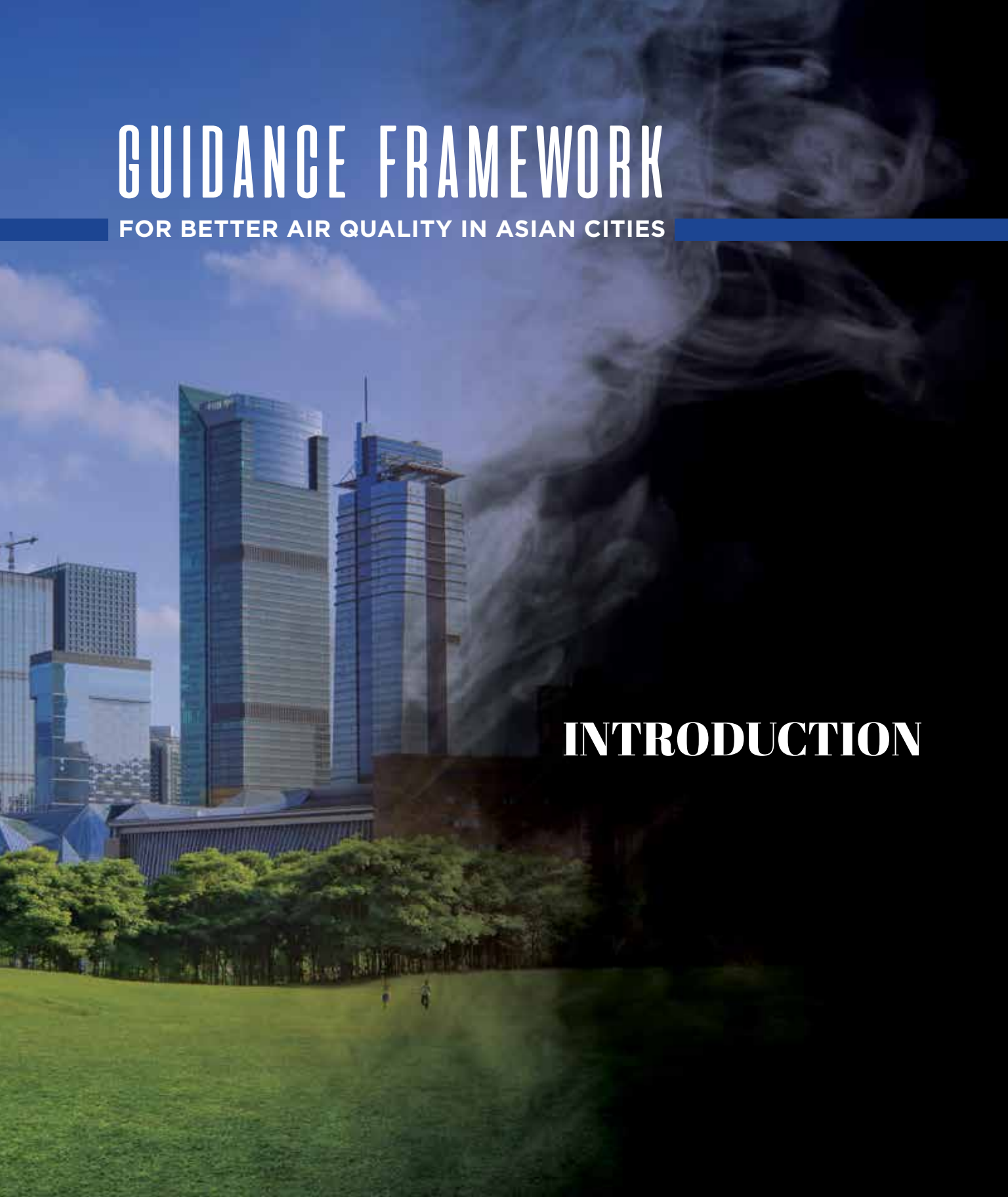
GUIDANCE FRAMEWORK

FOR BETTER AIR QUALITY IN ASIAN CITIES



INTRODUCTION

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Introduction

Published by Clean Air Asia, 2016. "Guidance Framework for Better Air Quality in Asian Cities". Pasig City, Philippines.
ISBN: 978-621-95434-0-8

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Citation

This publication may be cited as:

Clean Air Asia. (2016). Guidance Framework for Better Air Quality in Asian Cities. Pasig City, Philippines: Author.

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ABOUT THE GUIDANCE FRAMEWORK FOR BETTER AIR QUALITY IN ASIAN CITIES

The Guidance Framework is a voluntary and non-binding guidance document developed as an outcome of the biennial Governmental Meetings on Urban Air Quality in Asia, co-organized by Clean Air Asia and United Nations Environment Programme Regional Office for Asia Pacific (UNEP ROAP). It is an outcome of an extensive development process, which began in 2006 when the Long Term Vision for Urban Air Quality in Asia (LTV) was envisioned by representatives of environment ministries in the region. The LTV describes the desired state of urban air quality in Asian cities by 2030; the Guidance Framework serves as a guide for cities and countries to achieve this vision. In 2016, the Guidance Framework was launched as a pioneering approach to resolve air pollution challenges at the local- and national-levels. Centered on identified priority areas of concern in air quality management in the region, the Guidance Framework provides cities and countries with development capacity indicators and recommended steps and actions to improve air quality.

The Guidance Framework serves as a cornerstone document of Clean Air Asia's Integrated Programme for Better Air Quality in Asia (IBAQ Programme), which supports countries and cities in implementing the Guidance Framework through a range of targeted interventions, including knowledge-sharing platforms to strengthen regional collaboration, capacity building activities such as trainings, study tours and city twinning, and technical assistance at both the national and subnational levels.

ABOUT CLEAN AIR ASIA
www.cleanairasia.org

Clean Air Asia is an international NGO established in 2001 as the premier air quality network for Asia by the Asian Development Bank, World Bank and USAID. Its mission is to promote better air quality and livable cities by translating knowledge to policies and actions that reduce air pollution and greenhouse gas emissions from transport, energy and other sectors.

Clean Air Asia became a UN-recognized partnership in 2007, its network spanning 261 organizations in 31 countries in Asia and worldwide, with nine country networks: China, India, Indonesia, Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, and Vietnam. It is headquartered in Manila and has offices in Beijing and Delhi. Clean Air Asia leads efforts to enable Asia's more than 1000 cities to reduce both air pollution and CO_2 emissions, and thereby contribute to more livable and healthy cities with blue skies and a low carbon footprint. Clean Air Asia helps to reduce emissions, through policies, plans, programs, and concrete measures that cover air quality, transport and industrial emissions and energy use.

The Better Air Quality (BAQ) Conference is a flagship event of Clean Air Asia covering the key sectors of transport, energy and industry, with a particular emphasis on government policies and measures. Policymakers, practitioners and industry leaders meet at BAQ to network, innovate, learn, and share experiences. The biennial event was first held in 2002 and attracts close to a thousand participants from Asia and the rest of the world.

ABOUT UNEP

www.unep.org

The United Nations Environment Programme (UNEP) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system and serves as an authoritative advocate for the global environment. UNEP work encompasses assessing global, regional and national environmental conditions and trends; developing international and national environmental instruments; and strengthening institutions for the wise management of the environment. UNEP's mission includes to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.

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ACKNOWLEDGEMENTS

The Guidance Framework for Better Air Quality in Asian cities has been developed by Clean Air Asia, led by Executive Director, Bjarne Pedersen. The project was overseen by Maria Katherina Patdu and overall coordination support was provided by Dang Marviluz Espita.

Clean Air Asia is grateful to Atty. Glynda Bathan-Baterina, Deputy Executive Director, who provided a comprehensive review of the document. Clean Air Asia is also thankful to the staff who provided research assistance for the completion of the Guidance Framework: Maria Tanya Gaurano, Ma. Loisa Tong, Maria Preciosa Benjamin, Weihao Zhang and Philip Joshua Bernadas. Clean Air Asia also acknowledges Robyn Garner, Dorelyn Jose, and Patricia San Jose who provided editorial support for this project.

Clean Air Asia recognizes participating Environment Ministries across Asia to the Governmental Meetings on Urban Air Quality in Asia, United Nations Environment Programme Regional Office of Asia Pacific (UNEP ROAP), and the following peer reviewers – individuals and organizations – who provided technical review of the Guidance Framework:

Amanda Curry Brown, United States Environmental Protection Agency
Anubha Goel, Indian Institute of Technology - Kanpur
Anumita Roychowdhury, Centre for Science and Environment
Arnico Panday/Vanisa Surapipith, International Centre for Integrated Mountain Development
Benjamin Cornet, Independent Consultant
Bjarne Sivertsen, Norwegian Institute for Air Research
Elisea Gozun, Former secretary of the Department of Environment and Natural Resources of the Philippines
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Melina Magsumbol, Public Health Foundation of India
Molshree Pandey, Innovation Centre Denmark in India
Mukesh Khare/A.K. Nema, Indian Institute of Technology - Delhi
Mukesh Sharma, Indian Institute of Technology - Kanpur
Sarath Guttikunda, Desert Research Institute
Shun-cheng Lee, Hong Kong Polytechnic University
Simon Gilby, Institute for Global Environmental Strategies
Sumit Sharma/Sita Lakshmi, The Energy and Resources Institute - India
Supat Wangwongwatana, Regional Resource Center for Asia and the Pacific
Sven Callebaut, Independent Consultant
Titia Meuwese, Synspec BV – Netherlands
Vijay Jagannathan, CITYNET
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ABBREVIATIONS

AAQS	Ambient Air Quality Standards
ADB	Asian Development Bank
APCAP	Asia Pacific Clean Air Partnership
AQM	Air Quality Management
BC	Black Carbon
CAAP	Clean Air Action Plan
CH_4	Methane
CO_2	Carbon dioxide
EI	Emissions Inventory
GHG	Greenhouse Gas
IEA	International Energy Agency
LTV	Long-Term Vision for Urban Air Quality in Asia
O_3	Ozone
PM	Particulate Matter
PM_{10}	Particulate Matter (≤ 10 micrometers in diameter)
$PM_{2.5}$	Particulate Matter (≤ 2.5 micrometers in diameter)
QA	Quality Assurance
QC	Quality Control
SA	Source Apportionment
SDGs	Sustainable Development Goals
SLCPs	Short-lived Climate Pollutants
SOP	Standard Operating Procedure
UN	United Nations
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNEP ROAP	United Nations Environment Programme Regional Office for Asia Pacific
USEPA	United States Environmental Protection Agency
WHA	World Health Assembly
WHO	World Health Organization

FOREWORD

Bjarne Pedersen
Executive Director, Clean Air Asia

One of the greatest environmental challenges we face today is air pollution. It is a priority issue for Asian cities, with the health impacts alone a cause for great concern and suffering. In 2012 there were 2.6 million deaths in the Western Pacific and South-East Asia regions attributable to ambient air pollution. And in 2015, a Clean Air Asia survey of more than 400 cities found that seven out of 10 cities in developing Asian countries had unhealthy air quality based on average annual PM_{10} levels.

In response to this situation, Clean Air Asia and the United Nations Environment Programme Regional Office for Asia Pacific were encouraged by environment ministries during Governmental Meetings on Urban Air Quality in Asia to develop a Long-Term Vision for Urban Air Quality in Asia.

The result is this Guidance Framework for Better Air Quality in Asian Cities, which provides cities with concrete and realistic roadmaps to help them fully develop their air quality management capacity, and which Clean Air Asia is committed to supporting cities and countries in implementing.

Clean Air Asia encourages both cities and national governments, as well as stakeholders and the public, to use the Guidance Framework to bolster their understanding of local needs and challenges for the implementation of effective clean air strategies.

We extend our appreciation to the environment ministries and the UNEP ROAP for their support in this endeavor, and to the regional and international experts from various organizations who contributed to the development of the Guidance Framework.

We trust that the Guidance Framework will be a valuable resource for the region in moving towards better air quality.

EXECUTIVE SUMMARY

Air pollution is now considered the world's largest environmental health risk. The World Health Organization attributed seven million global premature deaths in 2012 to the joint effects of household (indoor) and ambient (outdoor) air pollution. People living in Asia are most at risk of ambient air pollution, which now ranks among the top five or six risks in the continent's developing countries. More than 2.6 million premature deaths attributed to ambient air pollution were reported in the Western Pacific and South East Asian regions.

Ambient air pollution primarily concerns urban populations, which now comprise more than 50 percent of the world's population. The continuing trend of rapid urbanization – compounded by Asian Development Bank's projections that by 2025, 21 of the world's 37 megacities will be in Asia – places the region at great risk. Much of the burden of air pollution comes from a rise in the demand for energy and mobility. This puts additional pressure on the existing limited supplies of energy, particularly from emerging Asian economies. If the trend continues, or if more sustainable measures are not implemented, air pollution impacts could negate some of the region's economic gains. However, with the appropriate frameworks and policies, air pollution control measures can capture synergies and minimize trade-offs in addressing climate change. The application of the co-benefits approach of addressing air and climate pollutants helps identify and implement win-win strategies that help meet the economic and social development needs of developing Asian countries.

There have been a number of global efforts calling for air pollution actions in recent years. In 2014, the first United Nations Environment Assembly (UNEA) adopted a resolution calling on governments to "formulate action plans and establish and implement nationally determined ambient air quality standards" and "to establish emissions standards for their significant sources of air pollution". Air pollution was also prominently discussed at the 68th World Health Assembly (WHA) in May 2015, which passed the landmark resolution on "Health and the Environment: Addressing the health impact of air pollution". These global calls for action on air pollution strengthen regional and national initiatives, and highlight the need to prioritize addressing this issue via a collaborative and integrated approach.

In the Asia Pacific region, a large number of regional processes and air pollution abatement initiatives have been operational for a number of years. Recent episodes of "airpocalypse" serve as a wake-up call for Asia and the world, and serves as motivation to advance air quality action by national and city governments to a fully developed stage of air quality management (AQM).

The Guidance Framework for Better Air Quality in Asian Cities (Guidance Framework) – which is meant to be a "living document" that will evolve with its users – offers guidance for policymakers and decision makers in key AQM components to help them progress through the development stages of AQM. The development of the Guidance Framework is a result of discussions at the biennial Governmental Meetings on Urban Air Quality in Asia organized by the United Nations Environment Programme Regional Office for Asia Pacific (UNEP ROAP) and Clean Air Asia to harmonize approaches in tackling urban air pollution and other related areas among Asian countries. The Guidance Framework intends to provide recognized guidance for implementing the Long Term Vision for Urban Air Quality in Asia (LTV), which describes the desired state of urban air quality in Asian cities by 2030.

The vision and indicator of the LTV are as follows:

Vision:
Healthy people in healthy cities, which puts emphasis on the prevention of air pollution, and which implements effective strategies for the abatement of air pollution.

Indicator: Asian cities have made significant progress towards achieving WHO air quality guideline values through the implementation of comprehensive air quality management strategies.

The primary target audience of the Guidance Framework are policymakers and decision makers at the national and local levels who are responsible for improving urban air quality. The Guidance Framework also provides information and recommendations to other relevant stakeholders who can support initiatives to improve air quality in cities:

Development organizations, the private sector, non-governmental organizations and other civil society groups, the media and academia.

The Guidance Framework complements and operates within a framework of strategic AQM. The document is organized around identified priority areas of concern in the region, which were then translated into six guidance areas. Each guidance area provides key indicators of development stages of AQM which aid cities in identifying additional and appropriate action necessary to effectively progress towards better air quality. Recommended steps to follow to implement distinct roadmaps for each guidance area are also provided.

Guidance Area 1: Ambient air quality standards and monitoring

Establishing/strengthening ambient air quality standards (AAQS) and sustainable national and local air quality monitoring systems is important to understand the status of air quality and air quality standards for public health and environment protection. The roadmap presents key action points – informed by international and regional experiences – to guide the development of AAQS. It is recommended to undertake a periodic review of AAQS as well as strengthen a sustainable air quality monitoring system to support AAQS development and enforcement. Compliance with these standards should then be linked with the development of Clean Air Action Plans (CAAPs) and other sector/development plans. Sustainable air quality monitoring systems provide data for modeling evaluation and contribute to health impact studies to appropriately inform populations-at-risk of the impacts of air pollution, with air quality standards as reference.

Guidance Area 2: Emissions inventories and modeling

It is necessary to develop an accurate and reliable emissions inventory (EI) and apply dispersion and receptor modeling techniques to have a better understanding of air pollution sources and their characterization to guide the development of CAAPs and related environmental and developmental plan and policies. The roadmap identifies steps to strengthen capacity to quantify pollutants, determine source contributions and evaluate existing and future emissions to help design CAAPs. It highlights the importance of enhancing the accuracy and reliability of EI and improving receptor-based modeling capacity while enriching technical knowledge for actual measurement and calculations. The development of localized dispersion models is essential to adapt and evaluate dispersion models for local conditions, starting with simple models and moving towards the application of more sophisticated techniques to enhance evidence base for AQM policies.

Guidance Area 3: Health and other impacts

Air pollution contributes to significant health and other impacts. Improved understanding of the impacts of air pollution informs CAAP development and helps engage stakeholders in this issue. Multi-stakeholder approaches contribute to effective co-management of air pollution as well as greenhouse gas (GHG) emissions, leading to significant co-benefits with regards to public health. The roadmap lays out the direction towards strengthening the capacity for health and other impact assessments. It is recommended to increase the accessibility of information and ensure the availability of health surveillance systems and air quality databases for exposure modeling. The roadmap is accompanied by a step-by-step guide on developing a health impact assessment.

Guidance Area 4: Air quality communication

This guidance area entails the development of an effective communication strategy to inform, educate, and strengthen stakeholder participation in all aspects of AQM. The roadmap for air quality communication presents measures that ensure the availability and accessibility of air quality monitoring data, the use of appropriate communication channels, the conducting of public warnings and forecasts, and the dissemination of comprehensive and non-technical information on the status of AQM to relevant stakeholders. The roadmap also provides guidance on communicating the co-benefits of air quality and climate change, highlighting how the inclusion of air quality benefits, specifically economic costs, in the design of climate strategies can be used to convince stakeholders to take action, and vice versa. An eight-step guide to develop an effective air quality communication plan is provided for stakeholders.

Guidance Area 5: Clean air action plans

A CAAP needs to be developed by cities and countries to include and/or legally strengthen AQM in relevant policies and

legislations, with the ultimate goal of improving air quality. The roadmap for CAAP details steps that enable governments and other stakeholders to identify appropriate policies and regulations, building on an understanding of the sources of air pollution and the status of air quality. Recommended components of a CAAP and case studies on the different developmental stages of CAAP development and implementation are provided.

Guidance Area 6: Governance

The environment and stakeholders can benefit from good air quality governance approaches in cities and countries in Asia. Effective governance aims to facilitate effective policy development and enforcement. Effective governance also educates and strengthens stakeholder participation in all aspects of AQM to prevent and reduce the impacts of air pollution. A roadmap for improving air quality governance presents the key steps needed to ensure clear, implementable and enforceable environmental policies and measures. Achieving an enabling environment for the implementation of measures with a clear institutional mandate and effective institutional arrangements is the key to reducing air pollution.

LOOKING FORWARD: Guidance Framework Implementation

Clean Air Asia is keen to support countries and cities in implementing the Guidance Framework as part of the IBAQ Programme. The range of activities include knowledge-sharing platforms to strengthen regional collaboration, capacity building activities (such as training, study tours, city twinning), and technical assistance at national and subnational levels to improve air quality using the Guidance Framework.

CHAPTER 1

INTRODUCTION

There is a growing recognition of the opportunity to save lives with cleaner air. Nowhere is this opportunity greater than in Asia.

Air pollution is now considered the world's largest environmental health risk. Seven million global deaths in 2012 can be attributed to the joint effects of household (indoor) and ambient (outdoor) air pollution, according to World Health Organization's (WHO) latest estimates (WHO, 2014a).

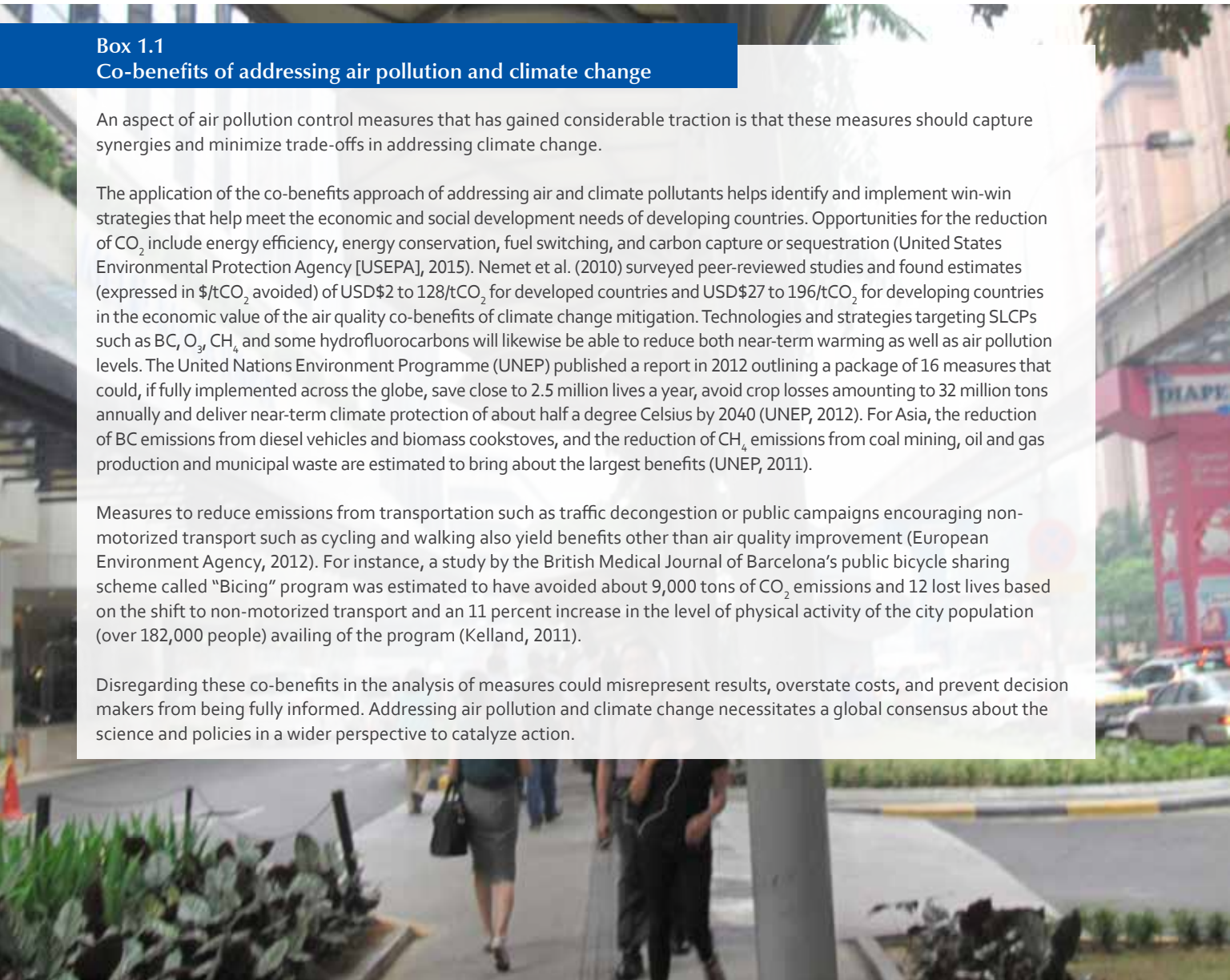
Ambient or outdoor air pollution primarily concerns urban populations, which now comprise more than 50 percent of the world's population (United Nations [UN], 2014a). According to the World Urbanization Prospects of the United Nations, as of 2014, 16 of the world's 28 megacities (cities with more than 10 million citizens) were located in Asia. This trend of rapid urbanization in Asia is expected to continue. The Asian Development Bank (ADB) forecasts that by 2025, 21 of the world's 37 megacities will be in Asia as economic growth continues in the region (ADB, 2010).

People living in Asia are most at risk of ambient air pollution, which now ranks among the top five or six risks in the continent's developing countries (Lim et al., 2012). More than 2.6 million deaths attributed to ambient air pollution were reported in the Western Pacific and South-East Asia regions (WHO, 2014b). A 2014 survey by Clean Air Asia found seven out of 10 cities in developing Asian countries had unhealthy air pollution levels based on annual average PM_{10} levels (updated from ADB & Clean Air Asia, 2014).

The Asian Development Outlook (ADB, 2014) projects steady economic growth for developing Asia as a whole, with GDP forecasts of 6.1 percent in 2012 to 6.4 percent in 2015. With rapid urbanization - *vis a vis* continuing economic growth - comes a rise in the demand for road transport in urban areas, increased pollution from the surge in motor vehicle kilometers, and additional pressure on the existing limited supply of energy, predominantly fossil fuels such as oil and coal. Emerging Asian economies, notably China, India and, to

a certain extent, South-East Asian countries - will account for more than 90 percent of net energy demand growth to 2035 (International Energy Agency [IEA], 2013a).

Fossil fuels, which currently account for about 80 percent of the world's energy supply, are a significant source of emissions. Worldwide, carbon dioxide (CO_2) emissions are expected to increase by 57 percent between 2005 and 2030, with China and India accounting for half of the growth (IEA, 2013b). Cities, in particular, are responsible for about 70 percent of global greenhouse gases (GHGs) (UN Habitat, 2011): CO_2, the most abundant GHG emitted through anthropogenic activities, has warming influences on the climate in the long-term; while short-lived climate pollutants (SLCPs) such as black carbon (BC) (a primary component of particulate matter (PM)), methane (CH_4) and ozone (O_3) have warming influences on the climate in the near-term (Climate and Clean Air Coalition, 2014; UN Habitat, 2011; UNEP 2014a). If the trend continues or if more sustainable measures, such as shift to renewable sources of energy, are not implemented, air pollution impacts could potentially negate some of the region's economic gains. However, win-win strategies are possible with the right frameworks and policies, particularly those recognizing the co-benefits of addressing air pollution and climate change (Box 1.1).



Box 1.1
Co-benefits of addressing air pollution and climate change

An aspect of air pollution control measures that has gained considerable traction is that these measures should capture synergies and minimize trade-offs in addressing climate change.

The application of the co-benefits approach of addressing air and climate pollutants helps identify and implement win-win strategies that help meet the economic and social development needs of developing countries. Opportunities for the reduction of CO_2 include energy efficiency, energy conservation, fuel switching, and carbon capture or sequestration (United States Environmental Protection Agency [USEPA], 2015). Nemet et al. (2010) surveyed peer-reviewed studies and found estimates (expressed in $/t$CO_2$ avoided) of USD$2 to 128/t$CO_2$ for developed countries and USD$27 to 196/t$CO_2$ for developing countries in the economic value of the air quality co-benefits of climate change mitigation. Technologies and strategies targeting SLCPs such as BC, O_3, CH_4 and some hydrofluorocarbons will likewise be able to reduce both near-term warming as well as air pollution levels. The United Nations Environment Programme (UNEP) published a report in 2012 outlining a package of 16 measures that could, if fully implemented across the globe, save close to 2.5 million lives a year, avoid crop losses amounting to 32 million tons annually and deliver near-term climate protection of about half a degree Celsius by 2040 (UNEP, 2012). For Asia, the reduction of BC emissions from diesel vehicles and biomass cookstoves, and the reduction of CH_4 emissions from coal mining, oil and gas production and municipal waste are estimated to bring about the largest benefits (UNEP, 2011).

Measures to reduce emissions from transportation such as traffic decongestion or public campaigns encouraging non-motorized transport such as cycling and walking also yield benefits other than air quality improvement (European Environment Agency, 2012). For instance, a study by the British Medical Journal of Barcelona's public bicycle sharing scheme called "Bicing" program was estimated to have avoided about 9,000 tons of CO_2 emissions and 12 lost lives based on the shift to non-motorized transport and an 11 percent increase in the level of physical activity of the city population (over 182,000 people) availing of the program (Kelland, 2011).

Disregarding these co-benefits in the analysis of measures could misrepresent results, overstate costs, and prevent decision makers from being fully informed. Addressing air pollution and climate change necessitates a global consensus about the science and policies in a wider perspective to catalyze action.

The Guidance Framework for Better Air Quality in Asian Cities – meant to be a **"living document"** that will evolve with its users – **offers guidance** for policymakers and decision makers to **help them progress** through the development stages of air quality management.

There have been a number of global efforts calling for air pollution actions in recent years. In 2014, the first United Nations Environment Assembly (UNEA) adopted a resolution calling on governments to "formulate action plans and establish and implement nationally determined ambient air quality standards" and "to establish emissions standards for their significant sources of air pollution" (UNEP, 2014c). At the United Nations Climate Summit in New York City in September 2014, world leaders agreed that climate action needed to be undertaken within the context of poverty eradication and the promotion of sustainable development. A significant reduction in emissions was recognized as the critical first step towards meaningful climate action (UN, 2014b). The Sustainable Development Goals (SDGs) provide opportunities to scale up policies and action on air pollution and mitigating its impacts on health, climate, and the environment. Air pollution was also prominently discussed at the 68th World Health Assembly in May 2015, which passed a landmark resolution on "Health and the Environment: Addressing the health impact of air pollution". The resolution recognized 13 measures for member states to implement in order to reinforce the capacity of member states and cities to reduce air pollution and benefit health and climate in the near term. These measures come with cross-cutting actions including enabling health systems to lead awareness-raising among all stakeholders about the impacts of air pollution on health, developing guidelines for reducing or preventing exposure, and fostering inter-sectoral collaboration for action (WHO, 2015).

The global calls for action on air pollution bolster regional and national initiatives and highlight the need to prioritize addressing this issue via a collaborative and integrated approach, particularly in areas where the burden of air pollution is high. In the Asia Pacific region, a large number of regional processes and air pollution abatement initiatives have been operational for a number of years. The need to synergize these processes and initiatives was identified during the Combined Meeting of Consultation Meeting for the Joint Forum for Clean Air in Asia and the Pacific and the Fifth Governmental Meeting on Urban Air Quality in Asia – organized by UNEP ROAP and Clean Air Asia – in November 2014 in Colombo, Sri Lanka. As a response to the call by countries for immediate and coordinated action to deal with air pollution and its impacts – as well as to follow up on countries' actions in implementing the UNEA and WHA resolutions – the Joint Forum of the Asia Pacific Clean Air Partnership (APCAP Joint Forum) was set up by UNEP ROAP.

The demand for cleaner air is gaining momentum, particularly with recent episodes of "airpocalypse" serving as a wake-up call for Asia and the world. Nowhere is this opportunity greater than in Asia. With suitable policies in place and proven technologies available, rapidly growing Asian economies have the opportunity to advance cost-effective improvement measures in air quality to a level that it took several decades to attain in developed countries. This document aims to guide and help policymakers and other stakeholders concerned about air quality for Asia's current and future generations.

The Guidance Framework for Better Air Quality in Asian Cities – meant to be a "living document" that will evolve with its users – offers guidance for policymakers and decision makers in key AQM components to help them progress through the development stages of AQM.

LONG TERM VISION FOR URBAN AIR QUALITY IN ASIA

Vision: Healthy people in healthy cities, which puts emphasis on the **prevention of air pollution**, and which implements **effective strategies** for the abatement of air pollution.

Indicator: Asian cities have made **significant progress** towards achieving WHO **air quality** guideline values through the implementation of **comprehensive AQM strategies.**

1.1 Guidance Framework for Better Air Quality in Asian Cities

The Guidance Framework for Better Air Quality in Asian Cities (Guidance Framework) intends to provide recognized guidance in implementing the Long Term Vision for Urban Air Quality in Asia (LTV), which describes the desired state of urban air quality in Asian cities by 2030 (UNEP & Clean Air Asia, 2008). The vision and indicator of the LTV as agreed upon by the country representatives are as follows:

Vision: "Healthy people in healthy cities, which puts emphasis on the prevention of air pollution, and which implements effective strategies for the abatement of air pollution."

Indicator: "Asian cities have made significant progress towards achieving WHO air quality guideline values through the implementation of comprehensive AQM strategies."

The Guidance Framework also supports the realization of the United Nations' Sustainable Development Goals, notably Goal 11: Make cities inclusive, safe, resilient, and sustainable; Goal 13: Take urgent action to combat climate change and its impacts; and Goal 3: Ensure healthy lives and promote well-being for all at all ages (Target: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination).

1.1.1 Target audience

The primary target audience of the Guidance Framework are policymakers and decision makers at the national and local levels who are responsible for improving urban air quality. The Guidance Framework also provides information and recommendations to other relevant stakeholders who can support initiatives to improve air quality in cities: Development organizations, the private sector, non-governmental organizations and other civil society groups, the media, and academia.

1.1.2 Development process

The development of the Guidance Framework is a result of discussions at the biennial Governmental Meetings on Urban Air Quality in Asia organized by UNEP ROAP and Clean Air Asia to harmonize approaches in tackling urban air pollution and other related areas among Asian countries. Countries that have participated in the Governmental Meetings include Afghanistan, Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Iran, Japan, Korea, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and Vietnam. Table 1.1 provides an overview of the past Governmental Meetings.

The Fourth Governmental Meeting identified priority areas of concern for Asia, which were then translated into the six guidance areas (Table 1.2). The current state of AQM in Asian cities varies widely. In general, AQM in Asia has not developed rapidly enough to respond to the changing urban landscape and evolving air pollution challenges. The Guidance Framework provides direction to address these challenges. The recommendations specified in each chapter outline corresponding points for action.

1.2 Air quality management framework

The Guidance Framework complements and operates within a framework of strategic AQM (Figure 1.1). This enables government authorities to set objectives to achieve and maintain good air quality and minimize impacts on human health and the environment. The key AQM components necessary for setting objectives to achieve and maintain clean air include (Stockholm Environment Institute, 2004):

(1) Air quality monitoring – results feed into a continuous process of improving air quality and having more stringent standards, the establishment of quality assurance/quality control (QA/QC processes), communicating air quality and co-benefits; and evaluating the effectiveness of policies and measures.
(2) Emissions – involve an understanding of emission sources and their contribution as relevant input in developing short-term, medium-term and long-term strategies, and the conducting of an emissions inventory.
(3) Air quality modeling – allows for better baseline data to provide more accurate air quality forecasts; allows pollutant concentration interpolation and extrapolation; and allows analysis of the efficacy of emission control strategies.
(4) Health, environmental, and economic risk assessments – strengthening and adoption of national and local programs that allow for better baseline estimates and inform better strategies to address these risks.
(5) Communication – involves developing communication and awareness-raising campaigns to mobilize political and public support for AQM;
(6) Policies – promote a participatory approach to policy

making and include AQM as an objective for sustainable development.

(7) Financing of AQM – acknowledgement of AQM as urgent and necessary to allow for funds to be earmarked for the conducting of AQM activities.

(8) Governance – includes policy instruments, institutional set-up and mechanisms, resources, periodic review, compliance monitoring and enforcement programs, capacity building and training.

Table 1.1 Overview of Governmental Meetings and their outcome

Governmental Meeting	Date and Location	Outcome
First Governmental Meeting	13-14 December 2006 in Yogyakarta, Indonesia	The meeting recommended the development of the LTV to help inspire Asian cities and countries in the establishment of their AQM policies and programs. Clean Air Asia and UNEP ROAP were encouraged to develop a vision document on AQM in Asian cities.
Second Governmental Meeting	12-13 November 2008 in Bangkok, Thailand	Representatives from 15 environmental ministries attended the meeting. Clean Air Asia and UNEP ROAP drafted the LTV. The draft document was circulated to all participating countries and its contents discussed during the meeting.
Third Governmental Meeting	8 November 2010 in Singapore	Seventeen senior officials from national environment ministries deliberated on the way forward in achieving Asia's LTV. Priority areas for the LTV were identified: • Conduct more health impact studies as a basis for policy development • Develop a roadmap for improving ambient air quality and emission standards in Asia • Optimize resources by sharing and aligning databases on air quality • Develop a mechanism for regional AQM (air basins) • Promote the co-benefits approach for policies and programs • Prepare an overview of regional forums, networks, and organizations at the national levels to facilitate cooperation at the regional level
Fourth Governmental Meeting	6 November 2013 in Bangkok, Thailand	The meeting, composed of thirty senior officials from national environment ministries, agreed on developing a Guidance Framework which will provide a recognized guidance in implementing the LTV.

Governmental Meeting	Date and Location	Outcome
Fifth Governmental Meeting	17-18 November 2014 in Colombo, Sri Lanka	The first draft of the Guidance Framework was presented. The meeting agreed that the Guidance Framework was useful for Asian cities and was comprehensive in terms of scope. The meeting also provided feedback on how to improve the draft document. The review and finalization process for the Guidance Framework was discussed. The final draft of the Guidance Framework was shared at the First APCAP Joint Forum and updates on implementation will be reported at the Sixth Governmental Meeting on Urban Air Quality in Asia.

Table 1.2 Overview of Guidance Areas

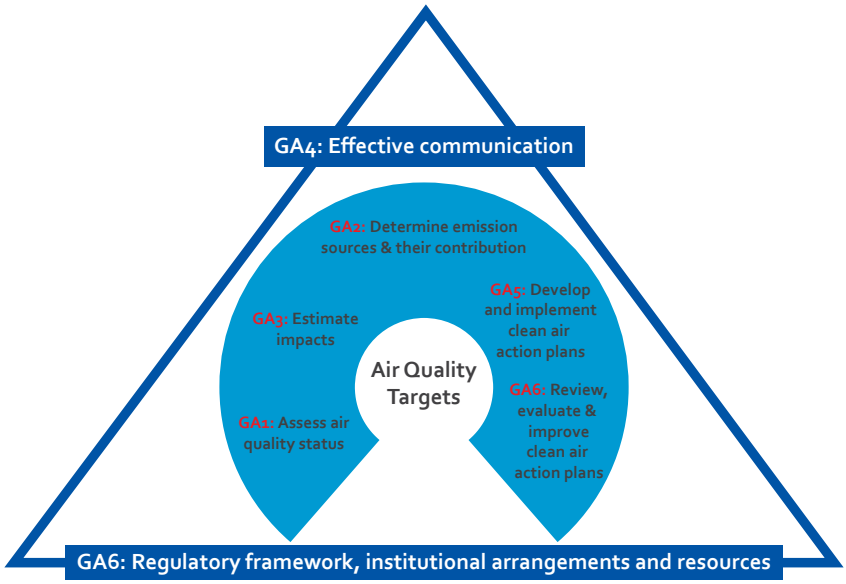
Priority areas of concern	Six Guidance Areas
Setting and strengthening national ambient air quality standards and improving air quality monitoring systems	Guidance Area 1: Ambient air quality standards and monitoring
Developing and updating emissions inventories, source apportionment, air quality modeling	Guidance Area 2: Emissions inventories and modeling
Linking air quality levels and emissions data with health impacts and their social and economic cost (including the link with climate change)	Guidance Area 3: Health and other impacts
Communicating air quality, health, and co-benefits information to government, other organizations and the public through Clean Air Reports, air quality indexes, mobile and web applications and other means.	Guidance Area 4: Air quality communication
Developing, implementing, and evaluating the effectiveness of clean air action plans, policies and measures (including co-benefits of climate change)	Guidance Area 5: Clean air action plans
Governance, covering compliance and enforcement, budgeting and financing, and institutional frameworks	Guidance Area 6: Governance

1.3 Structure of the Guidance Framework

The report is primarily organized around the six guidance areas within the AQM framework (Figure 1.1). Each chapter is provided as individual documents with a common Information Sourcebook, which is a compilation of resources to support the implementation of the Guidance Framework roadmaps. Each chapter includes: i) The objective of the guidance area and an overview of key concepts, ii) A definition of development stages that cities go through at different levels of AQM capacities, iii) An account of issues and challenges, and iv) A roadmap with recommended steps to follow in order to progress through the different development stages.

1.3.1 Development stages of air quality management

Cities can be classified according to their AQM capabilities. They could fall into any of these capability or development stages (Table 1.3): Underdeveloped, developing, emerging, maturing, or fully developed. These AQM development stages provide cities with the means with which to assess where they are on this continuum and attain the fully developed stage. The characteristics of each stage of AQM development are elaborated through indicators on data, capacity, public awareness and participation, regulatory structure and framework (**Annex VII of the Information Sourcebook).**



Note: GA = Guidance Area

Figure 1.1 Air Quality Management Framework

Table 1.3 Stages of air quality management

Stages	Indicators
Underdeveloped	There is generally little/no capacity, policies, information on, and mechanisms for AQM. The city's air quality is deteriorating due to the lack of control systems and mechanisms in place.
Developing	There is some capacity, policies, information on, and mechanisms for AQM in place but this is insufficient. Consequently, while air pollution levels at this stage remain high with associated serious health and environmental impacts, these are stabilizing and the trajectory can be reversed.
Emerging	Air quality management activities, policies, and communications are starting to be put in place and are starting to be implemented more regularly and systematically. There is some data available and used and there is demonstrated capacity at the operational level of staff, stakeholders, and institutions/ structures that support implementation.
Maturing	Air quality management activities, policies, and systems are regularly implemented, with review and monitoring systems in place to ensure quality control and the accuracy of information. These are supported by policies and governance processes that are more inclusive and varied to suit the different contexts at the national and subnational levels. There is a certain level of transparency such that information is communicated to a wider audience using different communication channels. The improvement of air quality is being achieved with the implementation of effective policies to reduce emissions.
Fully Developed	Where AQM activities, policies, and processes are in place, the focus is on ensuring the sustainability of the measures undertaken, the quality of data and research studies generated, and continuous improvement to existing measures through the upgrading of review and monitoring processes, leading to further improvements in air quality. Public participation is strengthened and supported by transparency in governance processes, regulations, and frameworks.

In order to **achieve the Long-Term Vision**, the Guidance Framework provides **interrelated roadmaps with recommended steps** or action points for cities to progress from the stage they are currently at to the next stage of air quality management.

1.3.2 Guidance Framework roadmaps

The LTV encourages Asian cities to actively consider long-term strategies and integrate them into development planning to achieve improved air quality (UNEP & Clean Air Asia, 2008). In order to achieve the LTV, the Guidance Framework provides interrelated roadmaps with recommended steps or action points for cities to progress from the stage they are currently at to the next stage of AQM. The Guidance Framework Roadmap (Table 1.5) consists of steps categorized into:

- **Management processes** - pertain to management capacities, resources, and institutional arrangements (regulations, policies) that aid in decision-making;
- **Technical processes** – involve scientific knowledge and technical skills, tools, and equipment that are relevant to the implementation of identified measures; and
- **General considerations** – identify factors (such as needed finance and human resources, stakeholder involvement, and others) that facilitate and may potentially hinder the attainment of goals and/or effective implementation

Case studies are provided along with the recommended steps to illustrate the specific actions and successful efforts undertaken by cities or countries to improve aspects of AQM relevant to each guidance area. Each guidance area is provided as a separate chapter and are developed in such a way that they can be used separately to discuss and address a specific area or as a section of the document to tackle AQM issues in a holistic and more strategic manner.

1.4 Guidance Framework implementation

Cities need support to implement the Guidance Framework. Clean Air Asia is keen to support countries and cities in implementing the Guidance Framework as part of the IBAQ Programme. The range of activities include knowledge sharing platforms to strengthen regional collaboration, capacity building activities (i.e., training, study tours, city twinning), and technical assistance at national and subnational levels to improve air quality using the Guidance Framework. Capacity building will also be provided through training courses for cities in implementing the Guidance Framework.

Cities need **support** to implement the **Guidance Framework.**

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ISBN 978-621-95434-0-8