimates have been made for a limited number of actions. Some are to be financed by the comprehensive Metropolitan Manila Air Quality Improvement Sector Development Project (MMAQISDP) supported by ADB.

Action	Cost (PhP) million
MMAQISDP	
Upgrading ambient air quality monitoring network	1,000
Outsourcing stack emission testing	200
Intensive enforcement of industrial emissions	150
Enhancing anti-smoke belching program	40
Other estimates	
Installation of continuous emissions monitoring systems by industry	2,500
Emission reduction by industry through pollution abatement equipment	3,000
Conversion to cleaner fuels (estimates by oil industry)	2,000
Motor vehicle inspection system	8,600

When extrapolated to cover current and future requirements and expanded to undertake countrywide activities, these are estimated to be at least PhP25 billion (US\$500 million) between 2000 and 2010. This is a huge amount, but the benefits (reduced hospital admissions, reduced deaths, and improved productivity) are likely to far exceed these costs.

caused by diesel vehicles such as buses, jeepneys, utility vehicles, and trucks. Stricter maintenance along with harmonization of standards for vehicles and fuel are required. Similarly, substantial sanctions for non-compliance must be enforced.

6 Improving air quality management. A systematic approach is needed to integrate monitoring and analytical capacity with decision-making. Monitoring is spotty and unreliable, analysis of monitoring data is very limited or non-existent, and consequently policy making is tentative.

- *Monitoring.* Air quality monitoring, the foundation for decision-making, is sporadic and lacks quality control. A transparent and systematic ambient monitoring system is needed in the Philippines. As progress is made in controlling obvious and large sources of pollution, and eliminating visible pollutants such as smoke and dust, new challenges are already on the horizon. Levels of fine particulates, ozone, and toxic hydrocarbons are on the rise and will need even more complex monitoring systems, technical understanding, and analysis.
- *Emissions inventories.* Basic and essential information, such as an emissions inventory for major sectors, and source contribution to human exposure are outdated, (the last one was done in 1990 for Metro Manila) and not even available for other cities. Large uncertainties in the estimates that are available make analysis and drafting of action plans difficult. The role of area sources, such as wastes, and agricultural and forest burning, is unknown and needs to be quantified and control options identified. However, for the immediate term, control measures should focus on particulate reduction in Metro Manila, where the problem is most severe. In order to devise a targeting strategy, in the interim, a source inventory for Metro Manila should be done and a source apportionment analysis conducted as a matter of urgency.
- *Health causality.* The effects of air pollution on human health and ambient air quality, especially the costs of damage to health, productivity, and linkages with poverty need to be further established and publicized. Health impact costs are still based solely on estimated pollution and exposure and not confirmed by epidemiological surveys. Once the magnitude of damage is publicly known, the public will demand that polluters pay for the controls and there will be political support for continual actions.

Moving from public awareness to participation.

While some people are aware of air pollution and many non-governmental and citizens groups are advocating for cleaner air, public perception surveys show that majority are dissatisfied with the government's response. Civil society and the private sector have an important role to play, but must have access to the necessary information. Without reliable information and active involvement, the public assumes air quality management to be purely a government function. They do not know and recognize the need and utility of their participation. Without public knowledge and demand for specific actions, political action will continue to lag behind the rhetoric. There should be systematic collaboration and consensus building across sectors, and among affected stakeholders, to get agreements on priorities and adoptable measures.