A Strategic Framework on Air Quality Management in the Asian Region

Consultation Document

October 2003
Preface

Urban air pollution continues to pose a significant threat to human health and environment and the quality of life of millions of people throughout the world. Urbanisation and associated growth in mobility and industrialization has resulted in the intensification of air pollution in densely populated areas, causing a deterioration in air quality. Many cities in Asia are now taking action to enhance their institutional and technical capabilities to monitor and control air quality and implement preventive actions in order to reduce the risks that air pollution poses to their citizens.

This Strategic Framework on Air Quality Management in the Asian Region aims to provide a regional approach to improving urban air quality by facilitating the setting of air quality priorities and providing direction on institutional development and capacity enhancement. The Framework is being proposed by the Air Pollution in the Megacities of Asia (APMA) initiative of the United Nations Environment Programme (UNEP) and the World Health Organization (WHO) and the Clean Air Initiative for Asian Cities (CAI-Asia) supported by the Asian Development Bank, World Bank and United States Asia Environmental Partnership Program of the United States Agency for International Development.

The Strategic Framework is a strong follow up of the recommendations of Agenda 21, derived from the 1992 United Nations Conference on Environment and Development, and the Plan of Implementation of the 2002 World Summit on Sustainable Development (WSSD) which requests States to strengthen capacities of developing countries to measure, reduce and assess the impacts of air pollution, including health impacts, and provide financial and technical support for these activities.1 In addition, the Strategic Framework supports the UN Habitat Agenda on the Urban Environment and the UNHABITAT/UNEP Sustainable Cities Programme and the objectives of APMA and CAI-Asia.

This document describes the activities that should be implemented at national and local levels to create conditions to improve urban air quality. It has been prepared by APMA, in collaboration with CAI-Asia, and with contributions from the APMA regional policy dialogue held on 15 December 2002 and the Better Air Quality 2002 workshop held on 16–18 December 2002 in Hong Kong, China.

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1 Introduction

Air Quality Management (AQM) provides a structured and stepwise process for achieving cleaner air in urban areas. The individual steps of the implementation of this process are determined by governmental authorities according to:

- local circumstances with respect to background concentrations of air pollutants and technological feasibilities;
- cultural and social conditions; and
- financial and human resources available.

AQM is a tool which enables governmental authorities to set objectives to achieve and maintain clean air and reduce the impacts on human health and the environment.

AQM as envisaged in this Strategic Framework (SF) enables governmental authorities, in collaboration with other stakeholders, to:

- identify and establish appropriate policies on air quality;
- identify relevant legislative and regulatory requirements;
- identify all sources of air pollution caused by human activities;
- set appropriate objectives and targets for human and environmental health;
- set priorities for achieving objectives and targets;
- establish a structure and programmes to implement policies and achieve objectives and targets;
- facilitate the monitoring of air quality and effects on human health and environment;
- facilitate urban planning, corrective action and the prevention of adverse effects;
- ensure compliance with emission and air quality standards;
- account for changing circumstances.

2 Aim of the Strategic Framework

The SF on AQM in Asia is a broad high-level approach that is flexible and adaptable to the needs of different countries and cities. It highlights the most important components of a comprehensive AQM system in a rational and systematic manner.

The SF aims to guide decision makers in Asia in the formulation and implementation of AQM strategies and programmes to prevent further deterioration of ambient air quality.

3 Target Group

The SF is aimed primarily at legislators and implementing agencies at the national and local government level responsible for AQM.

However, the implementation of the SF will require partnership of a number of stakeholders such as:

- judiciary
- private sector
- civil society including non-governmental agencies
- media
- academia
- development agencies
4 Guiding Principles of Air Quality Management

The SF is based upon the following guiding principles:2

Coherence: orientation of the efforts of all stakeholders towards a common objective.

Concerted effort: discussion and cooperation among all stakeholders involved.

Compatibility: development of AQM compatible with regional, national and local needs.

Continual Improvement: to promote the continual improvement of AQM as well as air quality itself.

Decentralization: implementation of decentralized AQM with regional, national and local components.

Equity: AQM regardless of sex, age, ethnicity, etc.

Integrated approach: development of integrated AQM (prevention, monitoring of adverse impacts, control of sources, and education).

Opportunity: sound solutions to air quality problems at the suitable moment.

Participation: active participation of the population in the development and implementation of the plans to minimize air pollution and prevent the deterioration of air quality.

Polluter Pays Principle: individuals responsible for pollution should bare the cost of it consequential impacts.

Precautionary Principle: where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing cost effective measures to prevent environmental degradation.

Sustainability: development of economically, socially and environmentally compatible AQM which is sustainable over the long term.

Universality: comprehensive AQM including environment and health.

5 Air Quality Management

5.1 Policies, Standards and Regulations

5.1.1 Objective

To include or strengthen the concept of air quality, health and environment in the goals, policies, strategies, legislation and their implementation in the countries of the region.

5.1.2 Challenges in Asia

- The general policy statements on the need for AQM of some countries are not always fully integrated or coordinated with sector and local development policies and plans.
- Legislation on AQM in Asia is often not in line with existing capacity to effectively implement AQM legislation and policies.
- There is a need to develop appropriate review mechanisms, which form a part of AQM policies and legislation.
- Lack of detailed cost-benefit analysis outlined in policy.
- There is a lack of monitoring of health and environmental impacts of air pollution in many Asian cities.

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5.1.3 Policies and legal requirements

Governmental authorities are recommended to acknowledge the importance of air quality and its adverse impacts as a development objective in the overall policy framework as well as in specific policies such as land use planning, energy, transport and industrial development.

Governmental authorities are recommended to strengthen the legal basis for AQM by further developing and implementing national laws, regulations, international conventions and treaties on air quality taking into consideration existing international guidelines and review relevant legislation on a regular basis.

Governmental authorities are recommended to:

- establish or strengthen national and local outdoor (and indoor) air quality management.
- establish or strengthen programmes for the monitoring of adverse health and environmental effects due to air pollution and to carry out operative research programmes on this issue.
- inform, educate, train and strengthen public participation in all aspects related to air quality, adverse health and environmental impacts, and prevention, and reduction of air pollution.

5.1.4 Periodic review

Governmental authorities are recommended to undertake periodic reviews of the integral parts of AQM. Periodic review will determine the effectiveness of AQM system and the desirability and feasibility to broaden the scope or refine its functioning. Governmental authorities are recommended to establish and maintain (a) programme(s) and procedures for periodic audits of air quality management to be carried out, in order to determine whether or not AQM:

- has been properly implemented and maintained; and
- provides information on the results of audits to improve management procedures.

The authorities’ audit programme, including any schedule, should be based on the environmental importance of the activity concerned and the results of previous audits. In order to be comprehensive, the audit procedure should cover the audit scope, frequency and methodologies as well as responsibilities and requirements for conducting audits and reporting results.

5.2 Air Quality Monitoring

5.2.1 Objective

To establish or strengthen national and local outdoor AQM programmes, which monitor air quality and its impacts on health and the environment and undertake operative research programmes on this issue.

5.2.2 Challenges in Asia

- A large number of cities do not yet have ambient air quality monitoring systems in place.
- Emphasis in Asia is still only on the establishment of ambient air quality monitoring systems and less so on the control and quality assurance of monitoring programmes and health and environmental impacts.
- The use of air quality monitoring data for policy making is not optimal. There is a need to improve the assessment of health, environmental and economic impacts of air quality and to establish the benefits of AQM. Relatively little reliable information is
available in these areas for Asian cities.

- There is need to expand the number and scope of air quality information systems in certain Asian countries and cities.

5.2.3 Standards

Governmental authorities are recommended to establish the standards of outdoor air quality as well as emissions from sources. World Health Organization (WHO) guideline values for outdoor air pollution should be adopted. Emissions standards based on developed countries’ experience and best available control technology should be adopted where appropriate.

The setting of standards should encompass a process involving stakeholders (industry, local authorities, non-governmental organisations and the general public) that assures - as far as possible - social equity or fairness to all the parties involved. It should also provide sufficient information to guarantee understanding by stakeholders of the environmental, health and socio-economic impacts of such standards. The setting of standards should be accompanied by setting procedures to test them.

5.2.4 Quality assurance and control

Governmental authorities are recommended to establish quality assurance and quality control (QA/QC) programmes and adopt QA/QC plans to ensure that monitoring and health and environmental monitoring data are reliable and provide a sound basis for policy making.

5.2.5 Air pollution impacts

Governmental authorities are recommended to adopt national and local programmes for the monitoring of air pollution effects on human health and the environment. These programmes should have a permanent recording system of the environmental and health impacts associated with air pollution and a standardized calculation of the social cost of air pollution on environment and human health.

Governmental authorities are recommended to:

- establish or strengthen national and local epidemiological monitoring programmes that record morbidity and mortality cases associated with air pollution on a regular basis and use environment and health indicators following regional guidelines where they exist.
- create or support national and local risk assessment programmes and request risk assessments to large development projects that may impact air quality significantly.
- establish national and local information and training centres focused on air pollution effects on environment and health.
- train specialized human resources and incorporate the topic of air pollution effects on environment and health in the general education of professionals.

5.2.6 Economic and financial impact assessment

Governmental authorities are recommended to undertake economic and financial impact assessment of air pollution. The assessment should estimate the economic impacts of air pollution on human health and environment. This will determine the economic costs of air pollution on society and the financial costs to different stakeholders.
5.2.7 Regulatory risk assessment

Governmental authorities are recommended to undertake an assessment of the environmental and socio-economic impacts of adopting new regulations on air quality.

5.3 Measures to Reduce Air Emissions

5.3.1 Challenges in Asia

• Across Asia particulate matter (PM) is the main pollutant of concern. In many countries the transport sector is the dominant source of PM emissions.

• There are considerable differences in the extent to which cities and countries in Asia have started to effectively regulate emissions from different sources. Only a few countries and cities have reached the phase of addressing secondary pollutants such as ozone.

• Strategies to reduce emissions are often short term in nature which fail to adequately address the overall problem.

• Stakeholders have found it easier in many cases to employ end-of-pipe and best available control technology solutions rather than implement solutions that prevent pollution such as traffic demand management, and economic restructuring.

• Optimal effectiveness of measures to reduce air pollution has not yet been achieved since the synergy between different measures is not fully exploited.

5.3.2 Emission inventories

Governmental authorities are recommended to compile an inventory of emission sources and their emissions which should include:

• point sources such as stacks in major industrial sites.

• mobile sources such as on-road motor vehicles.

• area sources including open burning of waste materials from agriculture, forestry and land clearance. Other area sources include diffuse sources such as emissions from vehicle refuelling, tube fittings, undefined openings, and commercial and domestic fuel combustion. Surface mining and overgrazing of land in semi-arid areas should also be considered as potential sources of particles.

• biogenic or natural sources, such as deserts, eroded areas, agricultural emissions are a non-anthropogenic source category, mostly resulting from area sources.

5.3.3 Dispersion modelling

Governmental authorities are recommended to employ dispersion models to determine the extent and coverage of the pollutants. Dispersion models are useful for estimating air pollutant concentrations from proposed industrial plants, for compounds too expensive or difficult to measure, in order to achieve spatial coverage of monitoring estimates. Source apportionment techniques should also be used to calculate the contribution that different sources make to ambient pollutant concentrations.

5.3.4 Emergency preparedness and response

Governmental authorities are recommended to:

• establish and maintain procedures to identify potential for and response to accidents and emergency situations, and for preventing and mitigating the environmental impacts associated with them;
• review and revise, where necessary, their emergency preparedness and response procedures, in particular, after the occurrence of accidents or emergency situations;
• periodically test such procedures where practicable.

5.3.5 Reducing emissions from mobile sources
Governmental authorities are recommended to reduce pollution from mobile sources through combination of measures:
(i) tighter emission standards and cleaner vehicle technology;
(ii) cleaner fuels;
(iii) improved inspection and maintenance programmes; and
(iv) improved traffic planning and demand management.

5.3.6 Reducing emissions from stationary sources
Governmental authorities are recommended to reduce pollution from stationary sources through a combination of measures:
(i) tighter emission standards;
(ii) cleaner fuels;
(iii) emission control technologies and cleaner production; and
(iv) land use planning, zoning and economic restructuring.

5.3.7 Reducing emissions from area sources
Governmental authorities are recommended to reduce emissions from area sources through a combination of measures:
(i) greening in particular reafforestation;
(ii) road cleaning and street cleansing;
(iii) implementation of guidelines for managing construction and waste deposit sites; and
(iv) reduced open burning.

5.3.8 Clean air implementation plans
Governmental authorities are recommended to develop Clean Air Implementation Plans (CAIP). A simplified clean air implementation plan should include:
• A rapid assessment of the most important sources;
• Monitoring results from a minimal set of air pollutant concentrations monitors;
• Simulation of the spatial distribution of air pollutant concentrations using simple dispersion models;
• Comparison with air quality standards;
• Assessment of adverse health and environmental impacts; and
• Control measures such as transportation, land use planning and their costs.

CAIP is a means to implement the SF and is a convenient way of organizing and integrating the different activities such as:
(i) monitoring activities;
(ii) measures to reduce emissions from mobile, stationary and area sources;
(iii) awareness raising;
(iv) capacity building; and
(v) monitoring of health and environmental impacts

The CAIP is especially suited for countries and cities where relatively little capacity exists and where no established tradition exists for AQM.
6 Institutional Arrangements, Awareness Raising and Capacity Building

6.1 Awareness Raising and Communication

6.1.1 Objective
To inform, educate, train and strengthen public participation in all aspects related to air quality and the prevention and reduction of air pollution.

6.1.2 Challenges in Asia
- Awareness raising on AQM in Asia has been ad hoc, with a strong focus on raising alarm on air quality and to a lesser extent on mobilizing public support for effective AQM.
- General public is not well informed on how it can contribute towards effective air quality management.
- Policy making on AQM in Asia and the design of implementation strategies is often based on incomplete knowledge.
- The absence of adequate communication strategies among stakeholders involved in the implementation of AQM strategies has hampered the effective implementation of AQM strategies.

6.1.3 Capacity in communication
Governmental authorities are recommended to develop a capacity that can be used to inform general public and other stakeholders on a regular basis of the importance of air quality and AQM strategies and the role that the general public can play in reducing emissions.

With regard to AQM, governmental authorities are recommended to establish and maintain procedures for:

a) communication between the various stakeholders including different responsible ministries, distributing relevant information to interested and concerned non-governmental organizations.

b) receiving, documenting and responding to relevant communication from other stakeholders.

c) informing the public in order to enhance public awareness on problems and adverse health and environmental impacts of air pollution.

6.1.4 Raising awareness
Governmental authorities are recommended to establish a system which will ensure that all stakeholders that have a defined role in AQM receive the correct type of information at regularly intervals. Awareness raising can be used in:

- defining the AQM system and encouraging public participation in design of AQM system;
- monitoring of air quality and sharing the results of monitoring, and impacts of pollution with public;
- using measures to reduce pollution and to obtain support of the public in the effective implementation of measures to reduce pollution from different sources; and
- establish alert systems, including air quality indices, to inform the population so that they could take the necessary measures to reduce adverse impacts.
6.2 Institutional Strengthening and Capacity Enhancement

6.2.1 Challenges in Asia

- Institutional capacity for AQM in many cities of Asia is in most cases inadequate. Mandates are often not well-defined, organizations understaffed and under-equipped.

- Local governments are perceived as being responsible for poor air quality but in most cases they have neither the capacity nor the tools to be effective in AQM.

6.2.2 Institutional set-up and mechanisms

Governmental authorities are recommended to establish or strengthen the national and local institutional set-up for AQM which have the capability to effectively implement policies and enforce laws and regulations on AQM and review their efficiencies.

The governmental authorities’ roles and responsibilities should be defined, documented, communicated and enforced in order to facilitate effective AQM. Governmental authorities are recommended to provide human resources and specialised skills, technology and financial resources essential to the implementation and control of air quality management.

Governmental authorities are recommended to have an established position/function, which irrespective of other responsibilities, shall have defined roles, responsibilities and authority for:

a) ensuring that AQM requirements are established, implemented and maintained in accordance with international practice.

b) reporting on the performance of AQM to top management for review and as a basis for improvement of AQM.

6.2.3 Capacity building and training programmes

Governmental authorities are recommended to ensure that agencies responsible for AQM are adequately staffed.

Governmental authorities are recommended to identify training needs. They should:

- develop national and local strategies to work with the mass media and to strengthen their participation.

- train specialized human resources achieving a multiplying effect (training the trainers).

- design mechanisms to communicate risks and disseminate policies, standards, and regulations.

- Encourage and support capacity building programmes of other stakeholders.

6.2.4 Resources

Governmental authorities are recommended to ensure that different organizations are equipped with physical resources to carry out their tasks.

6.2.5 Policy instruments

Governmental authorities are recommended to ensure that government agencies have appropriate policy instruments at their disposal to carry out their mandate.

7 Financing of AQM

7.1 Objective

To establish mechanisms for sustainability in national and local air quality and health programmes.

7.1.1 Challenges in Asia

- AQM in Asia is under-funded
7.1.2 Potential solution

The governmental authorities are recommended to:

- prepare economic, financial, and cost-benefit analyses for AQM including environmental and health programmes.

- define short, medium and long term investment programmes to comply with air quality and environment and health programmes.

- raise awareness among decision-makers on the need for financing AQM and the monitoring of air pollution impact on environment and health.

- create economic incentive mechanisms for emission reduction.
Annex A

Guidance on the Use of the Strategic Framework

This Annex gives on-line sources of information to support the implementation of the Strategic Framework.

A1 Air Quality Management

Urban Air Quality Management: Coordinating Transport, Environment, and Energy Policies in Developing Countries


Transport Fuel Taxes and Urban Air Quality

Ken Gwilliam, Robert Bacon, Masami Kojima, Ksenya Lvovsky et al. (2001). Pollution Management in Focus Discussion Note No.11, The World Bank, Washington DC


A2 Air Quality Monitoring


http://www.who.int/environmental_information/Air/Guidelines/Chapter5.htm

Several institutions have developed procedures for compiling emission inventories including US EPA, WHO and the European Environment Agency.

A4 Institutional Arrangements, Awareness Raising and Capacity Building

Clean Air Training Network For Asia (CATNet-Asia) is a key component of the Clean Air Initiative for Asian Cities which aims to improve air quality in Asia by delivering a comprehensive, regional training program based on collaboration, commitment, and sustainability.

A5 Financing of AQM
Annex B
Definitions of Air Quality Management Terms

For the purposes of the Strategic Framework the following definitions apply.

Adverse health effect
An adverse health effect is a change in morphology, physiology, growth, development or lifespan of an organism exposed to air pollution, which results in impairment of functional capacity or impairment of capacity to compensate for additional stress or increase in susceptibility to the harmful effects of other environmental influences.3

Adverse environmental effect
An adverse environmental effect means any significant and widespread adverse effect, which may reasonably be anticipated, to wildlife, aquatic life, or other natural resources, including adverse impacts on populations of endangered or threatened species or significant degradation of environmental quality over broad areas.4

Air pollution
Air pollution is state of the atmosphere where a wide variety of gaseous and particle compounds, which at higher than usual concentrations, are poisonous to humans and animals and damaging to plants and materials (adapted from WHO, 2000).5

Air quality management is the set of procedures to maintain air quality at levels that protect human health, and provide protection to animals, plants (crops, forests and natural vegetation), ecosystems, materials and aesthetics, such as natural levels of visibility.6

Clean air implementation plan
A clean air implementation plan is an instrument of air quality management to enforce emission and air quality standards. It includes emissions inventories, outdoor air pollutant concentration inventories, effects assessment, control measures at the sources, transportation and land-use planning, and enforcement procedures.5

Exposure
Exposure to a chemical is the contact of that chemical with the outer boundary of the human body. The outer boundary of the human body is the skin and the openings into the body such as mouth, the nostrils, and punctures and lesions of the skin.7

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Exposure-response relationships
An exposure-response relationship is any association between exposure to (a) chemical(s) and a health or an environmental effect. The association may also be functional and is considered to be causal.

Emissions inventory
An emissions inventory is the systematic assessment of relevant source data using information on raw material input, technical processes used and emission factors.

Guideline
A guideline is any kind of recommendation or guidance on the protection of human beings or receptors in the environment from the adverse effects of air pollutants. As such, it is not restricted to a numerical value but might also be expressed in a different way, for example as exposure-response relationship or a unit risk estimate.8

Guideline value
A guideline value is particular value of a concentration based on a guideline. It has a numerical value expressed either as a concentration in ambient air, a tolerable intake, or as a deposition level, which is linked to an averaging time.7

Quality assurance and quality control
Quality assurance and quality control is a sequence of activities that assures that a measurement meets defined standards of quality with a stated level of confidence.9

Standard
A standard is a level of an air pollutant, e.g. a concentration or deposition value, which is adopted by a regulatory authority as enforceable. Unlike a guideline value, a number of elements in addition to the effect-based level must be specified in the formulation of the standard. These elements include the management strategy, data handling procedures, statistics used to derive, from measurements, the value to be compared with the standard. The numerical value may also include the permitted number of exceedances.8

Transboundary air pollution
Long-range transboundary air pollution is air pollution whose physical origin is situated wholly or in part within the area under the national jurisdiction of one State and which has adverse effects in the area under the jurisdiction of another State at such a distance that it is not generally possible to distinguish the contribution of individual emission sources or groups of sources.10

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Annex C
Selected International and Supranational Initiatives in Air Quality Management related to Asia

Air Pollution in the Megacities of Asia

The Air Pollution in the Megacities of Asia (APMA) project is a joint effort by the United Nations Environment Programme (UNEP) and the World Health Organization (WHO) in collaboration with the Korea Environment Institute (KEI) and the Stockholm Environment Institute (SEI).

APMA is being funded by the Korea Ministry of the Environment (MOE) and the Swedish International Cooperation Development Agency (Sida) as part of their Regional Air Pollution in Developing Countries (RAPIDC) Programme.

The APMA project focuses on the development of policy to address urban air pollution in Asian Megacities. It aims to increase the capacity of governments and city authorities to deal with urban air pollution issues by developing regional action plans and establishing an urban air pollution network for Asian Megacities.

APMA builds upon UNEP/WHO efforts on air pollution in Megacities under the Urban Air Quality Monitoring Programme (GEMS/Air), which formed part of the UN Global Environment Monitoring System (GEMS), and the WHO Air Management Information System (AMIS). Both programmes acquired scientific data and information on the environment through monitoring and assessment.

The key activities of APMA have been to undertake a benchmarking exercise of urban air quality management and practice in major and megacities of Asia in collaboration with CAI-Asia and to promote a common approach to address urban air quality management via the development of a Strategic Framework on AQM in the Asian region.

Websites:
www.asiairnet.org
www.unep.org
www.who.int/homepage
www.kei.re.kr
www.sei.se
www.me.go.kr/english/newindex.html
www.rapidc.org

Clean Air Initiative - Asia

The Clean Air Initiative - Asia (CAI-Asia) is supported by the Asian Development Bank, World bank and USAEP/USAID which promotes and demonstrates innovative ways to improve the air quality of Asian cities through partnerships and sharing experiences.

The goals of the CAI-Asia programme include the following:

- sharing knowledge and experiences on air quality management;
- improving policy and regulatory frameworks at the regional level;
- piloting projects to encourage innovation; and
- assisting cities in implementing integrated air quality management systems.
CAI advances innovative ways to improve air quality in cities by sharing knowledge and experiences through partnerships in selected regions of the world. CAI partners and participants foster actions to improve air quality in cities. The initiative brings together a range of cross-cutting expertise in urban development, transport, energy reform, environmental management and environmental health. In addition to Asia, the Clean Air Initiative is also active in Latin America and Sub-Saharan Africa.

Public Health and Air Pollution in Asia

The Public Health and Air Pollution in Asia (PAPA) project is being undertaken by the Health Effects Institute in collaboration with CAI-Asia. The PAPA project aims to form alliances of Asian scientists and air quality officials, and their counterparts elsewhere in the world, to (1) produce a concise, rigorous, and understandable synthesis of all of the existing health studies in Asia, and (2) conduct and communicate the results of systematic, high-quality health analyses in four representative Asian cities. These analyses will be designed to provide specific local estimates of health impacts from air pollution that can be used in cost benefit analyses of the health and monetary benefits of reducing pollution. This information can thus inform public and private decisions on ambient air quality standards, air quality monitoring, and enhanced control programs.

To date, PAPA has attracted substantial commitments of support from foundations, USAID, and industry. Guided by the PAPA Advisory Committee – a multi-stakeholder technical advisory committee formed by CAI-Asia – PAPA will be managed by the Health Effects Institute, a respected international health research institute supported by both government and industry to provide high-quality, relevant, and credible science for decisions on air quality and health. Thus, PAPA will draw on the extensive network of key stakeholders coming together as CAI-Asia, and the experience of HEI in conducting analyses and building scientific capacity in a number of countries, to produce targeted results and a sustainable network of Asian scientific expertise to inform decisions for the decades to come.

Websites:
www.healtheffects.org
www.worldbank.org/wbi/cleanair/caiasia
www.adb.org

Integrated Environmental Strategies Program

The US Environmental Protection Agency’s Integrated Environmental Strategies (IES) program provides assistance to developing countries in identifying and implementing harmonized technology and policy measures in order to achieve local public health, economic, and environmental objectives in addition to significant greenhouse gas (GHG) reductions. Government agencies and research institutions in Argentina, Brazil, China, Chile, South Korea, India, the Philippines, and Mexico participate in the IES program.

The objectives of IES are to:

- promote analysis of environmental, public health, economic development, and air quality/greenhouse gas mitigation co-benefits;
- build permanent institutional and human capacity for integrated energy and environmental analysis;
- engage policy-makers to build support for integrated policy approaches and technologies;
- inform in-country energy and environmental policy processes and
integrate global issues with local policy initiatives;

- promote implementation of promising mitigation measures, plans and policies to realize co-benefits;
- refine, improve and disseminate analytical methodologies for co-benefits analysis;

IES builds awareness, support and in-country capacity for analysis and quantification of the local and global benefits of integrated energy and environmental policies. Analysis of these “co-benefits” promotes the adoption and implementation of integrated energy and environmental policies to achieve local air pollution and national climate change objectives. IES has forged collaborative relationships with USAID, the World Bank, the GEF, OECD, WHO, UNEP, and others to promote refinement and broader application of integrated environmental management methodologies. This collaboration developed a website (www.airimpacts.org) that is compiling state-of-the-art information on the public health benefits of improved air quality and integrated environmental management.

On behalf of the US EPA, the National Renewable Energy Laboratory leads the implementation of IES and provides financial and technical support to the participating countries. The US Agency for International Development (USAID) supports IES project activities in India and the Philippines.

IES utilizes a country-driven approach. IES activities are tailored to address local and national needs and priorities and build lasting capacity. Interdisciplinary in-country research teams, guided by policy-makers and assisted by international technical experts, identify key policy objectives and a range of potential conventional and innovative policy measures. The team then develops alternative scenarios involving the increased use of clean energy technologies and policies. These alternative scenarios, as well as a “business as usual” scenario, are then analyzed for their co-benefits. Air quality improvements from mitigation scenarios, an estimation of the public health benefits resulting from air quality improvements, and GHG mitigation are all quantified. The IES team then completes a ranking of the alternative measures analyzed with recommendations for policymakers.

Kitakyushu Initiative for a Clean Environment

The Kitakyushu Initiative for a Clean Environment was adopted by the Ministerial Conference on Environment and Development in Asia and the Pacific 2000 (MCED 2000) held in the City of Kitakyushu, Japan in September 2000, as a priority implementation mechanism for the Regional Action Programme for Environmentally Sound and Sustainable Development in Asia and the Pacific (RAP) 2001-2005, with specific focus on environmental quality and human health in urban areas.

The Kitakyushu Initiative primarily encourages activities at the ground-level to achieve tangible improvements in urban environmental quality, as well as promote the application of quantitative indicators and targets to monitor improvement, the transfer of successful practices through inter-city cooperation (i.e. twining cities, replication approach, etc.), the strengthening of local initiatives and enhancement of partnerships. For the implementation of the Kitakyushu Initiative, a variety of activities are ongoing.

Websites:
http://host-3.iges.or.jp/kitakyushu/
Sustainable Cities Programme

The Sustainable Cities Programme (SCP) is a joint UN-HABITAT\textsuperscript{11}/UNEP project for enhancing capacities in urban environmental planning and management. The programme is founded on cross-sector and stakeholder participatory approaches. It contributes to promoting urban governance. Currently the SCP operates in 20 main demonstration and 25 replicating cities around the world, including cities in China, Chile, Egypt, Ghana, India, Kenya, Korea, Malawi, Nigeria, the Philippines, Poland, Russia, Senegal, Sri Lanka, Tanzania, Tunisia and Zambia. Preparatory activities are underway in Bahrain, Cameroon, Iran, Kenya, Lesotho, Rwanda, South Africa and Vietnam (UNCHS/UNEP 2002).

Important publications of this project include the SCP Source Book Series. In volume 6 of this series urban air quality management is addressed. This document covers the improvement of

- Information and expertise for AQM;
- Strategies, action planning and decision making;
- Implementation and Institutionalisation.

Case studies for Shenyang, China, Manila, Philippines and Colombo, Sri Lanka illustrate the approach chosen in the SCP project.

Websites:
http://www.unchs.org/

\textsuperscript{11} UN-HABITAT is the United Nations Human Settlements Programme. It was formerly called UNCHS.

Urban Research Meteorology and Environment Project

The World Meteorological Organization’s (WMO) GAW Urban Research Meteorology and Environment (GURME) project was started in response to the requests of the National Meteorological and Hydrological Services (NMHSs). The WMO established GURME as a means to help enhance the capabilities of NMHSs to handle meteorological and related aspects of urban pollution. GURME is designed to do this through co-ordination and focussing of present activities, as well as initiation of new ones. NMHSs have an important role to play in the study and management of urban environments because they collect information and have capabilities that are essential to the forecasting of urban air pollution and the evaluation of the effects of different emission control strategies.

Websites:
www.wmo.ch
http://www.cgrer.uiowa.edu/people/carmichael/GURME/GURME.html