

GUIDANCE FRAMEWORK FOR BETTER AIR QUALITY IN ASIAN CITIES:

Financing Air Quality Management



Guidance Framework for Better Air Quality in Asian Cities: Financing Air Quality Management



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ABOUT CLEAN AIR ASIA

Clean Air Asia is an international non-governmental organization leading the regional mission for better air quality, and healthier, more livable cities throughout Asia. We work with partners to reduce air pollution and greenhouse gas emissions across Asia by building capacity, advocating for effective and appropriate policies and practice, and informing stakeholders of air pollution and climate change impacts. We aim to reduce air pollution and greenhouse gas emissions in 1000+ cities in Asia through a range of innovative policies and programs covering air quality, transport and industrial emissions, and energy use.

We work with energy, environment, health and transport ministries, cities, the private sector, development agencies, academia and civil society to provide leadership and technical knowledge in Air Quality and Climate Change, and Sustainable Transportation (Low Emissions Urban Development, Clean Fuels and Vehicles, Green Freight and Logistics). Since 2008, we have been a United Nations-recognized partnership comprised of more than 250 organizations in Asia and internationally, with six Country Networks (Indonesia, Malaysia, Nepal, the Philippines, Sri Lanka, and Vietnam). Our headquarters are in Manila, Philippines, and we have offices in Beijing, China, and New Delhi, India.

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Preface

In early 2020, the coronavirus (COVID-19) pandemic began, taking a terrible toll on individuals, communities, and societies around the world. The pandemic has had severe health impacts for many leading to illness, hospitalization, and death for hundreds of thousands globally. The resulting economic disruption linked to the virus and the measures to contain it have also had significant financial impacts for families and individuals, leaving them without the resources they are accustomed to. The same holds true for cities which were burdened to quickly mobilize resources for their pandemic response and recovery programs. These are impacts that will continue to be experienced over the course of the months and years to come, resulting in a decrease in tax revenues, leaving cities with fewer resources to maintain vital urban services. While the impacts of the pandemic are still with us, hope for an end to the challenges it presents is within sight. Planning for a future focused on Building Back Better points to investments in more resource efficient, low carbon, livable cities where environment and quality of life rank among key decision-making criteria.

As countries throughout the world continue to grapple with the escalating human and economic costs of the pandemic, air pollution and climate change remain to be the curves that cities and countries globally need to address. Air pollution remains to be the world's largest environmental health risk associated with nearly 6.7 million deaths and 213 million years of healthy life lost according to the Health Effects Institute's State of Global Air report in 2020. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change in 2021 further emphasized that global warming of 1.5°C and 2°C will be exceeded during the 21st century unless drastic reductions in carbon dioxide and other greenhouse gas emissions occur in the coming decades. Since air pollutants and climate forcers come from the same sources, urban policymakers, decisionmakers, and managers are presented with opportunities to harness the co-benefits of improving air quality, protecting public health, and mitigating climate change.

This Guidance Area on Financing Air Quality Management is designed to provide city decision makers with a framework to support improved air quality and climate action as part of those future looking efforts, supporting cities as they return to life and plan for a more sustainable and healthy future for their inhabitants.



About the Guidance Framework for Better Air Quality in Asian Cities

The Guidance Framework for Better Air Quality in Asian Cities (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 the United Nations Environment Programme Regional Office for Asia Pacific (UNEP ROAP). It is the result 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 national 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 through a range of targeted interventions, including knowledge-sharing platforms to strengthen regional collaboration, capacity building activities, and technical assistance.

Policy and decision makers in Asia and other relevant stakeholders can use one or a combination of the Guidance Framework chapters to develop local roadmaps or action plans on key air quality management areas.

The Guidance Framework consists of eight main books with these titles:

- Introduction
- Guidance Area 1 – Ambient air quality standards and monitoring
- Guidance Area 2 – Emissions inventories and modeling
- Guidance Area 3 – Health and other impacts
- Guidance Area 4 – Air quality communication
- Guidance Area 5 – Clean air action plans
- Guidance Area 6 – Governance
- Guidance Area 7 – Financing air quality management

Guidance Framework implementation is supported by the [IBAQ Programme Learning Portal](#). The IBAQ Learning Portal was launched to host accessible and sustainable capacity building resources tailored to the needs of the region. The Portal hosts the IBAQ Programme's flagship training course on Guidance Framework implementation. The Portal also hosts the IBAQ City Solutions Toolkit, which provides step-by-step guidance for cities on key components of the Guidance Framework, including the formulation of clean air action plans, identifying "low-hanging" air quality solutions and estimating their contribution to harnessing health and climate co-benefits.

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List of Abbreviations

ADB	Asian Development Bank
AQM	Air Quality Management
ASAP tool	Action Selection and Prioritization tool
BenMAP	Environmental Benefits Mapping and Analysis Program
BRT	Bus Rapid Transit
BTH	Beijing-Tianjin-Hebei region
C40	Cities for Climate Leadership
CAAP	Clean Air Action Plan
CDM	Clean Development Mechanism
CBA	Cost-Benefit Analysis
EPC	Energy Performance Contract
ESCO	Energy Service Company
ETS	Emissions Trading System
EU	European Union
EV	Electric Vehicle
GDP	Gross Domestic Product
GHGs	Greenhouse Gases
JI	Joint Implementation
LEZ	Low Emission Zone
PM _{2.5}	Particulate Matter (≤ 2.5 micrometers in diameter)
PPP	Public-Private Partnerships
SLCPs	Short-Lived Climate Pollutants
TIF	Tax-Increment Financing



Introduction

Achieving air quality management (AQM) goals involves a clear vision supported by good governance (see [Guidance Area 6: Governance](#)) and strong clean air action planning (see [Guidance Area 5: Clean Air Action Plans](#)). For this vision and planning to lead to successful outcomes, a strong financial framework that is supportive of AQM objectives is essential.

The financing of AQM is the process of directing monetary resources towards efforts designed to improve air quality in a given city, region, or country. As with the financing of other environmental undertakings, this involves the identification of financial resources, both own-source revenues derived from taxes, fees and other sources, combined with any external sources of finance from public and at times, private entities. These combined resources are in turn utilized to implement a set of policies, regulations, systems, and project undertakings with the explicit goal of improving air quality within the geographical area of focus.

The trend in past decades towards a devolution of tax and budgetary decision-making away from central authorities has enabled city leaders to develop policies and plans that are more in tune with local needs. This has also required local governments to manage an expanding range of services and infrastructure. The increasingly urgent demand for improved local air quality, combined with a growing focus on the need for climate action, is one such example.

In order to meet those demands, city governments must have financial strategies that are responsive to the complementary goals of delivering improved air quality while also managing climate impacts, including both mitigation and adaptation actions, for urban residents. Cities in low and middle-income countries face challenges in developing such strategies; however, there are many opportunities to leverage action and investment that address both air quality and climate priorities. These mutually reinforcing goals also provide the opportunity to capitalize on public demand for urgent action, underpinned by commitments at the national, regional, and international levels.

Understanding the synergies that exist between the other components of AQM planning – air quality standards and monitoring, emissions inventories, health impact assessments, communications, action planning, and governance – can inform the development of a strong finance strategy. (Refer to the [Guidance Framework for Better Air Quality in Asian Cities](#) for further insights into the strategic AQM approach.)

While a number of Asian cities have developed solid financial strategies to anticipate present and future AQM needs, there is a disparity in capacity and strategic approaches in relation to AQM finance among many cities in the region. This document provides high-level guidance on this subject and addresses considerations specific to cities in Asia. This is achieved through references and case study analyses focused on the experiences of cities in the application of AQM financing approaches.

This Guidance Framework chapter begins with a look at how finance is an integral yet sometimes overlooked component of clean air and climate action, situating it within a series of objectives that are linked to the developmental phases of AQM. This is followed by a discussion of the tools and approaches available to cities to help them better understand the costs and benefits of clean air investments. There is then a look at the synergies



While a number of Asian cities have developed solid financial strategies to anticipate present and future AQM needs, there is a disparity in capacity and strategic approaches in relation to AQM finance among many cities in the region.

that exist between clean air and climate action, and the basic finance strategies cities can employ to meet AQM resource challenges. Finally, the chapter covers equity in the allocation of costs, financial planning and project preparation, a step-by-step overview of the stages of financial development, and a summation of the key issues and challenges. It concludes with a roadmap to improve access to finance for local governments.

OBJECTIVES

The primary objective of the Guidance Framework chapter is to provide an overview of AQM financial planning while highlighting the important role of finance as an integral part of comprehensive AQM action, followed by a description of the financial readiness assessment and follow-on analysis to anticipate financing needs identified in the Clean Air Action Plan (CAAP) development process.

While the focus of this discussion is primarily oriented towards a city government audience, it is understood that good air quality, as a transboundary resource, relies on the coordinated action of a range of governmental and economic actors. With this in mind, it is also assumed that AQM financial planning approaches will require inter-city and/or regional approaches as determined by the circumstances encountered within a given airshed.

AIR POLLUTION AND CLIMATE PROTECTION

Because many of the pollutants that impact air quality also contribute to climate warming, cities are presented with a broad range of actions that can be employed to address the interlinked issues together. This also affords cities significantly expanded access to a range of climate-linked finance mechanisms, opening up additional opportunity for cities to further benefit from clean air and climate action resources.

As noted in earlier chapters of the Guidance Framework and related training materials, a variety of co-benefits can be linked to actions focused on air quality and climate. These co-benefits are most frequently aligned with positive impacts on health, the environment, economic productivity, climate, and quality of life. While the science of air quality and climate differ, primarily with respect to the warming impacts of pollutants and the health risks they pose, it is generally possible to view any action that seeks to reduce fossil fuel emissions as a boost to both climate and clean air objectives.¹

It is also important to recognize that each issue resonates differently with different constituencies. While people living in cities where pollution levels are high – as is the case in many cities in developing countries – are likely to prioritize clean air, a highly visible climate movement is driving climate action to mobilize international resources in support of global climate investments. City leaders in Asia are presented with an opportunity to capitalize on these dual catalysts for action. By maintaining consistent messaging that emphasizes progress on both fronts, while remaining responsive to the immediate interests of local populations, leaders are well positioned to deliver strong results towards achieving the combined objectives.

IMPORTANCE OF INTEGRATING FINANCE OBJECTIVES WITHIN AIR QUALITY MANAGEMENT PLANNING

When considering the best approach to financing air quality improvements, it helps to understand how AQM fits within the broader context of resource availability and associated costs and benefits. Investments in clean air can be significant, but it is important to understand that unhealthy air also carries costs resulting from negative impacts on health, economic productivity, and quality of life. It is estimated that 90 percent of premature deaths linked to

¹ For a detailed discussion on how different emission sources impact air quality and climate as well as the associated benefits derived from reducing Short Lived Climate Pollutants (SLCPs) please refer to the work of the [Climate and Clean Air Coalition \(CCAC\)](#).

air pollution globally occur in low and middle-income countries, with the global health impacts of PM_{2.5} estimated at USD 3.3 trillion in 2015 (World Bank, 2017). In Asia, the total economic costs of air pollution are estimated between 7.4 and 7.5 per cent of gross domestic product (GDP)(UNEP, APCAP, CCAC, 2018).

Any discussion related to the financing of clean air and the many parallels linked with climate action, implies a necessary focus on a series of AQM objectives. These objectives are supportive of overarching goals that drive city action towards cleaner air and reduced climate pollutants, including greenhouse gases (GHGs) and short-lived climate pollutants (SLCPs). These objectives range in scope from planning and emissions inventory development to the implementation of CAAP measures. And while the existence of a CAAP will facilitate the process of identifying resource gaps while assisting decision-makers to determine how best to utilize financial tools and mechanisms, it is not a prerequisite for the implementation of AQM financing guidelines. Further insights into the **four primary AQM objectives** with an explicit finance link are discussed in the following sections.

Objective 1 - Mobilizing resources for clean air action planning

The development of a strong knowledge base for clean air and climate action rests on a solid understanding of the existing status of air quality and the development of a robust regulatory framework to anchor action and investment moving forward. This focus on resource mobilization includes securing funding for key components of AQM planning, including air quality monitoring and emissions inventory development, health impact assessments, communications and community engagement, and the inputs and analysis required for eventual CAAP development and implementation. For instance, Box 1 outlines consideration of the resources necessary to support air quality monitoring systems.

Objective 2 - Mainstreaming air quality management financing of emission reductions within city services

City services are the primary interface with city administrations for many residents. Cities oversee services ranging from public safety and health to education and social services. Cities also manage services that residents use on a daily basis, including transport and water supply, waste management, and energy.

Box 1: Resources to support air quality monitoring systems and equipment

In working to develop reliable and sustainable air quality monitoring systems, it is important for decision-makers to understand that while equipment selection is important, the ultimate success of these investments will be determined, at least in part, by a strong commitment to the human resource, institutional, and financial support structure needed to sustain these systems.

Other key considerations include:

- The initial purchase price of monitoring equipment is not reflective of the full cost, which includes operations and maintenance (calibration), spare parts, filters, data management, and staff training.
- Donor-funded purchases should be accompanied by planning to ensure long-term dedicated funding for staff, operations, and management.
- Funding for annual budget allocations will ideally involve contributions from multiple ministries and agencies in an effort to both engage and encourage coordination and collaboration, while avoiding duplication.
- Various funding models should be explored that could include permit fees for select industries subject to compliance monitoring.
- Resources can be leveraged through academic collaboration utilizing grant resources.
- To the extent possible, data gathered as part of monitoring should be used to demonstrate health sector savings and a corresponding business case for prioritizing air quality monitoring in budgets.

Source: World Bank & US EPA, 2017

For many people, contact with these services is the sole interaction with city institutions, and it greatly influences their perceptions of the efficiency of a city's overall provision of service.

Major capital injections into these services often require investments that call for external financing. Because these systems often have built-in revenue-generation mechanisms – fees and tariffs for services – incoming sources of income offer an additional mechanism to fund action that can contribute to AQM and climate objectives.

It is generally understood that sources of revenue that are associated with the provision of services will only cover a portion of the required investment needed for strong AQM action. Other city funding sources can be directed to the preparatory stages of analysis and planning required for larger capital investments. Dedicated funding can also focus on the development of pilot activities designed to evaluate opportunities to apply new low-emission technologies and system implementation approaches. Areas of city-managed activities with the capacity to generate revenue fall into the following categories: public transport, waste management, water and wastewater treatment, business permits, land use planning, and in some cases, energy supply.

Within each of these areas of operations are a variety of AQM interventions that can be encouraged through existing oversight and supported by existing revenue flows, including energy efficiency, building standards, fuel-switching and renewables, transport, and biogas capture and utilization. Table 1 below provides additional detail on some of these potential interventions.



Table 1: AQM intervention links to city-level service provision

City services	City's role	AQM action items
Public buildings	Owned by local government	Energy efficiency Renewable energy Water conservation
Urban planning	Guiding city development towards more efficient transport and energy use	Land use Energy efficiency Pedestrianization Green spaces Improved mobility

City services	City's role	AQM action items
Transport and mobility	Regulations that reduce emissions from private and public vehicles, and the promotion of public transport systems	Vehicle emissions Low-emission zones/congestion charges Parking fees/policies Promotion of clean fuels BRT/rail/metro Bike lanes
Public space and parks	Support green space development for leisure and exercise purposes	Car-free streets/zones Park/green space development Community gardens
Waste management	Support system that maximizes efficiency and minimizes environmental impacts	Improved collection Eliminate open burning of waste Biogas recovery
Construction oversight	Implementation of best practices to reduce dust and traffic	Dust control Construction/demolition waste management
Water and wastewater services	Increased efficiency in operations resulting in more efficient energy use and waste management	Reduced water waste/loss Energy efficiency Biogas recovery
Building standards	Development of a city-wide approach to higher environmental standards	Energy efficiency Water conservation
Streetlighting	Upgrade to high-efficiency technologies	Energy efficiency Renewable energy
Energy supply (in case of city-owned energy supplier)	Decarbonization of city energy generation	Energy efficiency Renewable energy

Source: Adapted from Clean Air Asia and UNEP, 2019

Objective 3 - Establishment of financing mechanisms and economic instruments to support AQM

The role that economic instruments can play in supporting clean air and climate objectives is well understood and widely touted as one of the promising strategies to encourage the widescale behavioral change needed to address both challenges in a timely and straightforward manner.

While taxation of fossil fuels, often embedded in the price of electricity, gasoline, and diesel, is a common strategy applied in countries globally, accounting for more than half of the price of gasoline in several European countries and Japan, the taxation of emissions is in a more developmental phase of implementation (State of Michigan, n.d.). At the other end of the spectrum, a few developing countries continue to subsidize the consumption of fossil fuel, in spite of several multilateral efforts seeking the removal of such subsidies.²

² For more information on the impact of fossil-fuel subsidies and international efforts to phase them out please see the [International Energy Agency's](#) analysis of the subject.

Carbon pricing, or a carbon tax, has been mainly implemented by national-level governments with varying degrees of success, due in part to complications related to how to assess charges as well as the most suitable methodologies to determine appropriate level of taxation. Most European nations have implemented some form of a carbon tax, either through the EU-wide emissions trading system (ETS) or via a direct tax on emitters, e.g., transport operators or suppliers of heat (Tax Foundation, 2020). Other nascent carbon taxation efforts are underway globally with systems proposed or operational in Latin America, Australia, China, and several Southeast Asian nations (NGI, 2019).

While the use of a carbon tax or emissions-based taxation approach is less widespread at the city level, Portland in the US state of Oregon offers one example of a city-led proposal focused on reducing air and carbon emissions via a direct tax (see Box 2 for additional information). Other non-tax carbon linked pricing mechanisms have been developed and employed with varying degrees of success. This includes the selling of carbon offsets via Kyoto Protocol compliance mechanisms like the Clean Development Mechanism (CDM) and Joint Implementation (JI) in addition to a variety of voluntary mechanisms designed to support mainly corporate GHG emissions reduction efforts. The future role of carbon offsets in the context of the Paris Agreement has yet to be determined but does hold promise for supporting low-carbon urban infrastructure investments in the near future.

In addition to these pollution-tax approaches, cities can also tap revenue streams that are directly linked to AQM-focused activities. This approach includes vehicle inspection fees and congestion charges, building permits, real estate taxes and traffic fines. Table 2 offers an overview of national and subnational economic instruments and their potential links to AQM and climate objectives.

It is important to note that using economic instruments, similar to the mainstreaming of financing described above, is not dependent on clean air action planning and offers a good foundation for the development of dedicated sources of AQM funding. As is the case with the assessments of other forms of tax or fees, it is important to ensure that these costs are borne in an equitable manner so as not to disproportionately impact certain income groups, while ensuring that the revenue generated by these mechanisms is directed to AQM and climate efforts and not simply going towards other areas of the city budget.

Box 2: Clean Air, Healthy Climate – Portland, Oregon, USA

The City of Portland in the US is considering two novel pollution taxation approaches to drive progress on clean air and climate goals. The city has developed two related initiatives designed to tax carbon emissions from the city's largest CO₂ emitters, and taxing emissions of the city's largest emitters of hazardous air pollution. These fees - 1. Health Climate Fee; and, 2. Clean Air Protection Fee - are being proposed to address the disproportionate impact of unhealthy air on the city's communities of color, while also responding to the city's recent declaration of a climate emergency. The city's proposal is expected to raise roughly USD 11 million annually upon enactment to support pollution reduction programs.

Source: City of Portland, n.d.



Table 2: Fiscal policy at national and subnational levels and intersections with AQM

National	Provincial / State / City or Municipal
Revenue <ul style="list-style-type: none">• Transport fuel tax• Carbon/energy tax• Environmental tax• Non-compliance fines• Road tolls• Court decisions/penalties	Revenue <ul style="list-style-type: none">• National government transfer• Real estate tax• Transport fees• Building permits• Vehicle inspections• Congestion charges/tolls• Parking fees/fines
Budgetary expenditure <ul style="list-style-type: none">• Mobility/road construction• Environmental protection• Clean energy (subsidy)• Subnational transfers	Budgetary expenditure <ul style="list-style-type: none">• Mobility/road construction• Environmental protection

Source: Clean Air Asia and UNEP, 2019

The efforts of cities will be greatly facilitated when national governments have clearly delineated the roles and responsibilities of each level of government administration with respect to AQM. This applies both in terms of regulatory development and oversight as well as with finance and implementation of measures. In the absence of a strong national government support in defining and coordinating responsibilities, cities will face many challenges both to develop meaningful regulatory frameworks as well as to finance and enforce air quality measures.

Objective 4 – Mobilizing resources for the implementation of CAAP measures

Mobilization of resources is relevant for those cities that have progressed to a Maturing Stage of CAAP development (see *Guidance Area 5: Clean Air Action Plans*), where meaningful emissions mitigation actions requiring project finance have been clearly identified and the conceptualization of project initiatives is relatively well advanced.

This focus on project finance for CAAP implementation builds on the efforts outlined in the preceding stages and will benefit from links to existing efforts related to planning, the mainstreaming of AQM, and economic instruments. This final AQM-finance linked objective will encompass those initiatives requiring more significant capital expenditures, and will therefore also rely to a greater extent on external sources of finance.

The capital expenditures associated with this AQM-finance objective will generally include those investments related to transport, energy, or facility and infrastructure construction. This approach takes into account that CAAP activities will vary in size and scope and that not all CAAP actions will require capital outlays that need external sources of finance. When possible, cities can rely on own-source revenues to drive initiatives that can have meaningful AQM and climate impacts. These include user-funded investments driven by national or city-mandated inspection and permitting of vehicles, or the permitting of industrial emission sources.

At the same time, the project finance approach associated with this objective is perhaps the most complex of those under consideration, and involves several levels of analysis – technical, economic, environmental – also entailing the participation of multiple stakeholders, as well as city and national institutions. Also, during this phase the use of cost-benefit analysis (CBA) can be employed in order to better assess the return on investment associated with different CAAP actions, a step that can further assist decision makers as they navigate competing municipal interests through prioritization. These additional aspects are covered in the sections below related to finance readiness and creditworthiness, as well as project planning, preparation, and implementation.

MAKING THE CASE FOR AQM AND CLIMATE INVESTMENTS

It is important to have a balanced understanding of the associated costs and benefits when developing an AQM finance approach, as air quality and climate investments can place significant demands on already burdened city budgets. AQM and climate actions require initial capital investments and a commitment to sustained budgeting for long-term operational and maintenance costs. They also require funds to support the ongoing training and employment of qualified managerial and operator staff.

One valuable tool available to assist policy and decision-makers in conducting assessments is a Cost Benefit Analysis (CBA). Using the CBA approach, officials can quantify the benefits of each dollar invested, evolving from a process that analyzes the costs of inaction against the benefits associated with AQM investments. Typically, these benefits are expressed in monetary equivalents that are presented in terms of the avoided health and economic impacts of improved air quality. For example, when adding a climate lens to an analysis of improved public transport, additional monetary benefits can be explored that may include improvements related to economic productivity resulting from reduced traffic congestion.

While the development of a CAAP will facilitate planning by providing a high-level guide to improved air quality, it is equally important to develop a methodology by which cities can prioritize activities to ensure that key objectives are being met at an acceptable cost as part of that planning exercise. Within the climate sphere, several tools are available to cities seeking to navigate the considerations involved in action prioritization. The Cities for Climate Leadership (C40), a global cities network supporting cities to take climate action, has developed the ASAP tool (Action Selection and Prioritization) designed to help cities identify actions (policies, programs, projects) alongside a benefits assessment that includes GHG reductions, resilience, health, and urban services. A final component permits an analysis of various technology and financial considerations.³

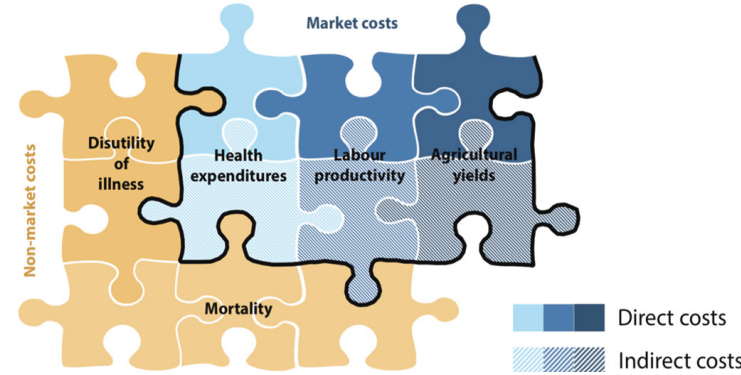


Figure 1: Air pollution cost categories – market and non-market costs. Source: OECD, 2016

³ For more information on C40's Action Selection and Prioritization (ASAP) tool please see: <https://resourcecentre.c40.org/resources/action-selection-and-prioritisation>

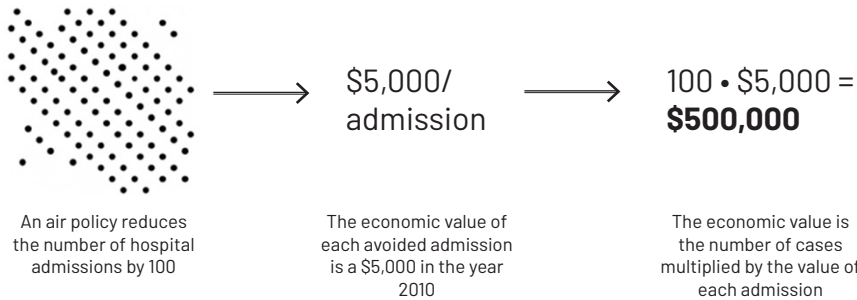


Figure 2: Overview of the BenMAP benefits estimation methodology. Source: US EPA

Another tool specific to AQM is the BenMAP tool, developed by the US Environmental Protection Agency (see Figure 2). BenMAP allows policymakers to answer questions related to the burden placed on human health by differing levels of air pollution. BenMAP is also used to assess the benefits derived from policies designed to improve air quality. It uses inputs related to changes in air quality, population, and baseline incidence rates of disease to calculate an estimated effect and associated health impact expressed in monetary terms (US EPA, 2020).

These tools are useful to city leaders by helping them to target investment in areas where there will be the greatest payback, while also ensuring that AQM planning objectives are appropriately scaled to local financial capacity.

ASSESSING FINANCE READINESS AND DEVELOPING STRATEGIES TO MEET CLEAN AIR AND CLIMATE CHALLENGES

City governments employ a variety of mechanisms to finance urban infrastructure. The main categories of these financing strategies include “pay-as-you-go” or cash flow financing, private finance via capital markets, and finance from international and bilateral financial institutions. An important point to consider is that each city operates within a unique set of circumstances often influenced by national statutory authority. This operating environment will, in some cases, impact the ability of a city to utilize a specific mechanism, the imposition of a new tax for example, and in some instances may be defined within legislation. In cases where borrowing from international lending institutions is of interest to city leaders, where subnational lending is permitted, it is frequently on the condition that the relevant national financial authority has provided their prior approval.

The pay-as-you go approach relies on current revenues or savings from public sector sources – taxes, tariffs, and transfers – to fund activities or investment. This approach shields cities from engaging in long-term repayment commitments while relying on existing cash

Box 3: Overview of sources of finance for urban infrastructure

Public sector sources:

- Taxes
- Fees
- Intergovernmental transfers
- Loans

Private sector sources:

- Bonds
- Privatization
- Direct infrastructure investment funds
- Public-Private Partnerships

Multilateral and bilateral institutions:

- Concessional loans
- Financing facilities
- Export credit agencies
- Loans to private sector in support of urban infrastructure risk mitigation
- Grants

Source: Clean Air Asia and UNEP, 2019

flow to cover capital and operating costs. While fiscally prudent, this approach will limit a city's ability to address large-scale challenges in a direct way, often prompting a delay in priority capital investments.

The pay-as-you go approach can be advantageous in that it permits a city to maintain or build a strong credit rating while preserving borrowing capacity. This strategy also avoids the transaction costs that come with externally financed projects. Finally, by limiting investment to what can be covered by incoming cash flow, planners should remain cognizant of the impacts on projects requiring phased investment over time (Australian Government, 2009).

Investments requiring larger initial capital outlays, such as the development of a new bus rapid transit (BRT) line, waste treatment infrastructure, or power generation, will require consideration of available external sources of finance. Private sector sources of finance may consist of a combination of debt and equity investments involving a range of financial, ownership, and management models. The private sector instruments available will vary according to the need and timeline of corresponding investments, and may include bond issuance, full or partial privatization, concession arrangements, direct infrastructure investments funds, and Public-Private Partnerships (PPPs).

A final category of financial resources is that offered by international financial institutions. These include multilateral and bilateral agencies offering concessional loans, or bilateral offers of support via financing facilities and export credit agencies to facilitate urban infrastructure investments, in addition to risk mitigation tools.

When considering these external sources of finance, decision-makers should be aware of the additional costs implied, including the return paid to investors providing the investment capital, the contingent liabilities associated with any financial claims, and the transaction costs associated with the management oversight provided by the financial entity (Australian Government, 2009).

Figure 3 below illustrates the flow of financial resources across structures to support AQM and climate action.

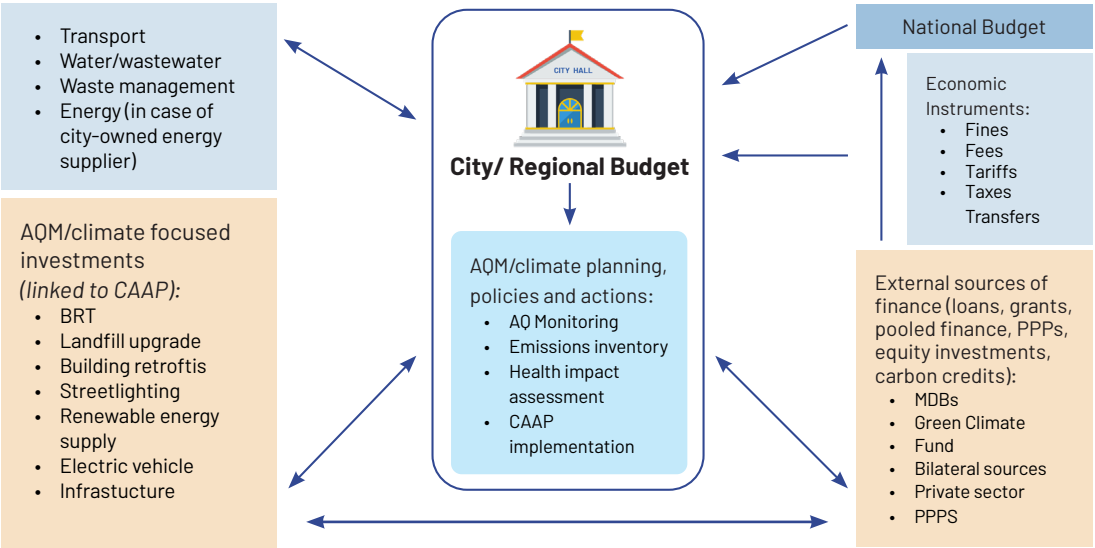


Figure 3. Flows of financial resources to support AQM and climate action

Ultimately, the financial path selected by city leaders will be in large part predetermined by the city's history of fiscal management. Historical patterns will be used to assess both the future capacity of a city to access finance and its debt repayment capacity. Two concepts – creditworthiness and finance readiness – provide additional insight into the relevance of a city's financial management history. These two concepts are explored in the following sections.

Creditworthiness

A determination of a city's **creditworthiness** is frequently required by lenders to assess the potential for loan default. Just as applicants seeking to borrow money for the purchase of a house or car are vetted to assess current debt obligations, history of repayment, and prospects for future repayment, so too is a city's financial history scrutinized to assess its ability to repay lenders. This is a process that can lead to the issuance of a credit rating (AAA, AA+, BBB+, etc.) by an international ratings agency, resulting in an internationally recognized assessment of a city's creditworthiness. These ratings facilitate the evaluation of international lenders in the development of a potential lending package (see Box 4 on initiatives focused on creditworthiness).

Box 4: City creditworthiness, an overview of international initiatives

Key takeaway messages related to creditworthiness include:

- Cities need investment from all providers of capital, including – necessarily – commercial sources.
- For commercial investors to invest in a city's projects, the city will need to be creditworthy.
- Creditworthiness is a risk assessment of the "ability and willingness" to service financial obligations.
- While creditworthiness is a status, it is important to be aware that it is not a binary condition but a point on a continuum.
- Creditworthiness is closely synonymous with long-term financial sustainability – and it empowers a city to achieve it.
- To become known as creditworthy in the market, a city needs to engage an agency for a rating; there are many important aspects of a rating that will need to be considered from a city's perspective.
- Investors seek predictable operating environments – in demonstrating their creditworthiness to the market it is important for cities to consistently update ratings and/or other assessments.

There are a number of international initiatives focused on creditworthiness and efforts focused on city climate finance with links to clean air investment:

- **The World Bank's City Creditworthiness Initiative** – This World Bank initiative helps cities improve their financial performance and secure the private investment they need to fund climate-smart infrastructure and services. <http://www.worldbank.org/en/topic/urbandevelopment/brief/city-creditworthiness-initiative>
- **C40 Cities Finance Facility** – This C40-led initiative supports cities to prepare and deliver climate change projects. Many links exist between climate and clean air investments. <https://www.c40cffi.org>
- **UN-HABITAT** – Guide to Municipal Finance, The Human Settlements Financing Tools and Best Practices Series, 2009. <https://unhabitat.org/books/guide-to-municipal-finance>

Source: UN Habitat, 2017

AQM Finance readiness

The concept of **finance readiness** is related to the concept of creditworthiness but focuses on a city’s overall capacity to engage with prospective lenders in order to agree to lending arrangements that both acknowledge the needs of lenders while safeguarding municipal interests and those of local taxpayers.

Finance readiness actions support cities to address the following issues related to engagement with potential financial partners:

- Raises awareness of financial challenges and potential pitfalls.
- Identifies financial weakness and risks that should be addressed.
- Positions cities for obtaining the most advantageous combination of financing.
- Increases transparency of a city’s financial status, reducing the risk for outside investors.
- Reduces the risk for cities (by mitigating the risk of default on payments).

Finance readiness is composed of several elements that assist in developing a clear picture of a city’s financial and budgetary status, as well as offering a look at the key regulatory, legal, and political considerations, e.g., the enabling environment that is needed to develop a complete picture of a city’s financial and budgetary approach (CCAC, 2018).

The elements that make up this assessment include:

- a. **Political environment** – Considers the degree to which the city’s elected leaders have embraced a culture of responsible financial management of municipal resources. This measures the extent to which officials charged with budgetary oversight have instituted practices that foster the attainment of this goal.
- b. **Regulatory environment** – Focuses on the degree to which existing rules and regulations support the goal of improving AQM. This ranges from considerations looking at the technical capacity of institutions involved in overseeing AQM coordination and enforcement to addressing questions related to the ability of a municipality to procure goods and services in a clear and transparent way.
- c. **Legal frameworks** – Determines the degree to which mechanisms exist to support engagement with external partners in the provision of environmental goods and services. This includes assessing the performance standards that exist for measuring the efficacy of service contracts to an assessment of the legal frameworks covering the key aspects of private sector involvement in infrastructure development.
- d. **Revenue streams** – Looks at the extent to which a city has developed a steady stream of revenue generation via taxation of economic activity or property ownership, or through the levying of fees linked to specific services or fines. This criterion is a key factor in consideration of a city’s creditworthiness.
- e. **Financial modeling** – Assesses if a city has the expertise and capacity to undertake modeling exercises focused on the analysis of various financial scenarios built around specific AQM investments. This includes the ability to assess how income and cash flow would impact the financial sustainability of a given project or activity. This also includes looking at the ability of a city to access outside expertise relating to this analysis.
- f. **Bidding process** – Determines the degree to which a city has put in place a system for procuring external goods and services, and to what extent that system functions well and has been tested.

Once city officials have a solid understanding of their own capacities and budgetary positions, they can then begin to assess which financing options best align with their interests. As the strategies and combinations for sourcing finance can be complex, consisting of both own-source revenues and external sources (both public and private), cities are faced with many financial and management options to select from. As cities begin to finalize their approach, they will need to begin by eliminating options that are not viable given their own particular set

of circumstances – legal, regulatory, political – providing a starting point for the analysis of the most workable paths forward. Box 5 below describes how a financing platform helped establish the enabling environment for air quality improvements in the Greater Beijing-Tianjin-Hebei Region.

Box 5: Green Financing Platform for Accelerated Air Quality Improvement in the Greater Beijing-Tianjin-Hebei Region

The Asian Development Bank (ADB) developed a project preparatory technical assistance of USD 500,000 to establish the institutional, legal, and financial arrangements for a dedicated green financing platform to overcome the barriers for green financing in the Greater Beijing-Tianjin-Hebei (BTH) Region. This platform was designed to introduce financial instruments as recommended by the Green Financing Guidelines of the China Banking Regulatory Commission and the National Development and Reform Commission. These instruments are intended to mobilize private and social capital for green investments. The platform is designed to offer different financial products, including:

- Debt financing with limited recourse to fixed asset collateral;
- Loss guarantee support to low-carbon development, energy saving, and environmental improvement projects for easier access to commercial bank financing; and
- Mezzanine financing in the form of subordinate debt or preference share investments in promising small and medium enterprises, etc.

The technical assistance will also ensure knowledge transfer of green finance and green technologies into the target region to support the shift of industries toward low-carbon, low-emission, and efficient practices, while contributing to improved air quality. In order to meet air quality targets defined in the 2013 Comprehensive Action Plan for Air Pollution Prevention and Control, the BTH Region requires direct investment of USD 37.8 billion. The creation of this platform is designed to support efforts to fill existing funding gaps while supporting green growth and low-carbon transformation for the BTH Region.

Source: ADB, 2017

ALLOCATING COSTS IN AN EQUITABLE MANNER

As Asian cities explore new approaches to finance clean air and climate, an assessment of how to equitably allocate costs is appropriate. Just as progressive tax policies are designed to assess tax at rates commensurate with income, policymakers in cities globally have begun to apply similar analysis in assessing climate and air quality benefits. This is achieved by looking at how costs are allocated across a population. This assists policymakers in determining how residents contribute to the funding of these measures, and the degree to which they benefit. This equity assessment ensures that those who can afford to bear these costs pay their share, while shifting costs away from those least able to afford them.

An example of this principal is offered in connection with the expansion of a BRT line, an investment designed to reduce congestion, improve air quality, and reduce climate impacts while providing better transit options. This type of infrastructure investment comes with significant costs, estimated at around USD 11 million per kilometer for lower-income countries in 2013 (ITDP, 2021). When these costs are passed on to users in the form of increased fares, increases judged negligible for middle class riders may be prohibitive for lower-income groups, resulting in these groups moving to other forms of cheaper and more polluting types of transport.

To anticipate negative outcomes, cities can work to develop approaches that assess how lower-income populations are impacted by increased user fees or other forms of taxation associated with clean air and climate

investments. Once these dynamics are better understood, it is then possible to develop mitigation measures that reduce the impacts on these groups while ensuring more equitable access by these groups to a wider array of public services.

Some examples of cost allocation and considerations regarding equity by AQM intervention are listed below:

- a. **Transport and mobility** – ensuring that fare increases linked to service improvements do not disproportionately impact low-income groups.
- b. **Public space and parks** – ensuring that public space investments are distributed equitably across a city and are not disproportionately located in centrally located neighborhoods.
- c. **Waste management** – support systems that maximize efficiency and minimize environmental impacts, while ensuring essential levels of service for all inhabitants.
- d. **Energy supply (in case of city-owned energy supplier)** – decarbonization of city energy generation while ensuring equitable energy access for all populations at an affordable cost.

FINANCIAL PLANNING AND PROJECT PREPARATION

As a city’s strategy for implementing clean air and climate action takes shape, a set of projects and supporting policies requiring both financial and human resources will begin to evolve. The items requiring resources will range from air quality monitoring and emissions inventory development to more capital-intensive undertakings involving transport infrastructure, renewable energy, and the creation of public green space.

Activities such as air quality monitoring and emissions inventory development, or the establishment of regulations and economic measures designed to reduce emissions, will often best be funded on a “pay-as-you go” or “own-source revenue” basis as these measures provide the foundational framework upon which other initiatives can be built. **Table 3** provides an overview of measures to control transport emissions, adapted from ‘Guidance Area 5: Clean Air Action Plans’.

Table 3: Overview of programmatic/regulatory and economic measures to control transport emissions

	Regulatory measures	Economic-based measures
Transport planning and traffic demand management: To increase fleet load, reduce travel demand times, and reduce travel time	<ul style="list-style-type: none">Public transportation systemParking control measuresIndividual ownership limitationsPedestrian-only zones in citiesCar use restrictionsPrivileges (e.g., restricted highway lanes) for high-occupancy vehiclesImprovement of biking/walking conditions“Park and ride” programsLimitations and restrictions on freight transport	<ul style="list-style-type: none">Road-based carbon tax on fuelEmission-related vehicle taxesRoad pricing or distance chargesParking chargesCarbon credits / offsets / ETSFiscal incentives for carpool programsInsurance adjustment for distanceEnvironmental hotel occupancy feesLand-use and physical planning instruments to reduce commuter travel and redistribute urban activitiesRedistribution mechanisms to finance more efficient transport modes

Source: Clean Air Asia, 2016

For investments requiring more significant capital outlays, in the range of hundreds of millions of dollars, such as investments in hybrid bus fleets, the implementation of energy efficiency in public facilities, and upgrades of logistics handling and infrastructure at port facilities, these investments will almost certainly require cities to partner with external financial partners in order to address the complexities and capital requirements involved (PwC, 2016). It is these more complex and costly projects where the clear delineation of the distinct phases of project preparation is essential, particularly for the planning and monitoring of implementation and costs going forward.

PROJECT PLANNING AND IMPLEMENTATION

Following the establishment of a strong enabling environment supported by solid air quality and climate data and planning, preparation for projects requiring external finance begins by defining the project concept, a process that often involves input from multiple actors and stakeholders. Figure 4 illustrates the phases of project preparation.

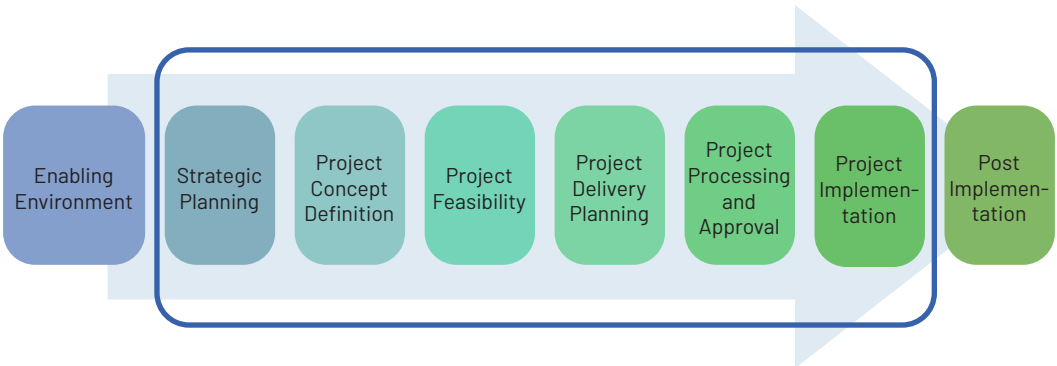


Figure 4: Phases of project preparation and development.

Source: Clean Air Asia and UNEP, 2019

This is followed by an analysis of technical and economic feasibility (project feasibility), an intensive period of planning and negotiation with multiple entities (financial, regulatory, technical, political) to define how the project will be delivered and when (project delivery planning), and a final phase involving the procurement process, the negotiation of contracts and terms of financing (project processing and approval).

Project implementation happens in the final stages. Projects requiring construction will break ground during this phase and then move to an operational phase. A final consideration related to the project preparation phase relates to the need to develop a methodology to monitor and evaluate the project’s attainment of air and climate goals. During this phase, it is beneficial to consider how procurement criteria impact on technology selection so as not to drive selection towards lower costs and possibly sub-par performance alternatives.

STAGES OF AQM AND CLIMATE FINANCE DEVELOPMENT

A city’s approach to AQM financing will evolve and mature as its experience working with different finance mechanisms grows. A combination of economic instruments, supported by strong financial management and clear strategies for addressing priority areas of clean air and climate action, will allow cities to build on successful efforts while learning from those that are less successful. Throughout this learning process, cities can be seen

⁴ For additional information on the phases of project preparation and development as well as associated costs please refer to: [Global Infrastructure Basel 2014](#).

to move through a series of developmental stages, with each stage leading to greater complexity in terms of financial and institutional arrangements.

Cities with relatively little AQM experience will begin by focusing on planning and analysis, a process that will generally be supported by a combination of own-source revenues, national environmental institutions, and external donors. Building on this understanding of AQM challenges, city officials may elect to focus on addressing AQM within the areas falling strictly within their purview, including city services such as transport, water and wastewater, waste management, and in some cases energy supply. These services will, in many cases, already have established funding mechanisms through which AQM measures can be supported. Other emission sources impacting air quality that are not strictly within the purview of city agencies, include household energy sources linked to cooking and heating, will need to be addressed through other mechanisms and communications efforts.

At a more advanced stage, a city may begin to develop economic and fiscal tools to further encourage AQM progress. This will require strong political support and technical expertise but can serve as a strong foundation from which to launch a final phase of action. This final stage focuses on resource mobilization for CAAP action, implying a focus on engaging external sources of finance, either public or private, to support even more aggressive action. At this stage, cities will require the highest level of preparedness and understanding to ensure a strong balance between financial sustainability and AQM and climate outcomes.

An overview of this phased progression is well defined within the context of the above description of primary AQM objectives having an explicit finance link. It is important to have a good understanding of each phase to understand the options available to support each objective, which are summarized in Table 4. An overview of the five primary stages of city financial development follows in Table 5.

Table 4: Primary AQM objectives having explicit finance links

AQM objectives with links to finance	Resources to support
1. Mobilizing resources for clean air action planning	Combination of own-source revenue, national environmental funds, and external donors
2. Mainstreaming AQM financing and emission reductions within city services	Utilization of established service funding mechanisms (fees/tariffs)
3. Establishment of financing mechanisms to support AQM	Combination of own-source revenue, national environmental funds, and external donors
4. Mobilizing resources for the implementation of CAAP measures	All of above to include new AQM finance mechanisms



Table 5: Stages of financial development for clean air and climate action

Stages	Indicators
Underdeveloped	<ul style="list-style-type: none">• Few laws exist governing outside private investment for AQM.• Air quality remains within the domain of national government with city role largely undefined within an integrated AQM regulatory framework.• The process for securing finance/funding from external sources is not defined.• The city has no credit rating and lines of financial management are not clearly defined.• City lacks internal coordinated effort to address AQM finance needs.• Sources of AQM funding are inexistent and resources for environmental activities largely seen as national level responsibility.• Local officials and personnel lack expertise related to financial management and private sector provision of AQM activities.• City has little to no experience with external providers of services or goods.• City has no experience with major capital investment activities
Developing	<ul style="list-style-type: none">• Primary legislation (e.g., codes, statues, past decisions) provide an initial framework for investment.• National fiscal policies (including national energy policy, among others) do not identify clear roles for city-level AQM financing action.• There are existing mechanisms for AQM finance engagement with external institutions and donor partners but these have not been utilized by the City.• City is starting to work on selected indicators towards the establishment of a credit rating.• Coordination among agencies within the City on AQM financing issues when the need arises.• City begins to act to implement AQM measures which can be justified by cost savings, but these are largely associated with city services.• City officials and personnel possess a basic understanding of AQM financial management.• Bidding / procurement measures are not well defined but city has some experience with external procurement while this experience does not include AQM.• City has begun to assess project finance as an option to address infrastructure needs but has not considered it with respect to AQM needs
Emerging	<ul style="list-style-type: none">• City has selectively implemented regulations in line with national government frameworks to support AQM progress but other opportunities for further progress exist.• The city is instituting internal reforms to improve financial and budgetary management.• City has implemented AQM actions financed by external institutions and donor partners.• The city has recently begun to assess the steps required to receive a credit rating.• An inter-agency group or council on AQM is established in the City and is starting to discuss AQM financing issues.• City has worked to create predictable revenue streams for AQM action and is undertaking improved budget management oversight.• City officials and personnel have good understanding of AQM finance principals and have identified gaps in expertise.• Bidding / procurement procedures are in process of development but have yet to be fully tested as procurement actions to date are limited.• City has embarked on planning focused on AQM project finance but has yet to implement a project using this approach.

Stages	Indicators
Maturing	<ul style="list-style-type: none"> • The legal framework governing private provision of goods/ service at the city-level is clear including mechanisms for coordination between national and city levels. • Strategies to improve national and city level AQM finance action have been identified, including steps that can be taken by cities. • A clearly defined process for accessing financing sources and approving projects exists but the timeline is not well defined. • There is a lead agency facilitating AQM financing and public/ private projects in the City, supported by an AQM Finance Working Group. • The city can borrow money but depends upon approvals from agencies at the national or regional level, it does not have a credit-rating but efforts to further the process are on-going. • City has within the past five years stabilized its revenue, and is on track to creating a reliable tax and tariff base for AQM action. • City has solid understanding and access to external expertise with some knowledge in-house that is used to support AQM analysis and planning through modeling. • City has developed procurement procedures to support AQM and has experience with procurement procedures designed to engage external partners, but only those having limited complexity. • City has some experience with project finance related to AQM goods and services and is continuing to build capacity in this area.
Fully developed	<ul style="list-style-type: none"> • City has fully functioning legal and regulatory frameworks that support robust AQM finance action. • City is engaged with external financial partners in support of AQM actions. • The city has a good track record of success with the implementation of projects/ infrastructure. • There is a lead agency facilitating AQM financing and public/ private projects in the City, supported by an AQM Finance Working Group. • The city is considered creditworthy, as is the country, lines of approval are clearly defined and it can borrow money without permission from other agencies. • Has fully developed financing mechanisms to support AQM planning, that includes range of taxes, tariffs, transfers, debt and PPPs. • City has strong in-house capacity and continues to engage external expertise to support AQM financial management, project analysis, and implementation. • City has developed a process to engage with outside service and infrastructure providers and timelines for activities as well as evaluation of service provided is clear. • City is a fully integrated partner of the national government on AQM, driving forward new AQM investment linked to CAAP actions through project finance approach.

Source: Adapted from Clean Air Asia and UNEP, 2019

ADDRESSING ISSUES AND CHALLENGES ASSOCIATED WITH FINANCING OF AQM

National authorities establish the foundation for clean air and climate action upon which city-level decision-makers can build. This includes the taxation of fossil fuels and any subsidies national authorities may provide to support clean energy.

Another important consideration for city governments pursuing external finance and investment is the enabling investment environment, which largely falls within the purview of national government decision-making. In some cases, local authorities may require permission from national authorities to borrow, or national laws may place limits on foreign investment. National legislation governing bankruptcy and PPPs are other factors that will influence the interest of international investors and expand or limit the options of city governments.

When looking at opportunities to leverage supportive clean air and climate efforts undertaken by other domestic actors, cities should coordinate governance and finance actions with those other actors, working to maximize the impact of the limited financial resources available.

Looking at an example from the US related to multi-level coordination of resources, the California Public Utilities Commission approved USD 437 million via a utility-managed program to expand electric vehicle (EV) charging infrastructure, an initiative that will greatly expand the efforts of cities in that state to better manage air quality (Reuters, 2020). Another example from the US is a federal program that supports the uptake of workplace EV charging stations. This program, while not a purely financial mechanism, supports coordination between cities and other stakeholders, helping to leverage investments in EV infrastructure, offering an example of government leadership that further facilitates action at the local level (USD OE, 2016). (See Box 6: Ensuring multi-level coordination of AQM action).

When financing a new system or other critical components of urban infrastructure, cities around the world face a series of common challenges. These challenges center around limited institutional capacity and know-how, access to financial resources, and access to information. Ultimately, without political support to pursue AQM objectives, city efforts will falter. As cities in Asia pursue their efforts, it will be helpful for them to consider the main challenges cities face in implementing new infrastructure and services. Some of these barriers are covered in Table 6 below.

Box 6: Ensuring multi-level coordination of AQM action

A port city wanting to address maritime shipping and port logistics emissions will face many layers of bureaucracy and oversight as port activity is governed by laws enforced by multiple jurisdictions. International shipping activity may require a national government’s enforcement of international treaties related to emissions from ships docked at a city port. Trucks arriving from both domestic and international destinations will be governed by emissions standards set at the national level and enforced by local authorities. Interventions may include switching to cleaner fuels in cargo-handling equipment and other heavy-duty vehicles involved in port operations, accompanied by municipally supported financing required to facilitate these investments.

In the case of a conflict in national and local air quality goals, the work of cities to address air quality is significantly more challenging. Where policies are aligned, progress can be significant. The adoption of National Ambient Air Quality Standards is a step which can have important ramifications for air quality at the local level. Of 22 Asian countries surveyed in 2016, 18 had PM_{2.5} standards (CAA & UN Environment, 2019). As these standards continue to be implemented, local authorities will have new and powerful tools to address local air quality.

Source: IMO, 2018 and Clean Air Asia and UN Environment, 2019



Table 6: Barriers to investing in sustainable urban infrastructure and potential solutions

Barriers	Challenges	Possible Solution/s
Lack of upfront public capital	City lacks upfront capital to fund investments	Address limitations to accessing capital through a focus on “creditworthiness” criteria – debt ratio, capital reserves, revenue
Institutional inertia	Difficulty in developing new investment patterns focused on city initiatives due to governance, traditional financial relationships, preference for existing technologies	Seek to cultivate relationships with financial partners having similar objectives and interests in improving AQM
		Educate technical staff and decision-makers on new technologies and approaches for AQM financing
Institutional capacity	Cities have difficulty initiating projects due to structural, technical and skills limitations.	Secure political support for improved financial management across local government
		Educate technical staff and decision-makers on new technologies and approaches for AQM
Risk	Investors feel the risk to their investment is too high due to variety of factors	Secure political support for improved capacity building on financial management across local government institutions
		Address poor governmental collaboration between government agencies via a formalized coordination body focused on AQM
Low returns	Investors feel that returns on investment will not be attractive when compared with other investment opportunities	Develop a good analysis of expected project performance and benchmarks against other existing projects
		Ensure the financial integrity of partners through a good vetting process
Imperfect information	Lack of information on existing opportunities and potential returns on investment	Build capacity to manage risk via mitigation tools (e.g., pooled finance, political risk guarantees, partial credit guarantees)
		Employ measures to improve finance readiness
		Build capacity to manage risk via mitigation tools (e.g., pooled finance, political risk guarantees, credit guarantees) in order to reduce finance and transaction costs
		Obtain good technical support to accurately forecast revenue and technical performance
		Ensure criteria establishing “green” performance on start-up
		Ensure transparent and fluid sharing of municipal financial and budgetary performance information

Source: The New Climate Economy, 2017

Cities selecting the **PPP model of service and infrastructure delivery** need to understand that this model requires extensive preparation and internal consultation even prior to the launch of a tender. While this model has demonstrated results for cities globally in terms of delivering quality services and value for money, PPP implementation requires extensive prior analysis of risks and rewards, including the development of a concession structure, the design of a transparent procurement process, and a clear path to mobilize finance. Upon award, the performance of the project operator must be monitored and measured against the performance criteria established as part of the concession agreement, requiring that the city have in place a system and an ongoing means to hold the operator accountable for quality of service and performance over the lifetime of the agreement.

A final and more general consideration is the reality that while AQM initiatives consist of a system or facility that can be supported through a traditional project finance approach – e.g., BRT expansion, wind power systems, bike-share infrastructure – many more AQM investments will **require that users bear some or all of the costs needed to upgrade systems and infrastructure to meet AQM criteria.**

Many AQM measures involve costs that are frequently borne by end-users coming either in the form of a mandated modification of existing emissions control systems for a car or motorcycle, or through a coordinated progressive phase-out of older-model vehicles. Sometimes these mandates are accompanied by government support via subsidies. More often, these systems are supported via mechanisms involving user fees that support inspection and enforcement operations. In those instances, city leaders must be prepared to build the case for the selection of that path while communicating clearly with the public about the costs they will bear as part of the transformation process.

ROADMAP TO IMPROVING ACCESS TO FINANCE FOR CLEAN AIR AND CLIMATE

Developing a solid approach to financing clean air and climate action is a key element in the transformation of a city’s air resources. By promoting a comprehensive understanding of the ways that finance underpins air quality action, city officials will be better prepared to make progress toward their ultimate air quality objectives. The following table offers an overview of recommendations for each of the several stages of financial preparedness for cities. This tool can be used to progress through the developmental stages of AQM financing, as well as to set goals for future development progress.

Table 7: Recommended steps to improve access to finance for clean air and climate

Developmental stages	Steps to follow
Underdeveloped	<ul style="list-style-type: none">• Map existing national policies and frameworks that institutionalize the city’s mandate to oversee and implement financing for AQM and use them as basis in AQM financing efforts for the city.• Secure technical and administrative support to review processes that would improve financial and budgetary management in the city and implement recommendations stemming from the review.• Explore partnerships with academia, private sector, and/or donor agencies to leverage human and financial resources for AQM action.

Developmental stages	Steps to follow
Underdeveloped	<ul style="list-style-type: none"> Map lines of financial management oversight and assess city’s financial status with respect to creditworthiness framework Identify existing own-source revenue sources with potential to support AQM finance/ funding. Develop financial capacity needs assessment of technical and managerial staff overseeing AQM planning and implementation. Identify legal and procurement obstacles that are seen as barriers to accessing AQM goods and services from external partners and begin addressing these. Use existing resources related to local health impacts and AQM interventions to develop persuasive arguments in support of capital intensive AQM investments.
Developing	<ul style="list-style-type: none"> Determine gaps in national policies that create finance uncertainty for cities and identify steps to clarify roles. Draft and enact city regulations supportive of AQM finance action that is facilitated by national government frameworks. Initiate a provisional AQM Finance Working Group through dialogue with Mayor’s office and relevant city agencies Seek partners to engage on creditworthiness best practice analysis and action planning Build on existing own-source revenues and highlight ways to expand scope of revenues (PPPs/ loans) in support of AQM. Launch initial capacity building efforts to strengthen expertise of city personnel related to financial management of AQM activities. Develop methodology template to facilitate procurement of goods and services related to AQM. Begin mapping process to identify potential financing mechanisms for CAAP actions, initiate project concept definition process
Emerging	<ul style="list-style-type: none"> Determine impact of national policies on city level AQM finance action and identify strategies to improve coordination. Drive increased political ambition and support for AQM financial action through utilization of CBA and other cost analysis tools. Establish an AQM Finance Working Group with participation of multiple agencies and reporting to Mayor Conduct city creditworthiness analysis exercise to identify gaps and need for additional capacity building and analysis Identify AQM finance planning weakness in budgetary process and engage in expanded finance strategies to promote AQM action Continue capacity building efforts to strengthen expertise of city personnel related to private sector engagement on AQM activities Launch a pilot procurement process focused on AQM equipment and/or services. Initiate pre-feasibility analysis of specific AQM interventions and further develop option analysis for financing mechanism selection

Developmental stages	Steps to follow
Maturing	<ul style="list-style-type: none"> Engage with national authorities to address need for additional policy alignment in support of city AQM finance needs. Communicate results of AQM investments to date to support further public and political engagement in support of AQM budgeting and fiscal actions. Engage AQM Finance Working Group on issues related to finance readiness and support further action on creditworthiness Engage with credit rating agency to assess creditworthiness Assess opportunities to optimize fiscal, budgetary and regulatory coordination through dialogue with appropriate city institutions Start engaging external experts with knowledge to build the city’s capacity on financial modeling and project finance. Establish performance criteria linked to implementation of procurement and finance of AQM measures within municipal service agencies. Conduct in-depth analysis of applicable AQM financial and management models tailored to CAAP planning process and develop project feasibility study.
Fully developed	<ul style="list-style-type: none"> Review legal frameworks governing financial partnering arrangements and determine how to mitigate negative impacts on bidding and procurement actions related to AQM. Optimize and align fiscal and regulatory policy for AQM finance through in-depth analysis of existing instruments, devise ways to further improve and build on these. Continue to engage AQM Finance Working Group to develop timetable for periodic review of finance readiness and creditworthiness Engage with external finance partners in support of expanded AQM finance actions. Review with AQM finance working group and external experts (as needed) new revenue and alternative finance opportunities. Enhance internal capacity for financial modeling and project development for AQM financing Expand scope of AQM procurement focus to integrate within other areas of city goods and services procurement actions. Use finance screening tools to further optimize AQM intervention planning



Annex: Overview of financial mechanisms for implementation of clean air investments *Source: Clean Air Asia & UN Environment (2019).*

Revenue Source	Definition	Characteristics	Sample Applicability	Examples in Asia
OWN-SOURCE REVENUES				
Local taxes	<ul style="list-style-type: none">Compulsory contribution associated with income, profit, service or transaction.	<ul style="list-style-type: none">Source for investment financeLocal govts responsible for managementNon-earmarkedMostly on economic activity	<ul style="list-style-type: none">AQM (AQS, emissions inventory, health assessment, governance, communications, CAAP development)Access to Technical and financial expertiseEstablish creditworthiness	Environmental Protection Tax Law of PRC⁵
Charges and user-fees	<ul style="list-style-type: none">Payment made in exchange for a service.	<ul style="list-style-type: none">Charges levied on public service usersAim is to recover operational costsFair and efficientFees are often not sufficient to cover operating costs	<ul style="list-style-type: none">Same as for ‘local taxes’Can be linked to air quality improvements within the sectors from which they originate (e.g. transport, waste, water)	Electronic road pricing in Singapore Pollutant discharge fees in cities in China
Tax-increment financing (TIF)	<ul style="list-style-type: none">Economic development tool used to encourage the redevelopment of areas in need of revitalization.	<ul style="list-style-type: none">TIF areas are designated for improvementsFuture additional property tax growth goes to environmental protection / development	<ul style="list-style-type: none">Air quality managementImproved waste managementLand use planningBuilding codesResidential energy efficiency	Financing Urban Infrastructure in India
Deve- lopment charges	<ul style="list-style-type: none">One-time levy on developers to finance the growth-related capital costs associated with new development.	<ul style="list-style-type: none">Charges are levied for works constructed by the municipalityFunds collected finance the infrastructure associated with the development	<ul style="list-style-type: none">High-efficiency street lightingBike lanesGreen space /parksConstruction zone management / dust	Financing Green Urban Infrastructure
Value- capture taxes	<ul style="list-style-type: none">Partially or fully taking the increase of land value generated by zoning or other value-added measures enacted by the city but external to the owner.	<ul style="list-style-type: none">Could encompass public investments in infrastructureLand use and/or administrative modifications (e.g. density)Value capture resources are held in fiduciary accounts and used to secure finance for infrastructure	<ul style="list-style-type: none">Bus fleet conversions to hybrid/electricLEZ implementationBRT / metro / light railGreen ports	Sustaining Transit investment in Asia’s Cities Rail plus property development in China: The pilot case of Shenzhen

⁵ Unofficial translation of the Law

Revenue Source	Definition	Characteristics	Sample Applicability	Examples in Asia
DEBT				
Loans	<ul style="list-style-type: none">A sum of money borrowed from a lender, to be paid back with interest.	<ul style="list-style-type: none">Market instrumentsRequires investment grade credit ratingSubject to controls and monitoringPermits financing of large capital sums over long period	<ul style="list-style-type: none">Electric-vehicle charging stationsBike-share systemsEnergy efficiency in public buildings	Ulaanbaatar Air Quality Improvement Program Policy Based Loans: Cities of Beijing, Tianjin, Hebei (China) (See Annex)
Municipal bonds	<ul style="list-style-type: none">A fixed income investment in which an investor loans money to a city, which borrows the funds for a defined period of time at fixed or variable rates of interest.	<ul style="list-style-type: none">Market instrumentRequires investment grade credit ratingRequires developed capital marketEfficient financing source	<ul style="list-style-type: none">Vehicle inspection systemsMetro extension /light railPort upgrades/ investments	
Green / Climate Bonds	<ul style="list-style-type: none">Similar in function to a municipal bond, but specifically earmarked for climate and/or environmental projects.	<ul style="list-style-type: none">Same as for bondsTypically, asset-linked and backed by balance sheet	<ul style="list-style-type: none">Bus fleet conversions to hybrid/ electricBus-Rapid TransitLow-emissions zone/ congestion zonesGreen ports2-stroke engine phase outResidential/ public building energy efficiency	Thailand’s Green Bond Project
TRANSFERS				
Intergovernmental transfers	<ul style="list-style-type: none">Transfers of government revenues from other levels to subnational governments.	<ul style="list-style-type: none">High participation in subnational revenue structureSeek to reduce vertical and horizontal imbalances among subnational entitiesMay be earmarked for specific purposes	<ul style="list-style-type: none">Will depend on flexibility of use / earmarksWater / energy / transport / roads	Fiscal Transfers in Asia

Revenue Source	Definition	Characteristics	Sample Applicability	Examples in Asia
Grants	<ul style="list-style-type: none"> A financial award given by a government or foundation to facilitate a desired outcome. 	<ul style="list-style-type: none"> Used to accomplish specific objectives / outcomes Not typically sufficient to finance a project Conditions may accompany resources, generally no expectation of payback 	<ul style="list-style-type: none"> Feasibility studies Market analysis Planning/design Awareness raising Community consultation 	<p>The State of Global Philanthropy on Air Quality</p> <p>VOC Control Report (China) (See Annex)</p> <p>Dhaka Air Quality Program (CASE – Clean Air and Sustainable Environment) Project (See Annex)</p>
ALTERNATIVE SOURCES				
Public-Private Partnerships (PPP)	<ul style="list-style-type: none"> Partnership between a government agency and a private entity used to finance, build and operate projects. 	<ul style="list-style-type: none"> Direct private sector participation in environmental infrastructure projects Long-term contract between public and private entities Useful for projects requiring large capital investment Private sector experience Risk transferred to private sector 	<ul style="list-style-type: none"> Roads and bridges Light rail / metro Ferries Bus lines including BRT Ports Water treatment/ distribution Wastewater collection/ treatment Waste treatment/ disposal Power generation Central heating/ cooling 	<p>Evaluating the Environment for PPP in Asia-Pacific</p>
Results Based Donor Financing	<ul style="list-style-type: none"> A form of funding project implementation where the principal (financier) pays the agent (implementor) upon achieving a pre-defined outcome. 	<ul style="list-style-type: none"> Creates incentives for results Transfers part of risk from donor to implementor Creates ownership on part of implementing partner Requires independent verification of results 	<ul style="list-style-type: none"> Cookstove uptake Waste collection improvement Water / sanitation delivery 2-stroke engine phase out 	<p>Catalyzing Green Finance: A Concept for Leveraging Blended Finance for Green Development</p>
Climate Finance	<ul style="list-style-type: none"> Investment aimed at reducing emissions of greenhouse gases, while also reducing vulnerability of systems to climate change impacts. 	<ul style="list-style-type: none"> Is broadly defined and will overlap with other finance mechanisms Has multiple sources: donors, private equity, loans Questions of additionality What is being financed: mitigation, adaptation, damages 	<ul style="list-style-type: none"> Energy efficiency Waste treatment / biogas / composting Renewable energy BRT implementation Green ports 	<p>Asia-Pacific Climate Finance Fund</p>

Revenue Source	Definition	Characteristics	Sample Applicability	Examples in Asia
Energy performance contract (EPC) / Energy Service Company (ESCO)	<ul style="list-style-type: none"> A form of financing for capital improvement which allows the funding of energy management/ energy efficiency and infrastructure upgrades through accrued cost savings. 	<ul style="list-style-type: none"> Upgrades are provided as a set of ‘turnkey’ services Upgrades are comprehensive, and can include energy efficiency, renewables, water conservation, etc. ESCO arranges for long-term project financing provided by third-party ESCO provides savings guarantee indicating that savings will cover costs of financing for life of project 	<ul style="list-style-type: none"> Public buildings – hospitals, schools, administration Streetlighting Water supply Wastewater treatment District heating /cooling 	<p>China Energy Performance Service Company Market Study</p> <p>See Error! Reference source not found.</p>
Microfinance	<ul style="list-style-type: none"> A type of banking service that is provided to low-income groups seeking to undertake specific services or activities generally linked with a specific development objective. 	<ul style="list-style-type: none"> Small loans aimed at poor, low-income groups Development focused Typically collateral free Interest rates range between that of money lenders and banks Repeat loans are possible of increasing size with repayment 	<ul style="list-style-type: none"> Cookstoves Small-scale biogas Recycling/ waste management Bicycle delivery services 2-stroke engine phase out 	<p>Microfinance industry in the Philippines</p> <p>Pilot Study: Microfinance on 2 strokes to 4 strokes partnership for clean air (Philippines)(See Annex)</p>
Crowdfinance	<ul style="list-style-type: none"> Crowdfunding is the use of small amounts of capital from a large number of individuals to finance a project or activity, generally via social media networks. 	<ul style="list-style-type: none"> Requires adept social media outreach Is cause / objective based promising a specific outcome Can be reward based Can incorporate aspects of traditional finance – debt repayment, equity stakes 	<ul style="list-style-type: none"> Shared gardening Tree planting Pedestrian safety Communications / outreach 	<p>ME Tech International crowdfinance for waste management</p>

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