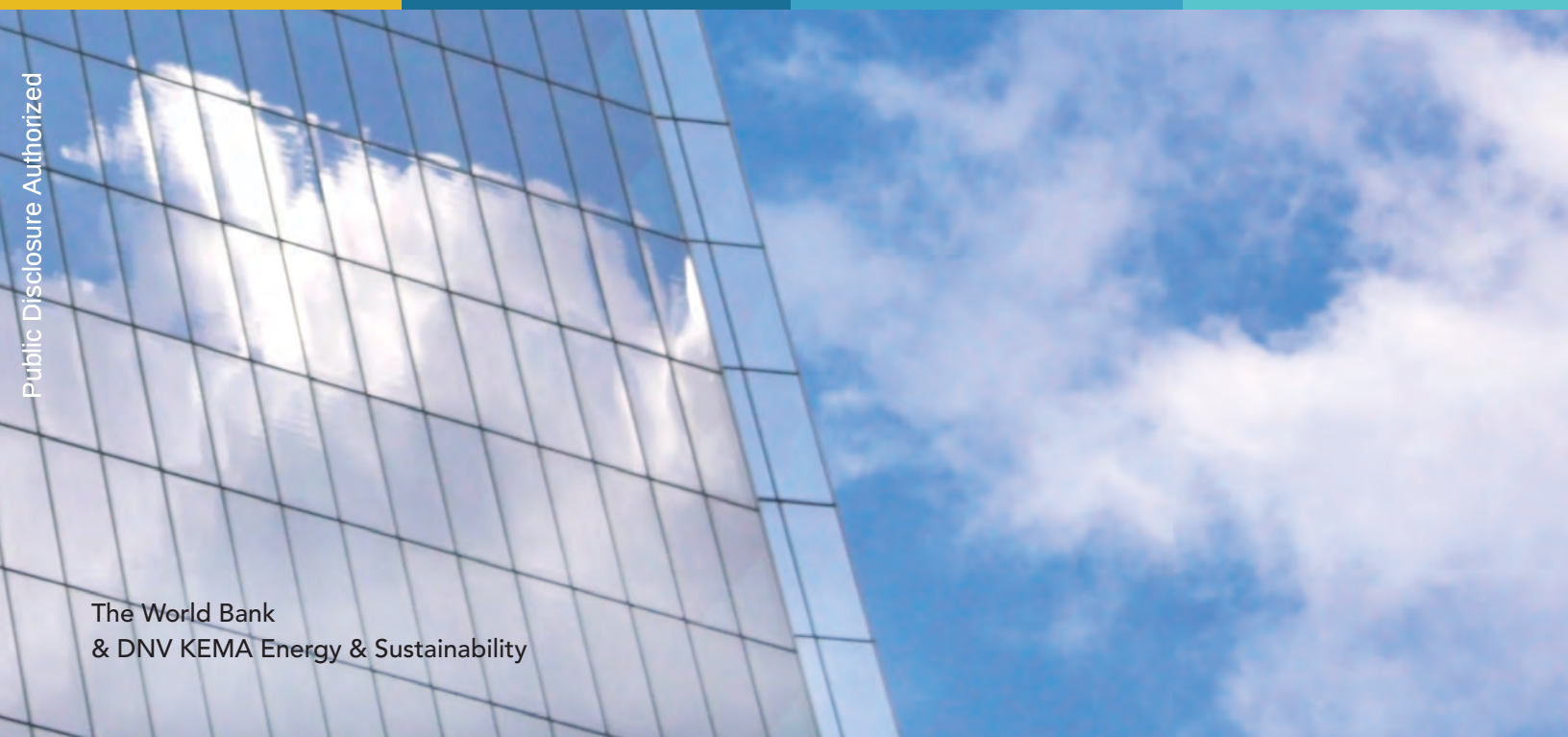
THE WORLD BANK

THE LOW CARBON CITY DEVELOPMENT PROGRAM (LCCDP) GUIDEBOOK

A systems approach to low carbon development in cities



The World Bank
& DNV KEMA Energy & Sustainability

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The Low Carbon City Development Program (LCCDP) Guidebook was developed by the World Bank and DNV KEMA Energy & Sustainability. An LCCDP is a systems approach to low carbon development, including a framework and comprehensive set of requirements, that helps cities to plan, implement, monitor, and account for low carbon investments and climate change mitigation actions across all sectors over time. Based on interest received following the launch of the Rio de Janeiro Low Carbon City Development Program in June 2012, the first LCCDP to be certified according to the LCCDP Assessment Protocol (including ISO 14064, ISO 14001, and the GHG Protocol), this Guidebook was developed to provide cities and urban practitioners with a roadmap for designing and implementing an LCCDP that complies with the LCCDP Assessment Protocol.

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Errors and omissions remain the sole responsibility of the World Bank and DNV KEMA Task Teams.

List of Acronyms

APrA	Buenos Aires Environmental Protection Agency *(Agencia de Protección Ambiental)*
BAU	business-as-usual
BRT	bus rapid transit
CDM	Clean Development Mechanism
CER	certified emission reduction
CME	Coordination and Management Entity
CO_2/CO_2e	carbon dioxide/carbon dioxide equivalent
ER	emission reduction
GGBP	Greener, Greater Buildings Program
GHG	greenhouse gas
GPC	Global Protocol for Community-Scale GHG Emissions
IME	Information Management Entity
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
KPI	key performance indicator
LCCDP	Low Carbon City Development Program
LEDS	low-emission development strategies
MRV	monitoring, reporting and verification
MWG	Multi-Sector Working Group
NAMA	nationally appropriate mitigation action
NGO	non-governmental organization
PNPM	National Program for Community Empowerment Mandiri *(Program Nasional Pemberdayaan Masyarakat Mandiri)*
REDD+	Reducing Emissions from Deforestation and Forest Degradation plus conservation, sustainable management of forests, and enhancement of forest carbon stocks
RICAPS	Regionally Integrated Climate Action Planning Suite
TAE	Technical Advisory Entity
UNFCCC	United Nations Framework Convention on Climate Change
UN-Habitat	United Nations Human Settlements Programme
URA	Urban Risk Assessment
VCS	Verified Carbon Standard
VCU	verified carbon unit
VVE	Validation and Verification Entity
WBCSD	World Business Council on Sustainable Development
WRI	World Resources Institute

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Executive Summary

The systematic approach offered by an LCCDP enables a city to pursue an integrated low carbon pathway

As urban populations rise exponentially, cities are increasingly facing challenges related to socioeconomic development and environmental issues—especially cities in low- and middle-income countries. By taking the lead on low carbon development, cities have the opportunity to engage in an important dialogue about sustainable development, directly address local issues, and contribute to the reduction of greenhouse gas (GHG) emissions. Low carbon development strategies allow cities to position themselves as major players in climate change mitigation, as well as set an example for the development of national emission reduction policies.

The systematic approach offered by a Low Carbon City Development Program (LCCDP) enables a city to overcome the barriers faced in single project implementation and pursue an integrated low carbon pathway. It provides a common framework to identify, implement, and measure low carbon interventions (that is, projects and policies) that will not only contribute to lower emissions, but will also address urban development needs. Accordingly, LCCDPs are flexible and can be designed in a manner that accommodates different cities' contexts, priorities, and visions of low carbon development.

The LCCDP Guidebook helps orient cities to design and implement an LCCDP that complies with the LCCDP Assessment Protocol, which is a new protocol based on existing, internationally recognized standards for systems design and GHG accounting. The LCCDP Assessment Protocol consists of a set of standardized requirements developed to ensure that LCCDPs will achieve their targets and objectives when implemented. Yet every city is different and so a whole range of interventions is available; the LCCDP and the LCCDP Assessment Protocol are designed to be flexible and accommodating in a variety of city contexts.

The Guidebook is structured according to the four stages of systems design, which also correspond to the four stages of LCCDP development:

INITIATION discusses all elements that a municipality needs to consider before embarking on low carbon development, including aspects required when initiating the specific LCCDP design, such as mission, scope, and stakeholder input.

PLANNING details the steps and elements that should be part of Program implementation, such as objectives, targets, roles, and responsibilities, and describes how to plan interventions so as to ensure objectives and targets are met.

INITIATION

- MISSION
- SCOPE
- BOUNDARIES
- STRATEGIES TO PROMOTE LONG-TERM PROGRAM CONTINUITY
- STAKEHOLDER CONSULTATION
- MUNICIPAL COMMITMENT
- EMISSIONS INVENTORY

PLANNING

- SETTING OBJECTIVES AND TARGETS
- PROGRAM ROLES
- INTERVENTION PLANNING
- PROGRAM IMPLEMENTATION PLAN

EXECUTION describes the day-to-day operations and systems of Program implementation, and includes descriptions of how interventions should be incorporated into the LCCDP, as well as how relevant information and documentation should be managed.

ASSESSMENT/EVALUATION explains the assessment and evaluation processes that the Program as a whole, as well as the individual interventions, must go through to ensure targets and objectives are met. This phase also allows for adjustments to be made in the Program in response to the findings of the assessment/evaluation, if needed.

EXECUTION

- INTERVENTION DESIGN AND REGISTRATION
- MONITORING, REPORTING AND EVALUATION
- PROGRAM REGISTRY

ASSESSMENT/EVALUATION

- PROGRAM ASSESSMENT
- PROGRAM/INTERVENTION EVALUATION AND ADJUSTMENT

INITIATION

Municipalities need to consider important elements when first deciding to embark on a low carbon city development pathway. An LCCDP must be designed with a long-term view to achieving the city's overall development goals. A robust initiation process that clearly defines the Program's mission, scope, and boundaries will help avoid having to make big changes to the LCCDP during its implementation. The LCCDP should be undertaken in tandem with other municipal policies that support socioeconomic growth and, therefore, the involvement and explicit commitment from all levels of local government and stakeholder groups is required. Whenever possible, the city should develop policy and/or legislative mechanisms that protect the Program from administrative and political changes in order to safeguard the Program's continuity. Lastly, a GHG emissions inventory, while not a prerequisite, will provide very useful information for setting realistic and accurate targets and objectives in the LCCDP planning phase.

PLANNING

Successful implementation of an LCCDP relies on effective planning. The objectives and targets of the Program should reach across all municipal sectors, especially those that have been identified as the highest emitting sectors. As these overall targets are developed, care should be taken to ensure that they are measureable as well as consistent, and can be achieved within the operational lifetime of the Program.

Five Program Roles ensure effective Program coordination and implementation. The municipality should first determine which agency will serve as the central body and be accountable for the Program's progress (that is, the Coordination and Management Entity or CME). The CME will take the lead on setting Program objectives and targets aligned with the Program mission and scope. Given the complex nature of implementing an LCCDP, the municipality must identify the appropriate entity to adopt each Program Role and be clear about their respective responsibilities. The other four roles in addition to the CME are: the Information Management Entity (IME), the Technical Advisory Entity (TAE), a Multi-Sector Working Group (MWG), and the Validation/Verification Entity (VVE). The exact relationship between the entities holding the Program Roles will depend on the size and resources of the municipality in question; however, to a certain extent, responsibilities will be consistent across all LCCDPs. Regardless of the way in which the roles are structured within a municipality, it is critical that they be appropriately documented and communicated both within the municipal administration and to external stakeholders.

A thorough planning process can help the municipality to establish a balanced and diverse *Portfolio of Interventions*, which should limit implementation barriers and facilitate a more even risk distribution. Prior to incorporating specific interventions into the Program, the interventions must fulfill the *Eligibility Criteria*. The *Intervention Feasibility Assessment* and the *Intervention Risk Assessment* are two useful tools to screen potential interventions and assess their contribution to the Program objectives and targets.

Finally, an important part of the planning process is to define a *Program Implementation Plan* to facilitate implementation. This plan also serves to help establish the documentation procedures and systems, define timelines for achieving city-wide emission reductions (ERs), and provide a framework for evaluating the success of Program implementation.

EXECUTION

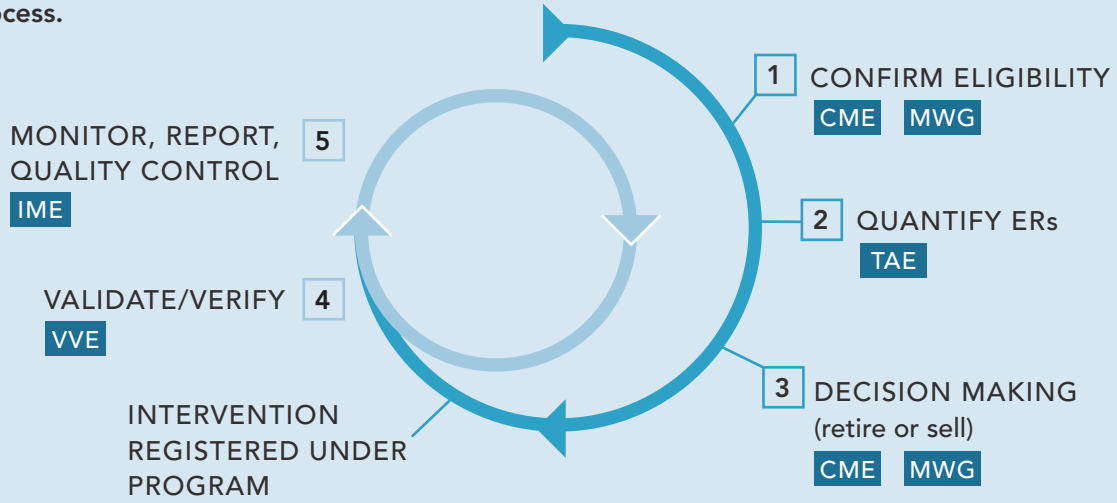
Implementing a diverse and balanced *Portfolio of Interventions* under the LCCDP requires that each municipality guide the development, approval, implementation, and evaluation of the interventions. This can be divided into two key sub-processes: the *Intervention Registration Process* (development, approval, and implementation), and the *Intervention Monitoring, Reporting and Verification (MRV) Process* (data collection and verification). These are interrelated, as shown in Figure E-1.

During the Intervention Registration Process, every new intervention undergoes an in-depth assessment to determine whether it meets a number of specific criteria and, consequently, can contribute to the Program targets and objectives. This process serves as a preventive measure against double counting and dual ownership of the interventions and their ERs. It is also an opportunity to generate information that will feed back into the Intervention Feasibility Assessment in order to identify and manage the risks that can adversely impact the implementation of the intervention.

Establishing guidelines for information management and MRV systems intended to support the LCCDP implementation is not necessarily straightforward, and it is likely that no two municipalities will follow the same pathway. Coordinating and managing data is a critical aspect of the MRV system, and the municipality's capacity needs should be addressed prior to the Program's launch, either by building the skills and expertise of municipal staff or by hiring external technical expertise. The MRV system should be interwoven within the entire LCCDP process. By integrating the MRV system within Program implementation, the municipality can create feedback loops that will allow for timely Program adjustments as needed. This supports a Program that stays relevant to the needs of the municipality and effectively meets its objectives and targets.

Figure E-1:
The "project cycle" each intervention follows under the LCCDP. Steps 1–4 relate to the Intervention Registration Process, while steps 4–5 relate to the Intervention MRV Process.

Program Roles with responsibilities at each step are shown in the blue boxes.



ASSESSMENT/EVALUATION

Setting the necessary procedures to allow for ex-ante assessment and ex-post evaluation and adjustment at the Program and intervention levels are key aspects of an LCCDP. Assessment and evaluation is highly relevant and helps to ensure the Program is fulfilling initial expectations and, if not, identifies the necessary corrective measures. It will also provide credibility among stakeholders and potential funding partners.

Validation of the Program by a third party against the LCCDP Assessment Protocol's requirements will provide initial guarantees that the framework has been correctly set up and all necessary elements have been correctly designed. This first demonstration of transparency will be important to secure stakeholder buy-in and commitment throughout the Program's implementation.

The success of the evaluation of the Program and its interventions will be largely determined by the quality of the MRV system and other processes followed during implementation. Measures of performance, compared against initial targets, will provide useful information on how the program is evolving, as well as where adjustments may be needed.

The Guidebook discusses all essential elements that must be considered for a successful LCCDP. Throughout the Guidebook, case studies provide additional references and sources of information where specific approaches to program elements have been taken by other cities or countries, if applicable. With an LCCDP that is designed and implemented following the Guidebook, and then validated by a third party according to the LCCDP Assessment Protocol, the municipality will be on the right track towards quantifiable, transparent, and effective low carbon city development.

INTRODUCTION

1.1 Background

The world is undergoing the largest wave of urban growth in history, with more people now living in cities than in rural areas

According to the United Nations Population Fund, the world is undergoing the largest wave of urban growth in history, with more people now living in cities than in rural areas. By 2030, over 60 percent of the population is expected to be living in cities. Megacities—cities with more than 10 million inhabitants—are on the rise and becoming a topic of frequent discussion in urban development discourse. However, most new urban growth will occur in smaller towns and cities in developing countries, which have fewer resources to respond to the magnitude of the urban population increase.

This projected growth is unprecedented and poses great challenges for cities to provide a high quality of life to their residents—now and in the future. In fact, in many cases, rapid urbanization is concentrating socioeconomic poverty and environmental degradation in cities. Today, cities face increasing development needs in infrastructure, land use, social cohesion, and basic service provisions. Consequently, sectors such as transportation, water and sanitation, education, food systems, energy supply, and health services, are under severe pressure from increasing population and limited resources.

Despite the magnitude of the current challenges, cities must also incorporate a long-term component into their planning processes, as future pressures will increase in severity due to further population growth and additional environmental degradation. A sustainable development approach will ensure that the needs of citizens today are met without compromising the ability of future generations to meet their needs. Such

an approach implies that, in addition to the efficient management of available resources, cities must take into consideration additional risks posed by climate change. For example, sea level rise and more frequent extreme meteorological events may affect coastal cities, while severe drought and desertification may impact landlocked cities.

Cities are also responsible for a high proportion of global carbon emissions, which are the main driver of anthropogenic climate change. A recent United Nations Human Settlements Programme (UN-Habitat) report showed that the world's cities cover only two percent of the total land area, but account for a staggering 70 percent of GHG emissions (UN-Habitat, 2011). Emissions in cities come mainly from fossil fuel combustion for power generation, transport, industrial activities, municipal waste, and water and sewage treatment. In addition, if urban expansion is not appropriately planned, land-use change and deforestation can lead to the release of carbon dioxide (CO_2) from natural carbon stocks, such as forest cover. Thus, cities will have to consider both mitigation measures that lower their carbon emissions, as well as adaptation measures that improve their resilience to climate impacts.

1.1.1 The Role of Cities in Establishing Best Practices in Climate Action

A city can reduce its carbon footprint while also providing a better quality of life for its citizens and a more attractive environment for business

The implications of an "urban carbon footprint" stretch far beyond city boundaries as locally emitted GHGs freely mix in the atmosphere and contribute to global climate change. While climate change is a global problem largely affected by local actions, a variety of local contexts, interests, and priorities explain the difficulties in reaching an international agreement to reduce carbon emissions.

The current lack of national and international consensus on climate change action presents an opportunity for cities to assume a leadership role in climate change mitigation, and to link climate change to local development priorities. By doing so, a city can reduce its carbon footprint while also providing a better quality of life for its citizens and a more attractive environment for business. Well-planned, compact cities can be highly resource-efficient and lead to lower per capita GHG emissions. Cities can invest in green economic sectors, such as transport, buildings, and waste management, thereby creating jobs and supporting long-term economic growth, which can benefit millions of people. As major actors in the flow of goods and services, urban residents can be leaders in creating demand for environmentally-friendly products and sustainable consumption (World Bank, 2012).

An increasing number of cities and regions have begun taking action to address GHG emissions. In recent years, urban political leaders have been more involved in climate change policy making, with many pledging action beyond or even acting in the absence of national commitments. For example, London called for a 60 percent reduction in emissions from 1990 levels by 2025 (Mayor of London, 2007), New York

City is aiming for a 30 percent reduction from 2005 levels by 2030 (City of New York, 2007), and Tokyo's Climate Change Strategy called for a 25 percent reduction from 2000 levels by 2020 (Tokyo Metropolitan Government, 2007). Through the US Mayors' Climate Protection Agreement, more than one thousand mayors agreed to meet or exceed Kyoto Protocol targets, even though the US has not ratified the Protocol. The World Mayors' Council on Climate Change, an alliance of over 80 committed local government leaders concerned about climate change, advocates for enhanced engagement of local governments in multilateral efforts to address climate change and global sustainability issues.

Cities must take into consideration additional risks posed by climate change

1.1.2 The Low Carbon Development Approach in Cities

Cities can engage in sustainable development and lead on climate change mitigation by considering a low carbon development approach. While no universal definition for low carbon development exists, "using less carbon for growth" and "decoupling carbon emissions from growth" are common features among low carbon development initiatives. These approaches also remain faithful to the principles of sustainable development, which aim to reconcile ecological limits with the goals of economic development and social justice.

Low carbon development in cities—or low carbon city development—allows municipalities to take advantage of integrated planning in a manner that ensures ER strategies and socioeconomic growth are not mutually exclusive. Similarly, mitigation and adaptation measures can also be complementary. While planning for low-carbon socioeconomic growth, cities should plan for the impacts of climate change, which will inevitably occur, given the current atmospheric carbon concentrations. A long-term vision can be created where economic goals across sectors align and balance with carbon reduction goals. Such an integrated approach not only makes planning more efficient, but also offers an opportunity to bring together multiple stakeholders and raise awareness of the benefits of simultaneously pursuing socioeconomic growth and carbon reduction. An integrated approach to planning that considers climate change can also be an opportunity to attract new investments and businesses to a city.

1.2 The Low Carbon City Development Program

An LCCDP is a pioneering model for low carbon and green growth in cities that demonstrates leadership, despite uncertainty in the current international climate change policy debate

At the municipal level, a city can integrate low carbon city development as part of its strategic planning and sustainable development with a Low Carbon City Development Program, LCCDP for short, as outlined in this Guidebook. This Guidebook describes the process of designing and implementing an LCCDP that complies with the LCCDP Assessment Protocol. An LCCDP is a pioneering model for low carbon and green growth in cities that demonstrates leadership, despite uncertainty in the current international climate change policy debate. It allows a city to incorporate innovative and cutting-edge practices that exist at the nexus of low carbon development and green growth into city planning. There are several organizations and partners around the world that are undertaking initiatives to reduce the carbon footprints of cities, such as the C40, ICLEI—Local Governments for Sustainability, the World Resources Institute (WRI), and others. The LCCDP is a new approach that builds upon and complements existing efforts in low carbon development and harnesses environmental markets for the unique situation in cities, which was first used by the City of Rio de Janeiro (see Case Study 1-1).

An LCCDP is a framework and set of comprehensive requirements to help a city plan, implement, monitor, and account for low carbon investments and climate change mitigation actions across all sectors over time. Transparency and flexibility should govern the design, planning, and implementation of any LCCDP, which enables a city to demonstrate the achievement of self-set mitigation goals through bottom-up mitigation

Case Study 1-1:
The Rio de Janeiro Low Carbon City Development Program

The Rio de Janeiro Low Carbon City Development Program (Rio LCCDP) was implemented with technical assistance from the World Bank and was tailored to the city's unique circumstances.

The Rio LCCDP is an ambitious, cross-sectoral climate change program implemented by the Municipality of Rio. Several economic and social growth plans and initiatives are being undertaken, particularly in preparation for the 2014 FIFA World Cup and the 2016 Summer Olympic Games. The Rio LCCDP acts as a channel to help distill the carbon reduction potential from these various initiatives, and allows the City of Rio de Janeiro to demonstrate the achievement of self-set mitigation goals through bottom-up mitigation accounting in a transparent manner. As such, the Rio LCCDP helps to create a low carbon lens through which future municipal investments are evaluated, and ensures investments contribute to a legacy of urban sustainability.

The Rio LCCDP was independently certified by DNV KEMA Energy & Sustainability in accordance with the newly developed LCCDP Assessment Protocol (shown in full in the Annex). The certification process ensured that the Program complied with international standards for GHG accounting and environmental management systems. Programs that comply with the LCCDP Assessment Protocol are also certified according to the following standards:

- ISO 14064-2: the standard for quantification, monitoring, and reporting of GHG emission reductions or removal enhancements;
- ISO 14001: the standard for certification of environmental management systems; and
- The GHG Protocol (Project Accounting Protocol and Guidelines; WRI and WBCSD, 2005).

Through compliance with these standards, the Rio Program prepares the city to participate in climate finance at both sub-national and international levels. In this sense, the LCCDP builds upon previous examples of enhancing climate finance opportunities for cities, including the City-wide Approach to Carbon Finance (World Bank, 2010). The Rio LCCDP learned from the latter approach and was designed specifically for cities, based on the underlying standard behind the Clean Development Mechanism (CDM) and Verified Carbon Standard (VCS), which is ISO 14064-2. As a result, the LCCDP has set a new precedent in the accreditation of city-level climate change programs, and has created an accreditation pathway specifically designed for cities, which can also be adopted by future carbon finance programs.

Source: World Bank and Rio Prefeitura, 2013.

action accounting. Furthermore, a successful LCCDP allows for including a diverse set of municipally-driven and cross-sectoral low carbon actions over the Program's lifetime, including policies and offset projects, referred to in the Program as "interventions."

The Program also provides the necessary framework for future climate finance to play a role in catalyzing investments in low carbon city development, while also setting the stage to allow municipalities to participate in future carbon pricing frameworks, such as emissions trading systems that rely on the same underlying standards.[1] The design and implementation elements suggested here will provide potential funders or donors with the necessary assurances that the Program and interventions will accomplish the intended goals and targets. On the other hand, under the Program, the city can choose to issue carbon credits for specific interventions that apply pertinent methodologies. The proceeds from selling these credits can then be used, for example, to finance other interventions that lack the necessary resources.

1 The standards underlying the LCCDP are ISO14064-2, ISO14001, and the GHG Protocol. It is important to note, however, that there is no direct assurance that interventions under the LCCDP will comply with future carbon pricing frameworks—the interventions will have to meet the requirements and standards of these individual frameworks when they arise.

An LCCDP offers an alternative to individual, project-based approaches to low carbon development, which are not generally well suited for cross-sectoral situations in complex environments across the large geographic areas that are typical of cities. Holistic approaches and comprehensive solutions that include different technologies and interventions are more appropriate. Thus, low carbon city development must be part of the broader municipal planning process. An integrated plan can also help overcome barriers that are common in urban projects, especially in developing countries, such as high transaction costs, limited access to start-up capital, limited institutional capacity, complex methodologies for quantifying ERs, and high monitoring costs due to multiple stakeholders (Gold Standard, 2011).

The leadership shown by cities in developing LCCDPs may contribute to a bottom-up push from city-level policies to nationwide climate change planning and policymaking. Empowering local governments can accelerate policy responses, foster resource mobilization, and engage local stakeholders, which can feed into national policies by leveraging existing local experiments. Moreover, city and regional governments are well positioned to develop policy and programmatic solutions that best meet the specific local geographic, climatic, economic, and cultural conditions. Sub-national strategies should also be coordinated with similar efforts at higher levels of government (such as national, low-emission development strategies or LEDS) to avoid duplicating efforts, potential negative policy interactions, and issues surrounding ER ownership and accounting (particularly in countries with ER pledges and domestic climate change policies).

City and regional governments are well positioned to develop policy and programmatic solutions that best meet the specific local geographic, climatic, economic, and cultural conditions

The benefits of an LCCDP and other low carbon development initiatives are not exclusive to climate change mitigation. They can also provide strong political and economic incentives to advocate for sustainable development, especially where climate change is not necessarily a priority over more immediate development needs (see Box 1-1). Sustainable urban planning, which includes integrated urban transport systems, affordable urban housing, and creating public green spaces, promotes low-carbon

Box 1-1:
Additional Co-benefits of Low Carbon City Development

- **NEW INDUSTRIES AND MARKETS:** Promoting clean energy technologies may enhance economic growth through the local development and adoption of new technologies, employment creation, and new investments.
- **CHANGES TO CONSUMER PARADIGMS:** Adding a climate change component to public policies can help shift consumer behavior towards more sustainable, less polluting and more environmentally-responsible consumption.
- **IMPROVED ACCESS TO CLEAN TECHNOLOGIES:** Widespread uptake of low carbon initiatives in developed countries can lead to lower costs of climate-friendly technologies by creating new technology markets.
- **"NO-REGRETS" LOW CARBON INTERVENTIONS:** Projects with positive financial rates of return, such as energy efficiency programs, should be undertaken regardless of climate change considerations.
- **ENERGY SECURITY:** Decarbonization of the energy sector can reduce energy dependence as well as national fossil fuel costs.
- **ENERGY-EFFICIENT TRANSPORTATION OPTIONS:** Energy efficiency programs, as well as vehicle inspecting and licensing programs, can ensure fuel efficiency and reduce fuel needs in the transport sector.
- **HUMAN HEALTH:** Reducing emissions and particulate matter, particularly from the transport sector, can also contribute to reduced urban pollution, reduced smog and improved urban air quality.
- **ENVIRONMENTAL PROTECTION:** Forestry and natural resource management practices can generate large environmental benefits in terms of soil conservation, water quality, and ecosystem preservation. Waste reduction programs and reduced emissions of local pollutants from energy facilities can also prevent environmental degradation.
- **STRATEGIC AND COMPETITIVE ADVANTAGES:** Leading low carbon development initiatives, new public programs that support climate change mitigation, and country-wide transfer of financial resources through carbon markets are likely to bring further opportunities to green economy pioneers, industries, and entrepreneurs, as well as positive marketing to attract business and tourism.

growth and brings socioeconomic co-benefits. Community building within a city reduces insecurity, crime, and violence, and increases the value of municipal land and private property (see Case Study 1-2). Sustainable urban planning that considers urban expansion can prevent land-use change and deforestation as well.

Rapid population growth and transformation of urban form need not be an obstacle for designing and implementing an LCCDP. Many general urban policies can be designed in such a way that they also lead to reduced carbon emissions. For example, new building codes can be developed in a manner that promotes energy efficiency. Similarly, incentives that promote public transportation not only improve traffic conditions, but also reduce carbon emissions and urban air pollution.

Politicians and policymakers make strategic use of these co-benefits in different ways. Some countries, such as China (Lockwood and Cameron, 2012), are focusing on green growth, which emphasizes the co-benefits of a low carbon growth path and the necessity of moving towards a low carbon economy. Green growth strategies take countries' economic growth ambitions as their starting point and seek to find low carbon or less resource-intensive paths to that growth (Bai, 2009). The global impacts of reducing emissions may not be immediately felt by stakeholders; however, by emphasizing co-benefits and the broader goals of promoting a green economy, a city can effectively communicate the local benefits and importance of its LCCDP.

An LCCDP provides a systems approach to developing and achieving a municipality's goals for sustainable development and green, low carbon growth. The LCCDP must operate in tandem with the city's other socioeconomic development goals, thereby requiring an integrated effort at various municipal government levels, as well as integration with other municipal systems and planning practices. For example, the LCCDP can be integrated into existing strategic and master planning processes, or linked to budgetary reporting, service delivery metrics, or other tools the city government uses to manage its operations.

The LCCDP documentation outlines the entities responsible for planning, implementation, day-to-day activities, and evaluation, as well as establishes the processes and strategies to ensure the municipality's goals are met. When designed and evaluated in accordance with the LCCDP Assessment Protocol, the LCCDP will have the necessary components in place to be successfully launched and implemented.

Case Study 1-2:
Co-benefits of Low Carbon Development: Bogota and Urban Happiness

A former Mayor of Bogotá, Enrique Peñalosa, is well known for driving radical urban improvements with far-reaching benefits. During his tenure as mayor from 1998 to 2001, he promoted a citizen-centric model of urban development, supported projects that restricted private car use, and built bicycle pathways, pedestrian paths, and parks. Also during this period, construction began on Bogotá's internationally renowned bus rapid transit (BRT) system, TransMilenio, and more than 100,000 trees were planted through urban greening efforts. However, while these projects and policies are environmentally sustainable and low carbon in nature, this was not the primary motivation.

"His policies may resemble environmentalism, but they are no such thing. Rather, they were driven by his conversion to hedonics, an economic philosophy whose proponents focus on fostering not economic growth but human happiness." (Montgomery, 2007)

Bogotá's demonstration of achieving co-benefits of urban projects and policies—improved security, human happiness, and urban livability, to name a few—has helped shape the paradigm of sustainable, low carbon development for cities around the world.

Source: Montgomery, 2007.

1.3 The LCCDP Assessment Protocol

The LCCDP Assessment Protocol (the Protocol; shown in full in the Annex) is a checklist that outlines all the requirements an LCCDP should fulfill, which ensures that the appropriate steps have been taken and relevant risks managed in preparation for the Program's launch.

The Protocol was first used by DNV KEMA to validate the Rio de Janeiro LCCDP (see Case Study 1-1). It was based on DNV KEMA's experience in developing climate action plans and LEDS, implementing and evaluating energy efficiency programs in municipalities, and working in carbon markets. The Protocol consists of 44 predefined requirements that an LCCDP should comply with before its implementation, and ensures that the LCCDP is well designed, consistent in its strategy, and relevant to the municipality's development objectives and targets.

The 44 requirements of the Protocol are grouped into eight categories—among others, program policy, roles and responsibilities, and documentation—where the municipality should spend considerable time establishing city-wide policies and processes to prevent potential pitfalls when implementing an LCCDP. The requirements are considered critical to successful implementation as they cover important aspects of planning, implementation, and evaluation.

The Protocol is the standard against which a third party will validate the design of an LCCDP prior to implementation. The validation process is a transparent, independent assessment where the audit team documents the Program's compliance, or

The assessment ensures that the LCCDP design includes all necessary elements for the Program's success

non-compliance, with each requirement. The assessment ensures that the LCCDP design includes all necessary elements for the Program's success, supports the LCCDP's transparency, and creates added value by obtaining external expert opinions on design and potential risks. As a result, the assessment may also help identify new opportunities for improvement.

A central tenant of the Protocol is its flexibility and applicability to as many low carbon city development initiatives as possible. The Protocol considers the variety of strategies and philosophies that exist behind sustainable development and green growth programs pursued by different municipalities—irrespective of the context, priorities or resources that different cities may have. Protocol requirements are described in a how-to format throughout this Guidebook, and the full list of Protocol requirements may be found in the Annex.

The Guidebook allows municipalities to begin from different starting points and develop Programs with varying levels of sophistication

1.4 About this Guidebook

This Guidebook aims to assist the reader through the process of designing and implementing an LCCDP. By following this Guidebook, municipalities can ensure their LCCDP will comply with all necessary requirements to achieve validation in accordance with the Protocol before implementation, which will contribute to the Program's success in reaching its targets in an efficient and transparent manner. The Guidebook has been designed to provide a clear and concise roadmap to take the reader through the main LCCDP components and processes.

Regardless of a municipality's previous experience in undertaking a similar process, the Guidebook serves as a step-by-step guide to Program development; helps identify key actors and roles in LCCDP development; and describes how to coordinate the activities of these entities at each stage of Program design and implementation. The Guidebook will help link the reader to the necessary design and implementation elements required for an LCCDP, as well as provide case study examples and suggestions for success.

1.4.1 Target Audience of this Guidebook

This Guidebook is intended to support those interested in promoting low carbon development and urban sustainability, including:

- Public officials interested in developing and implementing a low carbon development and green growth strategy within their municipality;

- Donors and non-governmental organizations (NGOs) interested in supporting the design and implementation of LCCDPs;
- Financing organizations and private companies interested in learning about potential investment opportunities within low carbon development plans in cities; and
- Consultants who will support LCCDP planning, implementation, and evaluation, as well as third parties who will conduct the assessment of the Program against the LCCDP Assessment Protocol.

Those who use this Guidebook and the Protocol will bring very diverse expertise and knowledge in developing and implementing a low carbon city development framework at the municipal level. Therefore, the Guidebook has been designed with the greatest flexibility possible to support a wide range of cities in designing and implementing their LCCDPs. These guidelines are not intended to constrain the participation of cities based on their development level, access to resources or strength of local institutions. The Guidebook allows municipalities to begin from different starting points and develop Programs with varying levels of sophistication. For example, a city may approach the LCCDP development from a top-down perspective, where the strategy for city-wide carbon mitigation cascades from the policy and/or legislative level to the project level. Another city may have previously initiated several offset projects on a sector-by-sector basis, and then decided to implement a city-wide program to ensure a cohesive carbon mitigation strategy. Thus, the Guidebook serves as a roadmap for any city that wishes to initiate a low carbon development effort.

Nevertheless, cities must be aware of the barriers they might face when implementing an LCCDP, such as difficulties reaching economies of scale due to city size, high transaction costs, limited access to start-up capital, or limited institutional capacity of the local administration. The requirements for the LCCDP described in this Guidebook and the LCCDP Assessment Protocol can help a city navigate and address these barriers.

1.4.2 Structure of the Guidebook

The structure of this Guidebook follows the same systems approach framework as an LCCDP. It goes through each step of the design and implementation process, and helps prepare the reader to meet the Protocol requirements specified at each step. Each section corresponds to an LCCDP step and includes the following subsections detailing relevant concepts and elements to be developed:

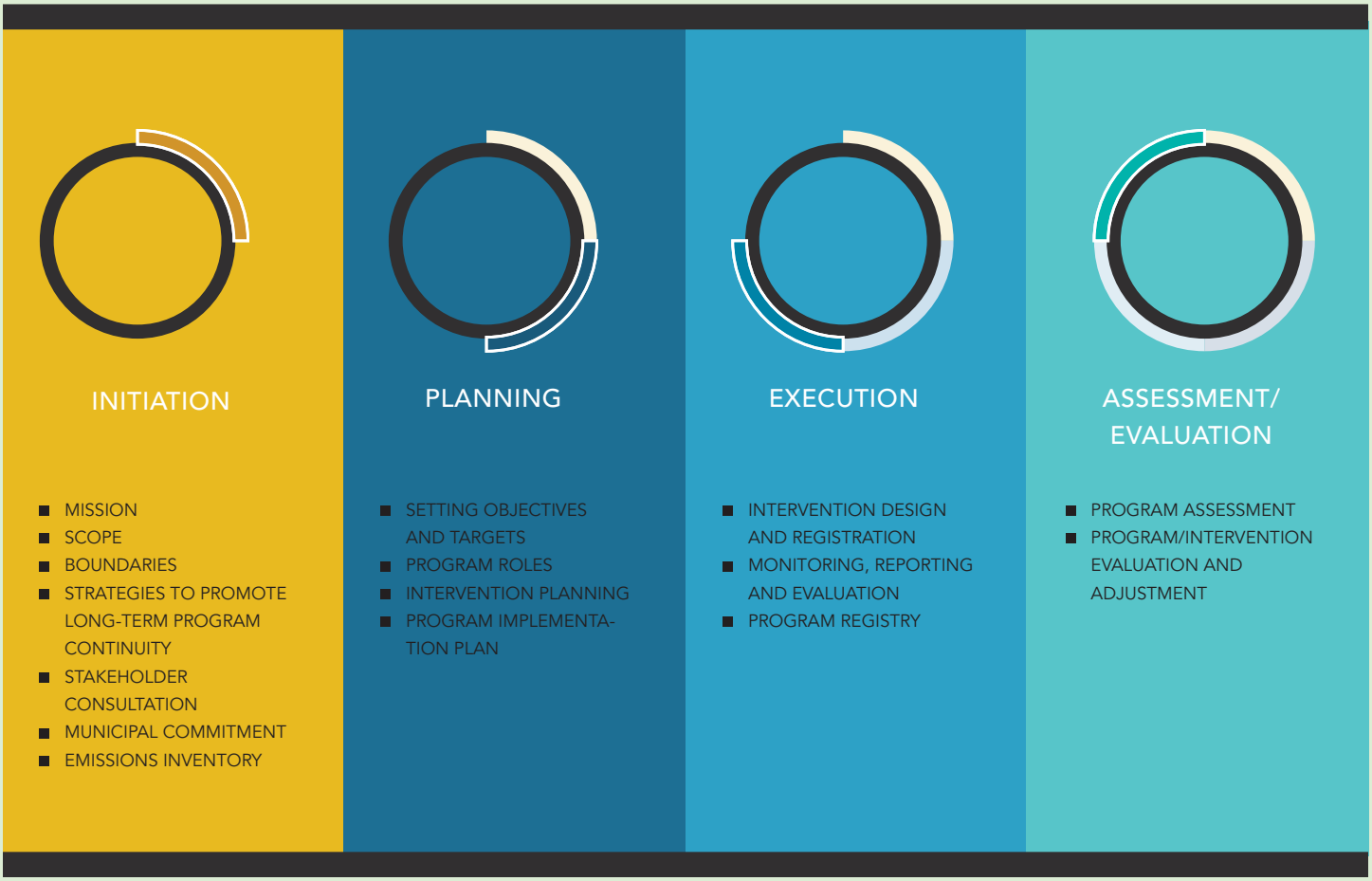
- Initiation discusses all elements that a municipality needs to consider when first embarking on low carbon development, including aspects required when initiating the specific LCCDP design, such as mission, scope, and stakeholder input.
- Planning details the steps and elements required to plan Program implementation,

such as objectives, targets, roles, and responsibilities, and describes how to plan interventions that will ensure objectives and targets are met.

- Execution describes the day-to-day operations and systems of Program implementation, and includes descriptions of how interventions are incorporated into the LCCDP, as well as how relevant information and documentation are managed.
- Assessment/Evaluation explains the assessment and evaluation processes that the Program as a whole, as well as the individual interventions, must go through to ensure targets and objectives are met. This phase also allows for adjusting the Program in response to the results of the assessment/evaluation, if needed.

Figure 1-1 appears throughout the Guidebook at the start of each section, to provide readers with a key to the Guidebook's contents.

Figure 1-1:
Structure and content of the LCCDP Guidebook



Section

2

INITIATION

PLANNING

Mission

Scope

Boundaries

Strategies to promote
long-term program continuity

Stakeholder consultation

Municipal commitment

Emissions inventory

EXECUTION

ASSESSMENT/
EVALUATION

Achieving maximum carbon reduction potential in a city requires aligning municipal carbon reduction interventions with the mitigation activities to be implemented. Establishing the right framework for an LCCDP early on ensures a coherent program design and can help avoid the need to alter the Program once implementation has begun. This chapter will discuss the groundwork that precedes and supports a successful LCCDP design when it is first initiated.

The success of an LCCDP relies heavily on integrating the Program's mission and scope with the broader socioeconomic development goals of the city. A common understanding of these elements at the municipal level, particularly among the agencies that will be involved in implementation, supports clarity on the types of interventions that can be included under the Program.

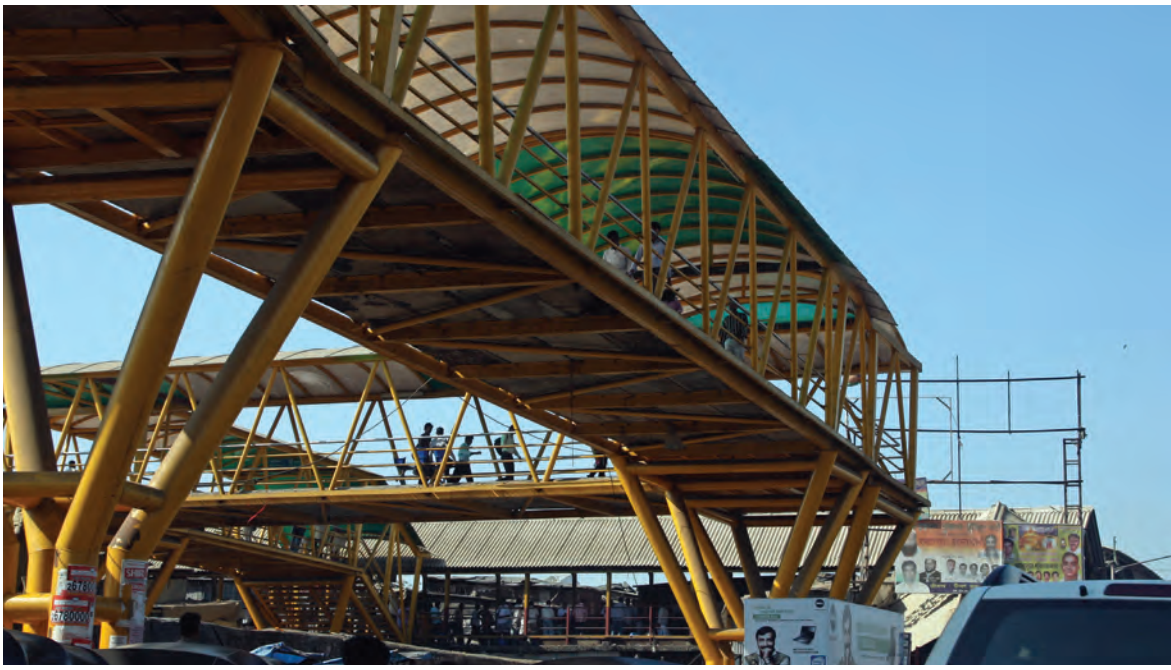
Certain elements, such as an emissions inventory, can help provide a clearer picture of the distribution of emissions in the city, the highest emitting sectors, and future emissions scenarios. This information can be particularly useful in later stages of Program design, such as when planning objectives and targets.

2.1 Mission

The Program mission establishes three important characteristics of an LCCDP: (1) it communicates the Program's purpose; (2) it designates the timeframe in which the municipality will seek to achieve its sustainable/low carbon development goals; and (3) it serves as an opportunity for the municipality to identify itself as the "owner" of the Program. By providing the Program's long-term strategic direction, the mission establishes the framework within which the objectives, targets, and implementation plan are discussed and defined.

The mission should describe the city's vision for the role carbon mitigation will play in short- and long-term social and economic development plans

When determining the mission, it is important not only to articulate the overall purpose of the LCCDP, but also to place sustainable/low carbon development goals in the context of the city's broader socioeconomic growth policies. The mission should describe the city's vision for the role carbon mitigation will play in short- and long-term social and economic development plans, as well as for how sustainable/low carbon development can be an avenue for green and inclusive economic growth. The LCCDP mission must be complementary to city-wide and cross-sectoral development goals in order to promote the sustainability and longevity of the Program.



2.2 Scope

While the LCCDP mission describes purpose and context, the scope details how the municipality will develop the Program and its strategy to realize sustainable/low carbon development benefits. A city-wide GHG inventory can help the municipality define its Program scope. For some cities, the scope will focus on ER strategies for the top emitting municipal sectors. For other cities, the focus will remain on city-wide carbon mitigation strategies. Therefore, the scope should: (1) elaborate on the sustainable/low carbon development strategy that the Program will undertake; and (2) identify the inclusion date, that is, the date from which interventions can be included under the Program (see Box 2-1).

Box 2-1:
Inclusion Date of an LCCDP

One of the challenges a municipality will face while establishing the scope of the LCCDP is determining (and justifying) the inclusion date—the date from which interventions can be included under the Program. Interventions that are initiated after the inclusion date are eligible for inclusion in the LCCDP. For example, the inclusion date can represent the point in time when the municipality started to take action towards sustainability and low carbon development.

An inclusion date that has been set too early (that is, several years prior to development of the LCCDP) may cause stakeholders to question whether the ERs from these interventions are a result of extra efforts, or whether the Program is attempting to capture past ERs from measures that would have been adopted even had there not been a low carbon development strategy in place.

On the other hand, an inclusion date can be set too late (that is, after the municipal government started to take action towards low carbon development). An inclusion date that falls too late may disqualify ERs from activities that derive from the municipal government's focus on a low carbon development strategy, and should therefore be included under the LCCDP and counted towards fulfilling the city's ER target.

A review of the current mitigation activities can help the municipality find a balance in determining the inclusion date. The city should assess whether the implementation of current mitigation activities was driven by a focus on sustainable/low carbon growth—that is, they are a result of the city's response to climate change—or whether they are measures that would have been adopted anyway to fulfill other objectives of the municipality. National regulatory standards or carbon pricing frameworks may also have specific approaches to setting the inclusion date of mitigation actions, which can also be important to consider if the municipality wants its LCCDP to comply with these standards and frameworks.

A review of the current mitigation activities can help the municipality find a balance in determining the inclusion date

2.3 Boundaries

Often, defining boundaries is the most controversial issue related to city mitigation policies and projects, and must be considered carefully

Clearly defined Program boundaries help avoid the risk of inaccurately counting cross-boundary ERs (such as reductions resulting from renewable electricity generated within the municipality but consumed by a neighboring municipality) and decrease the risk of double counting ERs (see Box 2-2). Often, defining boundaries is the most controversial issue related to city mitigation policies and projects, and must be considered carefully.

The boundaries that should be established as part of Program initiation can be separated into the following three categories:

1. *Geographic Boundaries,* the spatial extent of the Program boundary, which in most instances is confined to the governing boundaries of the municipality. However, there are occasions when defining the geographic boundary warrants further scrutiny. For example, a Program that includes a mass transit system that spans multiple cities may be considered in one of the following three ways. One, the intervention may fall under a municipal alliance that fulfills the mission and scope of the Program, and, therefore, the Program's geographical boundary is beyond that of the municipality. Two, the ERs may be split among the municipalities, but the Program would only count those that occur within the city's boundary. Three, a determination may be made that the intervention should be excluded from the Program; however, this should be the last option and considered only if the other two alternatives are not applicable. Further guidance on managing boundary issues can be found in publications such as the *GHG Protocol Policy and Action Accounting and Reporting Standard* (WRI, 2013b).

Box 2-2:
Examples of Double Counting

Double counting ERs can occur in several instances, some of which are described below.

- Two cities may claim the same ERs from an intervention that spans the municipal boundaries of both cities. Thus, defining the geographic boundaries of the LCCDP will allow each city to appropriately claim its own ERs from the intervention.
- Project interventions may participate in offset programs, such as the VCS, CDM or Gold Standard. When establishing whether the intervention is eligible to be included under the LCCDP, determining whether it is seeking registration with any other carbon finance program is necessary. The municipality will be able to track each ER unit and define whether it will be counted towards the municipality's reduction target or sold as a carbon asset, thereby preventing double counting.
- Avoiding double counting of ERs from policy interventions can be complex. For example, policy interventions included under a municipality's LCCDP may be part of crediting nationally appropriate mitigation actions (NAMAs) and may also include Renewable Energy Certificates, which are used in both compliance and voluntary markets. Whether ERs from a policy intervention will be sold on a market or counted towards reduction targets must be determined when assessing eligibility.
- Double counting can also arise when considering ERs at various geographical/governance scales, ranging from local to regional to national. The municipality can consider a nested approach as one option to address the challenges of creating a transparent carbon accounting system that spans multiple scales. Some standards, such as the VCS, have developed methodologies that apply this approach to REDD+ initiatives (VCS, 2012). While the nested approach is fairly new, it has the potential to address many of the complexities of carbon accounting for mitigation activities that occur across multiple scales in a transparent manner.

Clearly defined program boundaries and transparency about the final destination of ERs can help avoid double counting

2. *Emission Sources and Gases,* the sources and types of emissions foreseen within the geographic boundary. Emission sources and gases may be defined at the intervention level, on an intervention-by-intervention basis (particularly in the case of a city-wide Program scope). However, if the municipality has focused the Program scope on key emitting sectors, it may be beneficial to identify the specific gases that will be considered. For example, a Program scope focused on the transport sector would likely include CO_2 and methane (if natural gas is a transport fuel). Nitrous oxide, on the other hand, may not be included, as it is a minor source of total emissions in road transport and depends greatly on vehicle technology, fuel, and operating characteristics.

3. *Operational Timeline,* the period in which the Program is considered to be active and under implementation. The operational timeline should correspond with the designated timeline of the Program mission. When setting the timeline, it is important to consider that ERs from interventions included under the municipality's LCCDP, and therefore counted towards its targets, should materialize within the timeline that the municipality has identified to achieve its overall sustainability/low carbon development goals.

Case Study 2-1 provides an example of establishing the mission and scope from the Rio de Janeiro LCCDP.

Case Study 2-1:
Defining the LCCDP Mission and Scope: Example from Rio de Janeiro

The mission and scope of an LCCDP helps to articulate the motivation, purpose, and timeframes associated with the Program and its interventions. For example, the Rio de Janeiro LCCDP's mission and scope are as follows:

"The scope of the Program is to develop a cross-sectoral, low carbon, climate change mitigation program intensively over the next 2–4 years, with a longer-term implementation period expected (for example, 20 years).

The Program includes interventions with financial commitment confirmed on or after January 1, 2007, as this is the year in which the City of Rio de Janeiro first started taking action in response to global climate change, catalyzed by the publication of the *IPCC Fourth Assessment Report on Climate Change.*" (World Bank and Rio Prefeitura, 2013).

Source: World Bank and Rio Prefeitura, 2013.

2.4 Strategies to Promote Long-term Program Continuity

One of the biggest challenges for the long-term implementation of an LCCDP is ensuring continuity through changes in leadership and shifting municipal priorities. One strategy to promote continuity is to enact legislation that specifically states that the highest priority objectives and targets of the Program are independent from any changes to the municipal administration. Even with a law to support the continuity of Program implementation, mitigating all risks of an administration change with legislation alone is not possible. Gaining broad support and "buy-in" for sustainable development initiatives from stakeholders and political forces in the municipality can serve as an additional safeguard for the Program (and its interventions already underway) from the impacts of an administration change.

Early and structured stakeholder engagement will offer insight into LCCDP feasibility, as well as help align the Program mission, scope, and boundaries with existing conditions in the municipality

2.5 Stakeholder Consultations

Municipalities often have local laws or regulations that require a stakeholder comment period prior to implementation of certain programs and projects. However, cross-sectoral municipal efforts, such as an LCCDP, require a high level of cooperation and coordination across a municipality. Therefore, going beyond the legal requirements and also inviting stakeholder involvement in developing the Program and providing comments on its design and interventions is good practice.

Seeking input from a variety of stakeholders when establishing an LCCDP, including from community members, the private sector, NGOs, and municipal authorities, helps to ensure that both the populations affected by the Program and the institutions responsible for planning and implementation are involved in the decision-making process. In this context, stakeholders could be from entities external to the municipal government, from agencies or departments within the municipal government, and from state and national agencies (to ensure coordination with initiatives at different levels of government). Early and structured stakeholder engagement will offer insight into LCCDP feasibility, as well as help align the Program mission, scope, and boundaries with existing conditions in the municipality. In particular, stakeholder engagement can help identify potential synergies and overcome implementation barriers. Case Study 2-2 describes a community-driven development program in Indonesia, where stakeholder involvement has resulted in particularly successful development outcomes.

If no existing requirements are in place, various models for stakeholder consultations can offer guidance, including requirements for environmental impact assessments, CDM

registration, and registration with a socially-oriented carbon registry, such as the Gold Standard or the Climate, Community and Biodiversity Standard. Typically, stakeholder consultations include:

- At least one public hearing or meeting, announced through both local media and targeted invitations to ensure stakeholders without media access are appropriately informed.
- A 30–90 day public comment period for Program documents, which are available online.
- Interviews and/or focus groups with specific stakeholders.

After stakeholder consultations, along with the Program documents, the following should be prepared: a brief description of the stakeholder consultation process; a summary of the comments received; and a report describing how comments were taken into consideration in the LCCDP's design. Stakeholder consultations can also be conducted periodically as part of the ongoing improvement of the LCCDP.

Case Study 2-2:
Community-Driven Development in Indonesia

NATIONAL PROGRAM FOR COMMUNITY EMPOWERMENT MANDIRI (PNPM - *Program Nasional Pemberdayaan Masyarakat Mandiri*), is the Government of Indonesia's flagship community-driven development program. PNPM invests in small-scale infrastructure projects in individual villages and urban neighborhoods according to the priorities of the local community. In doing so, it aims to increase local employment opportunities and improve the local socio-economic conditions. It was officially launched in 2007, scaling up existing initiatives in both rural and urban areas.

Stakeholder engagement is at the core of PNPM. To identify and plan projects, the Program uses a community planning process, including community consultations, to define investment priorities. It also supports empowerment and capacity building at the local level. The Program has activities in more than 6,000 sub-districts and 70,000 communities in 33 provinces in Indonesia. Evaluations show that the Program has had a positive impact on its communities. As a result, PNPM now offers innovative lessons in community planning, capacity building, and targeting marginalized groups.

Source: World Bank, 2011.

2.6 Municipal Commitment

Once the LCCDP mission and scope have been defined, the municipality's formal commitment to Program delivery must be established, which provides an opportunity for the municipality to reaffirm its pursuit of a sustainable development strategy, as well as promote long-term program continuity. In addition to committing to the Program's goals, the municipality should formalize its commitment to continually reviewing and evaluating the Program's progress towards its objectives and targets.

Municipal commitment may be established through a variety of means, such as a legal instrument, a signed agreement, or a public declaration. Examples of legal instruments include a local environmental law, a specific climate change law, or a municipal planning law that elicits stakeholder participation in the design and planning processes. Commitment can also include a signed agreement with other stakeholders, such as the private sector and civil society organizations, who make a voluntary commitment to the Program. A public declaration that supports sustainable development is the most basic form of municipal commitment and is best accompanied by a legal instrument and/or signed agreement.

As with stakeholder consultations, documenting approval towards the municipal commitment is important, as is the process to gain approval from the various municipal entities involved in developing and implementing the LCCDP. To achieve broader support, the municipality's commitment to low carbon city development should be communicated to all stakeholders, especially those who participated in earlier stakeholder engagement processes, and the public.

The municipality's commitment to low carbon city development should be communicated to all stakeholders

The municipality will have to assess what constitutes a sufficient level of commitment to achieve the Program's mission and scope. Other considerations and tips for establishing municipal commitment to an LCCDP include:

- *Creating a cross-department team* – This could include departments that will fulfill future Program Roles (discussed later in the Guidebook), which can help garner consensus and commitment from the municipal entities that will be involved in Program implementation. This cross-department team can also serve as a mechanism to enhance resilience to changes in the municipal government.
- *Clarifying resources and timelines* – The municipality should clarify the amount of human and fiscal resources dedicated to the Program in the near and long term, to demonstrate the operational commitment to the Program's design and implementation. The level of involvement required by various local government entities should also be clear. The municipality should establish a timeline by which Program implementation should begin (the timeline should allow for a thorough implementation planning process) and ensure that the responsible municipal entities are sufficiently supported and held accountable for achieving the timeline.
- *Abiding by existing laws* – When declaring its commitment towards low carbon city development, the municipality should ensure that its commitment reflects its primary environmental, social, and economic context. The commitment must comply with all applicable legal requirements to which the municipality subscribes (local, federal, international, etc.), but particularly those that relate to ERs.

2.7 Emissions Inventory

During LCCDP design, the municipality will need to set objectives and targets, including measuring success and progress in terms of emissions reduced (as well as co-benefits achieved, which can be an additional way to measure success, described further in Section 3.1.2). An emissions inventory can significantly contribute to setting adequate objectives and targets, as well as help to identify high-emitting sectors on which to focus intervention efforts.

A municipality's emissions inventory can be a central tool in the design and evaluation of an LCCDP that aims to systematically reduce carbon emissions, and provide details on the sources and magnitude of a city's emissions. Sophisticated emissions inventories, with high data quality and preparation resources, can also include the timeframe and geographical distribution of emissions. Forecasting future emissions—that is, emissions that would occur in the absence of the LCCDP—is also useful because it represents a business-as-usual (BAU) scenario. Based on this scenario, assessing potential ERs from Program interventions in a targeted manner is possible.

While an emissions inventory is extremely valuable during Program design, the LCCDP Assessment Protocol does not require a city to have an emissions inventory prior to launching the Program, principally because embarking on a low carbon development path should not be constrained or delayed. However, the Protocol requires that the municipality outline future steps to build an emissions inventory to help evaluate progress towards low carbon city development.

Some considerations and tips for conducting a city-wide emissions inventory include the following:

- *Using an internationally recognized methodology,* such as the *Global Protocol for Community-Scale GHG Emissions* (GPC; C40/ICLEI/WRI, 2012), which follows a standardized approach to city-level GHG inventories. The GPC was developed jointly by the WRI, C40, ICLEI, the World Bank, the UN Environment Programme, and UN-Habitat to harmonize GHG emissions' measurement and reporting processes for cities. This ensures that inventories meet a high credibility standard, are comparable across cities, and are calculated consistently over time (see Case Study 2-3). A standardized approach to GHG inventory calculation also makes it possible to determine the absolute ERs achieved by the city (described further in Section 3.1.2), gauge city-wide GHG impacts of policy actions, and participate in any new market mechanisms based on city-wide ERs that may emerge. Technical resources are available to help guide cities through the process of developing an inventory that complies with the GPC, including ICLEI's *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* (ICLEI, 2013) for US cities, and WRI's *Greenhouse Gas Accounting Tool for Chinese Cities* (WRI, 2013c).

Case Study 2-3:
New York City's GHG Emissions Inventory and Scenario Modeling

NEW YORK CITY provides an exemplary model for city-led emissions inventories. The Mayor's office of Long-term Planning and Sustainability compiles and reports an annual GHG inventory, comparing it to the city's 2005 emission levels published in their first climate action plan, PlaNYC, in 2007. By monitoring against the initial inventory, the city has been able to inform its policymaking and actions, as well as report and demonstrate performance in a transparent and engaging manner for external stakeholders and the general public.

The initial inventory of the city's emissions profile revealed that nearly 75 percent of emissions in New York City are related to heating, cooling, powering, and lighting its buildings. Understanding this profile, the city initiated the Greener, Greater Buildings Program (GGBP), which has updated the city's energy code, required lighting updates, and established a benchmarking process for building owners, among other activities. The GGBP is estimated to ultimately reduce emissions by almost 5 percent, the largest single effect of any of the city's policies in reducing emissions.

Source: City of New York, 2007.

- *Building on previous inventories*, such as the national GHG emissions inventory and ongoing emissions inventory efforts. Countries that are parties to the United Nations Framework Convention on Climate Change (UNFCCC) have committed to submit periodic updates that include national emissions. Emissions inventories prepared for the UNFCCC are consistent among countries, and while they may not be detailed at the municipal or state level, they can often provide basic information and trends, as well as data proxies if local data is not available (UNFCCC, 2013). Past local emissions inventories may be helpful for designing the LCCDP, but they should generally not be more than 5 years old.
- *Identifying resources for inventory development* – While developing an emissions inventory can be intensive in terms of time, money, and data, it is extremely valuable. When conducting an inventory for the first time, assistance from a third party with previous experience, such as a local university or consultancy, is beneficial. During the process, government officials can also undergo inventory training so they can be responsible for future periodic updates.
- *Periodically updating the inventory* – By definition, an emissions inventory quantifies emissions that have occurred in the past; they can only be calculated once the input data is available. These inventories are commonly updated every 2 years, which can help reduce calculation time. City-level GHG inventory-monitoring systems can also be vertically layered with inventory systems at the regional or national level to share data and promote harmonization. When the most recent update includes any change to methodologies or data sources, it is best practice to go back and recalculate past inventories to ensure consistency in baselines and emission trends over time.
- *Identifying key sectors* – The emissions inventory can be used to identify key emitting sectors. Further exploring these sectors can help identify the factors contributing to city-wide emissions or provide background for further analysis, such as marginal cost abatement curves, which show the potential for reducing emissions and associated costs.
- *Establishing future scenarios* – Once a baseline emissions level has been established, preparing scenarios of emissions over time is possible by considering the potential impacts of various interventions. For example, a scenario can be developed by choosing feasible interventions within a priority sector with good ER potential, and estimating emissions and implementation costs. The scenario can then be compared with the baseline to assess potential reductions, as well as with other scenarios to understand which combination of interventions will yield the best results in terms of mitigation and costs (see Case Study 2-3). Building scenarios often requires sound technical, financial, and legal knowledge.

INITIATION

Section

3

PLANNING

Setting objectives and targets

Program roles

Intervention planning

Program implementation plan

EXECUTION

ASSESSMENT/
EVALUATION

Following the decision to develop an LCCDP and the successful determination of its mission and scope, planning must be undertaken. The planning phase focuses on moving the LCCDP from a concept towards implementation, and requires setting objectives and targets, assigning roles and responsibilities, and building a feasible strategy and portfolio of interventions to meet the objectives and targets. As with many programs, the LCCDP's success depends greatly on robust planning at the outset.

In this section of the Guidebook, how to set adequate objectives and targets will be clarified, including developing a strategy and timeline for achieving them. This section will also discuss assigning and communicating responsibilities to municipal agencies or third-party entities for effective Program management. Several stages and associated responsibilities need to be managed in planning and implementing an LCCDP, which requires not only technical and financial capabilities, but also a clear distribution of roles and responsibilities. The planning process is best initiated by selecting the entity that will coordinate and manage the LCCDP (called the Coordination and Management Entity, described further in Section 3.2), and should be well documented in a Program Document (see Box 3-1).

This section will also elaborate on the two types of interventions that can be developed under an LCCDP: policy and project interventions. Planning an effective

portfolio of interventions will help the Program reach its targets. Prospective interventions should initially be screened to ensure they fulfill certain eligibility criteria, as well as undergo a feasibility assessment and a risk assessment.

As interventions start being implemented, relevant information will be generated that will grow in complexity and quantity as the Program develops. The final part of this section describes the Program Implementation Plan, which will provide the roadmap and structure for implementation, and ensure that the appropriate information and documentation procedures are in place. This Plan is a "live" document that should stay relevant by reflecting the most up-to-date status of the municipality's LCCDP.

Box 3-1:
Tips for Embarking on LCCDP Planning

At the onset of the LCCDP planning process, the following should be done:

- **IDENTIFY THE ENTITY THAT WILL COORDINATE AND MANAGE THE LCCDP** (called the Coordination and Management Entity), which is responsible for defining the LCCDP objectives and targets. This entity will also play a key function in assigning Program Roles and Responsibilities, as well as in managing the portfolio of interventions.
- **BEGIN RECORDING IN A PROGRAM DOCUMENT**, which will play a key role in communicating and maintaining the institutional memory of the LCCDP design. This document should be made publicly accessible along with the document that expresses the municipality's commitment to the Program.

3.1 Setting Objectives and Targets

The objectives and targets should be developed using a cross-sectoral approach and, if an emissions inventory exists, reflect carbon performance goals for the major emitting sectors or for the city as a whole

The LCCDP objectives and targets should be measureable and consistent, reflect the mission and scope, and be aligned with the municipality's commitment to the Program. The objectives and targets should be developed using a cross-sectoral approach and, if an emissions inventory exists, reflect carbon performance goals for the major emitting sectors or for the city as a whole.

In the absence of an emissions inventory, the municipality could consider the status of each sector through an assessment that evaluates the adoption of new technology and best practices. This assessment can serve to orient the objectives and targets by identifying priority sectors that will require more attention and additional resources to achieve ERs in a cost-effective way. Sectors that have already adopted advances in technology and other best practices may not require capacity building or support: achieving a greater leap in ERs may require extensive investments, which may not meet the municipality's preferred cost-benefit ratio for the Program.

3.1.1 Objectives

The Program objectives should be linked to the Program mission, and should provide further details on what the Program is designed to accomplish once it is implemented. Program objectives differ from Program targets, which identify specific ER goals.

For example, Program objectives can address the following questions:

- Why is it important to quantify ERs for the municipality?
- How will the Program support green and inclusive growth in the municipality?
- What role does carbon mitigation have in future municipal plans and initiatives?
- Which interventions can be included under the Program and when can ERs be counted towards the Program target?

3.1.2 Targets

Program targets identify specific ER goals. Clear and specific targets help to measure the success of an LCCDP, and can set city-wide ER goals, sector-based ER goals, or a combination of the two. It is recommended that short-, medium- and longer-term targets be set (for example, targets to be reached in 2 years, 5 years, and 15 years, respectively), to serve as a mechanism for continuous evaluation of the Program and its effectiveness. The targets, at a minimum, should comply with all applicable legal requirements, particularly in cities that are subject to mandatory national or regional ER targets. Targets can be set in absolute or relative terms.

- *Absolute ER targets* involve a commitment to reduce GHG emissions by a specified amount. The municipality identifies a base year and quantifies its emissions levels through a city-wide GHG inventory, and can then use the base year as a reference point for its carbon reduction goals. In this context, a standardized methodology for calculating the GHG inventory is essential. An example of an absolute ER target is the target set by the Tokyo Metropolitan Government in Japan (Case Study 3-1).
- *Relative ER targets* frame ERs in terms of the amount of emissions relative to a certain factor, such as ERs "per unit of output" or "per unit of input." This is a good alternative for municipalities with limited resources or limited capacity that may not be able to develop a city-wide emissions inventory prior to implementing an LCCDP—relative targets can help kick-start climate change actions in such circumstances. Identifying a base year when developing relative targets is not necessary. Instead, the municipality can develop an emissions inventory during the implementation process in tandem with collecting data on progress towards the relative ER goals. Relative targets are best for Programs with objectives linked to the development of new technologies and other efficiency improvements, and can be useful for tracking performance and benchmarking. It is important to note that while relative emissions can decrease, absolute overall emissions in the municipality can increase.

The municipality must be clear about whether it is setting an absolute or relative target so that appropriate interventions can be developed and implemented

Case Study 3-1:
Tokyo Metropolitan Government's GHG Reduction Target

IN DECEMBER 2006, THE TOKYO METROPOLITAN GOVERNMENT set the target to reduce its GHG emissions by 25 percent from 2000 levels by the year 2020. It then adopted the *Tokyo Climate Change Strategy* and the *Tokyo Metropolitan Environmental Master Plan* to build on existing programs and chart a path towards achieving the target. Tokyo has experienced success with a variety of low-carbon initiatives, including mandatory GHG reporting, the Tokyo Green Building Program, and Tokyo's first of its kind urban Cap-and-Trade Program.

Source: Tokyo Metropolitan Government, 2011.

The municipality must be clear about whether it is setting an absolute or relative target so that appropriate interventions can be developed and implemented. The municipality should avoid using both kinds of targets, as this may lead to confusion. The *GHG Protocol Mitigation Goals Accounting and Reporting Standard* (WRI, 2013a) is a good resource for other important considerations and examples for setting targets, including types, level, length, and boundaries of targets (for example, 50 percent reduction relative to 2010 emissions; total ERs of 200 tCO_2e; or 50 tCO_2e reduced from a baseline scenario).

Programs that include emissions-trading schemes and offset generation, which involve buying and selling ER units, require quantification in absolute terms in order to track the destination of ERs in a clear and transparent manner. If ERs are retired, they can count towards meeting the LCCDP targets. However, if they are sold, they will be accounted for by the buyer and therefore cannot count towards the LCCDP targets. Clarity on the destination of each ER unit will avoid double counting and dual ownership, which is essential for the Program's credibility.

In addition to specific ER targets, targets can also be set for measurable socio-economic co-benefits. For instance, a city may set targets related to improving quality of life, transport connectivity, or energy access. As with ER targets, it is best practice to have a strong methodology for quantification, a baseline, and a monitoring system in place to track the progress of any additional target that is set.

The coordination and management role should be assigned as soon as possible so that the entity is involved in Program development from the onset

3.2 Program Roles and Responsibilities

A successful LCCDP will have clearly defined roles and responsibilities that reflect the needs, objectives and targets of the Program. A general description of the main roles is provided below, and other assignments and responsibilities may be specified as the Program evolves and complexity increases. The coordination and management role should be assigned as soon as possible so that the entity is involved in Program development from the onset.

When identifying the actors and agencies that will fulfill each of the Program Roles, no conflict of interest should prevent the agency from effectively carrying out its role. The agencies that take on the Program Roles should have sufficient authority to carry out their responsibilities, but should not have the authority to undermine the role of other agencies involved in Program implementation. The institutional architecture of the Program Roles is flexible, as long as the process for assigning responsibility is clear.

3.2.1 Roles and Responsibilities

This Guidebook identifies five roles (outlined below and shown in Table 3-1) that are critical to the successful implementation and efficient coordination of an LCCDP. These roles and responsibilities can be assigned in a variety of ways among municipal agencies, as outlined below. More details on how these roles function during program implementation are given in Section 4. The responsibilities of each of these roles are

intertwined; therefore, communication and accurate information flow between these roles is necessary for the Program's success.

- *Coordination and Management Entity (CME)* – This is the central body that will oversee Program coordination and management, and should be assigned first. It plays a crucial role, as it will manage the execution of every phase of the Program (design, planning, implementation, and evaluation).

  The CME should be invested with the authority to manage the Program's political, institutional, and administrative coordination, and, therefore, must be an agency positioned at a sufficiently high level to ensure it has coordinating authority across all municipal departments. This entity should be authorized to make requests of municipal departments, as well as enforce and monitor compliance. It should also coordinate reports on Program performance, and make recommendations for improvement. The CME also has a responsibility to engage stakeholders and gain their feedback on the Program and its interventions.

  Some of the CME's key responsibilities are to ensure double counting of ERs does not occur and to establish an operation and management system, including appropriate documented procedures for Program implementation. Other responsibilities include determining new interventions to be included under the Program and the final destination of the ERs (that is, whether ERs will be retired internally against the municipality's ER target or sold externally). In addition, the CME is responsible for coordinating all carbon sales and transactions, coordinating with state- and national-level registries, integrating local government actions across sectors during the implementation of interventions, and monitoring and enforcing compliance of other entities involved in the Program. Depending on the capacity, resources, and structure of the government administration, the CME may take on additional responsibilities or, conversely, delegate responsibilities to other entities as needed.

- *Multi-Sector Working Group (MWG)* – This working group is comprised of representatives from across sectors that advise the CME on crucial input during the planning and implementation phases. The MWG deliberates and assesses the eligibility of potential interventions to be included under the Program, and advises on whether to include the intervention under the Program—based on sector expertise, knowledge of existing municipal activities and institutional arrangements, and an understanding of on-the-ground realities within the municipality. Therefore, the MWG should consist of representatives from different sectors to ensure a broad range of perspectives and criteria are considered in the assessment process. The MWG can also provide input on what methodology should be applied to an intervention, as well as recommend whether to retire or sell the ERs.

  The MWG is closely linked to the CME and multiple possibilities exist for a structured relationship between the two. The entity designated as the CME could

Table 3-1:
Roles and responsibilities needed for successful implementation of an LCCDP

	SUMMARY	RESPONSIBILITIES
Coordination and Management Entity, CME	The central body that oversees Program coordination and management.	○ manage the execution of every phase of the Program (design, planning, implementation, and evaluation) ○ manage the Program's political, institutional, and administrative coordination ○ make requests of municipal departments, as well as enforce and monitor compliance ○ coordinate reports on Program performance, and make recommendations for improvement ○ engage stakeholders and gain their feedback on the Program and its interventions ○ ensure double counting of ERs does not occur ○ establish an operation and management system, including appropriate documented procedures for Program implementation ○ determine new interventions to be included under the Program ○ determine the final destination of the ERs (that is, whether ERs will be retired internally against the municipality's ER target or sold externally) ○ coordinate all carbon sales and transactions ○ coordinate with state- and national-level registries ○ integrate local government actions across sectors during the implementation of interventions ○ delegate responsibilities to other entities as needed
Information Management Entity, IME	The entity that coordinates and manages all Program-related information and data.	○ house the Program's MRV system ○ establish clear information and documentation management systems that track individuals responsible for implementing procedures ○ ensure that all involved in the LCCDP are aware of the documentation procedures ○ keep track of the interventions developed, ERs achieved, and transactions involving the retirement or sale of reductions ○ generate annual monitoring reports that a VVE can use to verify ERs ○ report to the CME on data results and data input compliance from the respective municipal departments

	SUMMARY	RESPONSIBILITIES
Assignments linked to interventions		
Multi-Sector Working Group, MWG	The working group comprised of representatives from across sectors that advise the CME on crucial input during the planning and implementation phases.	○ deliberate and assess the eligibility of potential interventions to be included under the Program ○ advise on whether to include the intervention under the Program—based on sector expertise, knowledge of existing municipal activities and institutional arrangements, and an understanding of on-the-ground realities within the municipality ○ provide input on what methodology should be applied to an intervention ○ recommend whether to retire or sell the ERs ○ consider input, or have members, from other stakeholder groups outside the municipal government ○ report opinions, recommendations, and decisions to the CME
Technical Advisory Entity, TAE	The entity that provides technical input to help the proposed interventions move forward through the Program process.	○ identify and recommend an appropriate methodology to quantify ERs ○ recommend the appropriate asset class to pursue (that is, CDM, VCS, Gold Standard, if applicable) ○ estimate the financial information needed to evaluate cost-effectiveness ○ gather input from the MWG, IME, and VVE to ensure that the selected methodologies are aligned with the objectives, data availability, and any monitoring requirements of the Program ○ make the initial estimate of potential ERs to be generated by the intervention ○ report back to the CME for input into its decision-making process
Validation and Verification Entity, VVE	The external body that carries out essential quality control measures to ensure that each ER generated under the Program is real and properly counted.	○ validate/verify the ERs generated by interventions according to its assigned methodology ○ evaluate the appropriateness of new methodologies under the Program ○ certify ERs according to the regulatory standard of a chosen asset class (that is, CDM, VCS, Gold Standard, if applicable) ○ operate externally and independently of the CME and any of the other Program Roles

possibly have the resources and capacity to also fulfill the MWG responsibilities. Another possibility is that the CME serves as a Secretariat to the MWG to coordinate meetings. The MWG can also consider input, or have members, from other stakeholder groups outside the municipal government. In any case, MWG opinions, recommendations, and decisions must be reported to the CME, which should then be held accountable for efficient follow-up.

- *Technical Advisory Entity (TAE)* – This entity provides technical input to help the proposed interventions move forward through the Program process. Interventions are chosen by the CME, based on MWG recommendations. The TAE then identifies and recommends an appropriate methodology to quantify ERs and the appropriate asset class to pursue (that is, CDM, VCS, Gold Standard, if applicable), and estimates the financial information needed to evaluate cost-effectiveness. In this process, the TAE can gather input from the MWG, the Information Management Entity (IME), and the Validation and Verification Entity (VVE; see IME and VVE descriptions below) to ensure that the selected methodologies are aligned with the objectives, data availability, and any monitoring requirements of the Program. The TAE is responsible for making the initial estimate of potential ERs to be generated by the intervention and reporting this information back to the CME for input into its decision-making process.

  Since the TAE is responsible for providing recommendations on the technical aspects of Program implementation, the designated entity should be separate from the CME and have staff with a high level of technical expertise. Furthermore, by separating the Program's political and technical coordination, the municipality can prevent the technical recommendations from being perceived as political actions.

- *Information Management Entity (IME)* – This entity coordinates and manages all Program-related information and data. It houses the Program's MRV system and should be allocated strategically within the municipality's existing data collection structure. The IME must have the necessary mandate to access data; for example, one alternative is to use existing reporting obligations of public agencies, such as those for the national communications to the UNFCCC. The IME should establish clear information and documentation management systems that track the individuals responsible for implementing procedures, as well as ensure that all involved in the LCCDP are aware of procedures. Among its other tasks, the IME should keep track of the interventions developed, ERs achieved, and transactions involving the retirement or sale of reductions. If required by specific methodologies or regulatory systems, the IME will generate annual monitoring reports that a VVE can use to verify ERs. The IME reports to the CME on data results and data input compliance of the respective municipal departments.

  What entity should be designed IME will depend greatly on existing municipal data collection practices and capacity within the municipality. The IME role can also

be assigned to an external entity that is mandated to collect data from municipal departments and report to the CME, or to the CME, provided it has the necessary capacity and capability.

- *Validation and Verification Entity (VVE)* – This external body carries out essential quality control measures to ensure that each ER generated under the Program is real and properly counted. The VVE validates/verifies the ERs generated by interventions according to its assigned methodology, and evaluates the appropriateness of new methodologies under the Program. The VVE can also certify ERs according to the regulatory standard of a chosen asset class (that is, CDM, VCS, Gold Standard, if applicable). To avoid any conflicts of interest, the VVE must operate externally and independently of the CME and any of the other Program Roles.

3.2.2 Guidelines for Assigning Roles and Responsibilities

Determining which municipal entities will take on each Program Role requires insight into the specialized skills, infrastructure, and resources that will be required to fulfill the responsibilities. Once Program implementation has begun, each municipal entity that has taken on a Program Role will need to fully understand its new responsibilities and corresponding expectations, as well as how to interact with other municipal entities during each step of the process.

Each municipality must organize the responsibility structure of its LCCDP in a way that is both appropriate for its resource availability and capacity, as well as for leveraging existing expertise or political positioning

It is not necessary for each role to be taken by a separate municipal entity. Fulfilling multiple roles (except the VVE) is fine, as long as the conceptual distinction among the various roles is maintained and the responsibilities are clear. For example, one municipal entity, which is strategically located within the local administration and has sufficient capacity and expertise, could possibly take on more than one role (or all roles aside from the VVE). Each municipality must organize the responsibility structure of its LCCDP in a way that is both appropriate for its resource availability and capacity, as well as for leveraging existing expertise or political positioning.

However, some considerations and guidelines must be taken into account to avoid potential conflicts of interest stemming from assigning incompatible roles to the same entity. In this regard, the assignment of each role should be subject to the following guidelines:

- The responsibilities and requirements of each role must be completed or delegated by the designated entity.
- The CME and IME assignments are fixed in the short term to maintain Program continuity.
- The composition and attendance of the MWG may vary from intervention to intervention, but the MWG will always report to the CME.

- The TAE and VVE assignments may change from intervention to intervention, and must be clearly stated every time a new intervention enters the Program. For any intervention, TAE and VVE roles must be assigned to different entities to ensure integrity in the audit process and avoid conflicts of interest. The VVE must always be external to the CME.

While the responsibilities and requirements of each role are fixed, the specific assignments of each role may vary over time to reflect changes in the municipal administration and/or structures (that is, with CME or IME) or on an intervention-by-intervention basis (that is, TAE and VVE). Municipalities have a diversity of departments and political economies that can influence the assignment of Program Roles. Some examples for how roles may be organized are outlined in Table 3-2, which can evolve and improve over the lifetime of the Program as capacity increases in the municipality.

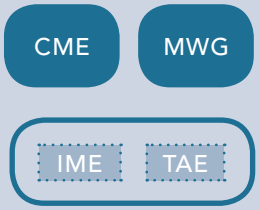
3.2.3 Identifying Characteristics of Municipal Agencies to Adopt Program Roles

3.2.3.1 IDENTIFYING THE CME

The most effective CMEs will be located within the Offices of the Mayor, and assigned through the Chief of Staff and advisory team. Another good choice for a CME is an existing office that advises and implements actions related to climate change mitigation or adaptation. If such an entity does not exist, the CME's role can be assigned to another office or a new office can be created. In all cases, it is advisable to confirm that the chosen entity fulfills a series of characteristics that will help it succeed. For example, does the agency have:

- A high standing in local government, so others will follow its leadership?
- Legal authority for planning and executing strategic interventions, as well as for managing municipal resources?
- A sufficient budget to accomplish the necessary LCCDP tasks (either from its own budget or through other agencies involved in the LCCDP)?
- Political support from high-level officials to design and implement the LCCDP?
- Trust from the public and other agencies within the local administration?
- The leadership and technical capabilities needed to coordinate and manage the LCCDP?

Table 3-2:
Examples for assigning Program Roles and responsibilities

DESCRIPTION	VISUAL REPRESENTATION	
	Internal Entities	**External Entities**
In small municipalities, the CME could also carry out the MWG and IME functions, and seek technical input from an external TAE entity.		
Municipalities with a strong technical information management department could combine the IME and TAE functions.		
Big municipalities could assign each role to a different entity and contract external agencies for the IME and TAE roles. This arrangement could also work for smaller municipalities with limited internal capacity.		
In theory, a high-level, centrally located, well-staffed and well-funded low carbon city development agency with municipal-wide authority and expertise could fulfill the CME, MWG, IME and TAE roles.		

3.2.3.2 IDENTIFYING THE MWG

In most cases, a new group will need to be created to fulfill the MWG responsibilities and advise the CME. Its membership should include representatives from the different sectors in the municipality, to ensure that a broad range of perspectives and insights are considered. Specific people should also be appointed to the MWG to promote continued commitment to the working group. The following questions may help confirm the capacity of the MWG. Does the MWG have:

- Members representing different urban sectors that will be the target of mitigation and adaptation actions?
- Members that are appointed and supported by the sector or entity they represent?
- Members that can make decisions and commitments on behalf of their represented entity or sector?
- Access to the technical and socioeconomic information that will enhance understanding of the challenges and provide the best advice?
- Internal rules of organization and procedures for documenting its work?

3.2.3.3 IDENTIFYING THE TAE

The TAE should have staff with the technical capabilities needed to identify and recommend methodologies, estimate ERs, and conduct cost-benefit and risk assessments of the proposed interventions. Entities that may be suitable for this role include consultants, universities, research institutions, or non-governmental think tanks. Engaging multiple TAEs through the course of the Program can be beneficial, as it engages diverse capabilities and promotes multidisciplinary analysis. Answering the following questions can help determine whether the selected entity is appropriate for the role. Does the TAE have:

- A sufficient number of well-trained technical personnel who are available to accomplish the necessary duties?
- The necessary infrastructure, in terms of access to information and information management (computing facilities, software, etc.)?
- Trust from the public and from the entities participating in the LCCDP?
- The legal authority to participate in this role?

3.2.3.4 IDENTIFYING THE IME

The IME coordinates and manages all Program information and data, and existing organizations may be able to accomplish these tasks, either within the municipal structure or externally. The LCCDP will introduce new and unique duties, such as managing the MRV system, and the selected entity may need to adjust its internal capabilities and

resources accordingly. The IME will also collaborate with the VVE during validation/verification, and should oversee the management of data and information generated as part of the LCCDP. When selecting the IME, the municipality should address whether the IME has:

- The mandate to collect data from various municipal departments, as well as to collaborate with external stakeholders.
- The necessary staff, in terms of availability and capabilities, to carry out the IME responsibilities.
- The necessary infrastructure, in terms of access to information and information management systems (computing facilities, software, etc.).
- Trust from the public and from the entities participating in the LCCDP.
- A sufficient budget to accomplish the IME tasks.

3.2.3.5 IDENTIFYING THE VVE

The VVE is the accredited third party that will verify ERs from the interventions under the Program. In most cases, accreditation is received through national accreditation bodies, but other means of accrediting do exist. The situation may differ across countries, which is why the municipality should define who can be considered a third party and what should be demonstrated in order to receive accreditation. For example, a municipality might specify that a VVE may be any entity that is certified under an existing carbon finance program, such as the CDM, VCS, or Gold Standard.

3.2.4 Assessing Agency Capabilities and Availability of Resources

Designing and implementing an LCCDP requires certain capabilities and local resources. Each case may vary, depending on the Program scope, but the general requirements to consider when undertaking an LCCDP are described below.

1. *Human resources* – The entities involved in the Program must have sufficient capacity in terms of quantity, qualification, training, and availability. Well-trained personnel are necessary to undertake the Program's daily operations, and the municipality is advised to create a matrix to match tasks with the required personnel and skill sets. A training program can help develop skills and transfer knowledge among Program staff.

2. *Sufficient budget* – The municipal budget should be sufficient to accomplish all the necessary management and operational tasks of the LCCDP. Information on

the available and allocated budget can be provided to the IME on a regular basis to help track costs.

3. *A documentation system* – A documentation system will ensure Program personnel are aware of procedures and who holds responsibility. The system should establish the duties related to record keeping, data collection, and the MRV system, which are fundamental to the Program's success.

4. *Legal mandates and terms of reference* – The existing responsibilities of entities participating in the Program should be reviewed, and legal mandates and terms of reference should be prepared if they do not exist for the new LCCDP responsibilities.

5. *Sufficient infrastructure* – The entity must have sufficient infrastructure and equipment to complete tasks, particularly in terms of computing capacity, data access, and information dissemination. An LCCDP requires large quantities of data, and produces information that should be provided to different stakeholders through, for example, the Internet and other media.

In some cases, the capacity required for certain Program Roles already exists within the municipality. Case Study 3-2 provides an example from Buenos Aires, where a municipal department was tasked with undertaking actions related to climate change, which was an area of work initially unrelated to its primary sector/area of expertise.

Case Study 3-2:
Buenos Aires Climate Change Action Plan

In May 2012, the Buenos Aires Environmental Protection Agency (APrA – *Agencia de Protección Ambiental*) Climate Change Operations Team convened a meeting to launch the Urban Risk Assessment (URA) for the City of Buenos Aires. The URA is a flexible framework that helps to strengthen coherence and consensus regarding how cities can plan for natural disasters and climate change; as such, it lays the groundwork for collaboration across multilateral agencies, the private sector, and both national and city governments. The initial meeting to launch the URA process convened representatives from multiple government ministries and agencies, including those responsible for infrastructure, planning, civil defense, modernization, sustainable mobility, financing, treasury, international relations and cooperation, metropolitan police, and census and statistics. During the meeting, the agencies identified key areas in which each could contribute to reducing urban risk in Buenos Aires, ranging from gathering the necessary data to identify at-risk areas to enabling other agencies to develop actions to respond to the risk in question. The meeting provided an opportunity to highlight each agency's skill set and area of expertise.

As a result of the meeting, two previously unrelated agencies were recognized as providing added value to the process: the Census and Statistics Agency and the Ministry of Modernization. The Census and Statistics Agency conducts a yearly data gathering process, which helps identify vulnerable inhabitants and areas within the city. The Ministry of Modernization had recently developed an Open Data Initiative, which was determined to be a viable platform to share and exchange information for urban risk data analysis. While neither was associated with the climate change agenda prior to the URA process, the meeting provided an opportunity to illustrate the ability of agencies working in other sectors to play a significant role in urban climate change adaptation and mitigation plans.

Sources: Buenos Aires Ciudad, 2007; Buenos Aires Ciudad, 2010; Buenos Aires Ciudad, 2012; and Hoornweg et al., 2012.

In some cases, the capacity required for certain Program Roles already exists within the municipality

3.3 Intervention Planning

Policy Interventions and *Project Interventions* are two types of interventions that can be developed under an LCCDP.

- *Policy interventions* are top-down municipal carbon mitigation actions implemented at the municipality's administrative level. For example, policies can be economic, fiscal, or regulatory, and the intervention boundary is typically the municipality's geographic boundary, as this is often the reach of municipality's administrative influence. Policy interventions are dependent on a number of administrative and political processes. Depending on the municipal administration, coordinating political processes and gaining support for policies may lengthen the intervention registration process, which may lead to delays or unpredictable yearly ER rates. Monitoring and attribution of ERs can also be complex with policy interventions, but technical guidance is available (described further in Section 4.1.2.2).
- *Project interventions* are bottom-up carbon mitigation activities that reduce GHG emissions from specific sources within a designated sector and geographical area. Project interventions may be implemented throughout the city or fall within a geographic subsection of the city. In general, when compared to policy interventions, projects tend to have a clearer and more easily quantifiable BAU emissions profile that is reduced as a result of project activities.

Municipal priorities, stakeholder input, and local political and economic contexts play a role in determining the intervention options that could be pursued under an LCCDP. Numerous studies have been written for specific countries and regions about the most

A city-wide energy efficiency policy that includes regulations (for example, building codes, household energy efficiency, etc.) provides the impetus for a city-wide project to replace outdated household appliances with more energy-efficient ones

effective project and policy options to achieve low carbon city development, particularly considering the local political and economic contexts. One example, the book *Sustainable Low-Carbon City Development in China*, is described in Case Study 3-3.

A *policy intervention* may lead to various *project interventions*. For example, a city-wide energy efficiency policy that includes regulations (for example, building codes, household energy efficiency, etc.) provides the impetus for a city-wide project to replace outdated household appliances with more energy-efficient ones. In such cases, exercising caution when counting ERs towards the LCCDP targets is important. For example, ERs from the appliance replacement project may be attributed either to the project or to the overall energy efficiency policy, but not both (which would constitute double counting ERs). For a carbon reduction project that has the necessary financial support and meets other eligibility criteria, implementation risks may be easier to overcome with project interventions than with policy interventions. Case Study 3-4 provides further examples of policy interventions and project interventions.

3.3.1 Eligibility, Feasibility, and Risk

Planning an effective Portfolio of Interventions requires screening all intervention options according to their eligibility, feasibility, and risk profile. The Program's *Eligibility Criteria* is a first check that the intervention is suitable for inclusion. The *Intervention Feasibility Assessment* and the *Intervention Risk Assessment* go into further detail to determine an intervention's potential contribution to the Program's objectives and targets. Figure 3-1 describes the relationship between the Eligibility Criteria, Intervention Feasibility Assessment, and the Intervention Risk Assessment.

These assessments support the development of a diverse and balanced Portfolio of Interventions with a high probability of achieving the Program's full ER potential. Through this three-tiered assessment process, the municipality can identify a set of suitable interventions and develop a comprehensive strategy to manage risks in the short and long term. It also serves as a preventive measure against double counting and dual ownership, and can help municipalities take advantage of any synergies that may exist across interventions and sectors (for example, doing construction on a new dedicated BRT lane while installing energy-efficient street lights along the corridor). Overall, an optimal Portfolio of Interventions will include interventions with different levels of implementation risks, different starting dates, and both policy and project interventions in different sectors.

The *Intervention Feasibility Assessment and the Intervention Risk Assessment* are useful to do both *ex-ante* (that is, before implementation) to determine adequacy and potential of proposed interventions, as well as *ex-post* (that is, after implementation) to determine portfolio performance as part of the periodic control and evaluation process (described in Section 5).

Case Study 3-3:
Country-level Low Carbon City Studies: Sustainable Low-Carbon City Development in China

In its *12th Five-Year Plan*, China set a target to reduce its carbon emissions per unit GDP by 17 percent. Cities will play a central role in achieving this national target, particularly given the rapid rate of urbanization and economic growth in China. To support this goal, the World Bank published the book *Sustainable Low-Carbon City Development in China*. The book is a compilation of policy suggestions and experiences, which were developed based on lessons learned from World Bank sustainable city development activities in China. Key sectors of focus include energy, transport, waste, and water. The book suggests a set of actions that Chinese cities could take, and are already taking, to achieve both economic growth and low carbon development. While designed specifically for China, the suggested actions are also relevant for cities around the world.

Source: Baeumler et al., 2012.

Case Study 3-4:
Future Proofing Cities: Examples of Interventions

The report *Future Proofing Cities* looks at risks and opportunities for inclusive urban growth in developing countries, and offers examples from 129 cities and 100 suggested solutions. The actions usually have varying degrees of difficulty in terms of implementation and/or cost, and range from changes to city codes and creating incentives to education and outreach programs.

Some measures apply to the entire community, such as incentivizing solar installations throughout residential and commercial properties. Other measures apply only to municipal operations, such as instituting a minimum fuel-efficiency standard for the municipal vehicle fleet. These examples draw from cities' climate planning efforts or memberships with city organizations, other planning or sustainability programs, and any planning or project activities related to energy, water conservation, recycling, etc.

EXAMPLES OF TYPES OF INTERVENTIONS:

- Codes and Standards
- Incentives
- Mandatory Requirements
- Government Program or Policy
- Procurement
- Development Policy

EXAMPLES OF SPECIFIC INTERVENTIONS:

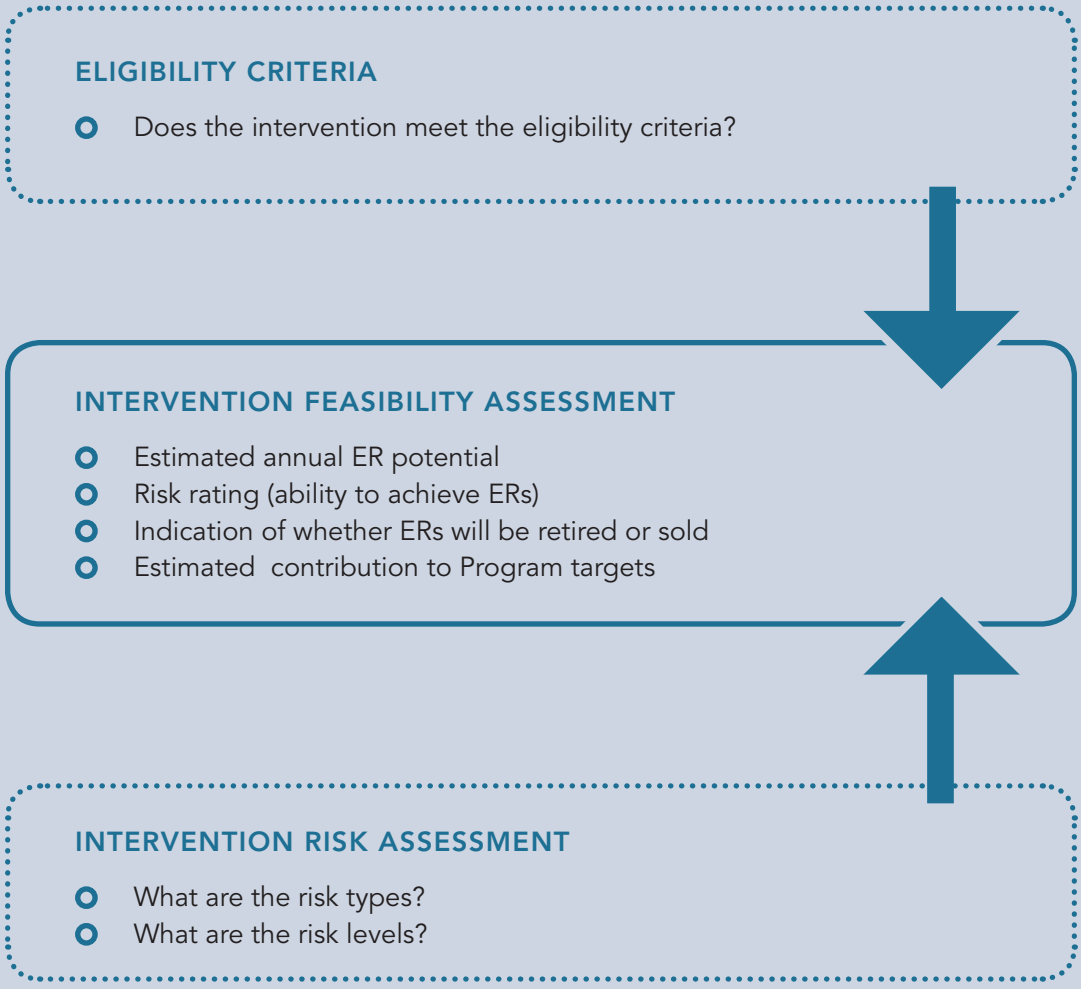
- Upgrading labor force skills to promote flexibility and innovation in responding to climate- and resource-related shocks
- Land management policies and property rights
- Pedestrian- and bike-oriented development plans
- Vehicle quota systems to reduce private vehicle use
- Energy-efficient street lighting
- Solar consciousness in newly built neighborhoods
- Mitigation of urban heat island effects through urban greening
- Flood-resistant infrastructure design
- Grey-water harvesting
- Micro-generation of electricity
- Low-cost enhanced efficiency cook stoves

Source: Atkins Global, 2013.

Figure 3-1:
The relationship between the Eligibility Criteria, the Intervention Feasibility Assessment, and the Intervention Risk Assessment ▼

After conducting the initial eligibility, feasibility, and risk assessments, the municipality will have a greater understanding of:

- The composition of an optimal Portfolio of Interventions;
- The estimated ER potential of the entire Portfolio of Interventions, as well as an estimate for the individual policy and project interventions; and
- Barriers to implementation in the short (1–3 years) and long term (more than 3 years).



3.3.1.1 ELIGIBILITY CRITERIA

If the intervention does not fulfill or is not transparent about all the eligibility criteria, it should not be included under the Program

The *Eligibility Criteria* are a set of requirements an intervention must meet in order to be registered under the municipality's LCCDP, which should be developed in the early stages of Program development. If the intervention does not fulfill or is not transparent about all the eligibility criteria, it should not be included under the Program. Through this mechanism, the municipality can ensure that interventions fulfill certain requirements of the LCCDP Assessment Protocol, particularly those pertaining to preventing double counting and dual ownership of an intervention and its ERs.

While the specific eligibility criteria may change depending on unique conditions in the municipality, in general each intervention must be:

1. *Within the pre-defined intervention inclusion parameters,* which are criteria (in addition to those outlined below) that the municipality sets in advance to determine whether an intervention can be included under the Program. Examples include financial commitment secured on or after the Program inclusion date (defined as part of the LCCDP scope), the intervention's inclusion in the municipality's long-term plan, the existence of a formalized contract (for interventions implemented by an external organization), a well-defined mechanism for implementation, and intervention targets that align with Program objectives and targets. The intervention inclusion parameters should be determined based on existing conditions in the city and municipal processes, and help the municipality clarify for stakeholders which interventions may be included under the Program and why.

2. *Transparent about registration with carbon finance or carbon offset programs (VCS, Gold Standard, CDM, etc.),* which may affect the ownership of the intervention's ERs. Disclosure of an intervention's registration, or intention to register, with such programs will inform the ownership criteria (see #4 below), as well as the decision to retire or sell ERs. This proactively prevents double ownership and double counting by disclosing if the ERs produced are already allocated to another program or entity.

3. *Located within the city's geographical boundaries,* which ensures that laws and regulations of the municipality apply to the intervention.

4. *Under the ownership and/or control of the municipality,* even partially, through either direct implementation or agreement. For example, the intervention may be implemented:
   a) directly by a municipal department;
   b) by a municipal department through a sub-contractor;
   c) by a municipal department through a public-private partnership;
   d) by a civil society organization in cooperation with a municipal department; or

e) through financial or other incentives introduced by the municipality to encourage behavior change (the intervention, in this case, does not include a physical activity).

This helps ensure that the municipality owns the ERs from the intervention. If there are multiple parties involved in implementation or financing, an agreement must be produced that specifies the transfer of ER ownership to the municipality or specifies the terms of shared ownership, including any revenue-sharing arrangement. The terms must reflect that, while ERs from an intervention may be owned by multiple parties in various shares, each individual ER is owned exclusively by only one party. In this sense, it is also good practice to be transparent about sources of financing for interventions.

5. *In a sector governed by the municipality,* which can often vary from city to city. Some examples, based on the sectoral scopes permitted under the CDM and other mechanisms, are:

- Energy industries (renewable/non-renewable)
- Energy distribution
- Energy demand
- Manufacturing industries
- Chemical industries
- Construction
- Transport
- Mining/Mineral production
- Metal production
- Fugitive emissions from fuel (solid, oil, and gas)
- Fugitive emissions from production and consumption of halocarbons and sulfur hexafluoride
- Solvents use
- Waste handling and disposal
- Afforestation and reforestation
- Agriculture
- Forest conservation/REDD+

6. *Not legally mandated by higher levels of government,* such as state or federal governments. If a legal mandate does exist, evidence should be presented to show it has not been enforced to date and that enforcement will improve as a result of the LCCDP. This is to ensure that the ERs are under ownership and/or control of the municipality, and are not double counted by higher levels of government. Good coordination with higher levels of government is important in this regard, as in some cases an agreement may be needed for shared ER ownership (as described above in #4). This is particularly pertinent for countries with international ER pledges and domestic climate change policies.

7. *Shown to result in ERs, of any quantity, that go beyond what would occur in a baseline scenario,* that is, it must add carbon reduction value. The LCCDP aims to develop interventions that add carbon reduction value, which is demonstrated as follows.

All interventions must add carbon reduction value

When, in the absence of the Program,

- the proposed voluntary measure would not be implemented; or
- the mandatory policy or regulation would not be enforced systematically and non-compliance with those requirements is widespread in the municipality.

—OR—

When the Program:

- leads to a greater level of enforcement of the existing mandatory policy or regulation; or
- allows for the reduction of emissions exceeding the mandatory reductions required under existing policy or regulations.

Accordingly, the BAU and baseline emissions are not necessarily the emissions scenario that would have occurred without the existence of the LCCDP. In some cases, interventions that may have been initiated prior to the official adoption of the LCCDP may also add carbon reduction value. It is important to note that interventions that seek to comply with different carbon or climate finance mechanisms, such as the CDM or VCS, will also be required to fulfill the criteria imposed by the relevant regulatory body.

8. *In compliance with all environmental and legal requirements* of the city, state and national governments, which ensures that the intervention embodies environmental and legal due diligence.

3.3.1.2 INTERVENTION FEASIBILITY ASSESSMENT

A balanced Portfolio will include interventions that are easy to implement, as well as those that require a considerable investment in terms of human resources, time, finances, and/or technology

The *Intervention Feasibility Assessment* is an ongoing assessment of the potential contribution of each intervention to the Program's objectives and targets. Periodic reviews of the Intervention Feasibility Assessment will keep the content up-to-date as the Program evolves, thus serving as an evaluation tool that reflects the current status of the LCCDP. During the Planning stage of LCCDP development, the Intervention Feasibility Assessment will serve as an initial scoping of potential interventions before the Program is launched. Future interventions will be further defined and assessed in subsequent iterations, particularly because the Portfolio of Interventions is expected to continue to expand throughout the Program's lifetime. The municipality should determine in the Planning stage how frequently potential interventions under the Program will be assessed (quarterly, bi-annually, or otherwise).

The Intervention Feasibility Assessment will give the municipality a better picture of the resources required to implement the interventions, particularly to help create balance in the Portfolio of Interventions. A balanced Portfolio will include interventions that are easy to implement, as well as those that require a considerable investment in terms of human resources, time, finances, and/or technology. An initial Intervention Feasibility Assessment can help to avoid portfolios that are unrealistically capital-intensive or will not generate enough ERs. In addition, examining the Portfolio in terms of its contribution to green and inclusive growth (that is, environmentally sustainable and socially inclusive economic development) can help overcome political barriers to implementation by leveraging co-benefits (see Case Study 3-5 for an example of co-benefits of bike-sharing programs). Positive and negative interactions of the various policies and actions should also be considered in an examination of the Portfolio, which can help optimize and improve robustness of its implementation. A balanced Portfolio of Interventions allows the municipality to move forward with a number of its planned interventions, even if it is unable to immediately acquire sufficient resources for the more ambitious options.

Case Study 3-5:
Potential Co-Benefits of Bike-Sharing Programs in Cities

Many interventions have multiple co-benefits that promote green and inclusive growth. For example, the potential co-benefits of bike-sharing programs include:

- More transportation options for inhabitants, out-of-city commuters and visitors.
- Better health outcomes, such as potential reduction or slower rise of obesity rates.
- Improved positive, "green" image for the city, which can, in turn, result in increased tourism and a strong business climate.
- Potential to help the city achieve its goals of reducing GHG emissions.
- Potential reduction in vehicular traffic and congestion.
- Less pressure on overburdened transit lines, by allowing subway riders to bicycle on less crowded and/or more direct routes.
- Financial incentives to use bike-share programs as the cost of driving and transit increases.
- City revenues from fees, increased tourism, and bicycle-related sales.

In the Planning stage, the initial Intervention Feasibility Assessment is a high-level scoping of the potential interventions under the Program, and it can take the form of a simple table (for an example, see Table 3-3). The information available at this stage is unlikely to be detailed, highly accurate, and/or precise, which is appropriate for the initial scoping exercise. As the Program goes through the Execution and Assessment/ Evaluation stages, each intervention will be subject to more extensive processes of data collection and analysis (such as the Intervention Registration Process described in Section 4.1.2) that will feed into future iterations of the Intervention Feasibility Assessment.

In the first Intervention Feasibility Assessment, the following information should be assessed for each potential intervention:

1. *Estimated annual ER potential* – The potential volume of ERs per year should be estimated based on ex-ante calculations, that is, before the intervention is implemented (ex-post calculations will verify whether the ERs have in fact been achieved). In the Planning stage, this can be a general estimate and categorized into low, medium, or high volumes (for example, less than 15,000 tCO_2e/year, 15,000–50,000 tCO_2e/year and 50,000 tCO_2e/year, respectively), based on comparable mitigation activities as points of reference. In the Execution stage, each intervention will undergo more rigorous calculations to estimate ERs, which involve using an appropriate methodology to determine baselines and emission reductions. Periodic updates of the Intervention Feasibility Assessment with more precise ER estimates will provide the municipality with better information to help determine whether it is implementing an appropriate mix of interventions.

   It is important to remember that at the time of conducting the Intervention Feasibility Assessment, these values are expected to be **estimates** meant to assist with planning an appropriate Portfolio of Interventions that is likely to achieve the Program's targets. They are not intended to be a confirmation of **actual** ERs achieved by the intervention (which is calculated ex-post).

2. *A risk rating that reflects the intervention's ability to achieve ERs* – Uncertainty related to whether an intervention will be successfully implemented and achieve all of its estimated ERs will always exist. The Intervention Risk Assessment (Section 3.3.1.3) should be used to determine the intervention's risk rating, and guide the municipality through identifying and evaluating the potential risks faced during the design and implementation of the intervention. In subsequent iterations of the Intervention Feasibility Assessment, percentage risk discount rates could be used to provide a better picture of the impact of risk on ER potential.

3. *An indication of whether ERs will be retired or sold* – Each unit of ER generated by the intervention has only <u>one</u> final destination: the sum of units **retired** and units **sold** must equal 100 percent of the ERs generated by the intervention. ERs that are sold may not be double counted towards the Program's ER targets. Therefore, an early indication of the percentage of ERs that will be **retired** toward the targets is essential to estimate an intervention's contribution to the Program targets.

4. *The estimated contribution to the Program targets* – An intervention's estimated contribution to the Program's targets is calculated using the following three factors: the estimated ER potential; the risk rating; and the percentage of ERs that will be retired. The initial Intervention Feasibility Assessment may include a qualitative estimated contribution (that is, low, medium, or high) based on the less detailed/precise data that is available. In the subsequent iterations, however, the contribution can be calculated as the product of the ERs/year, the risk discount rate, and the percentage of ERs retired. It may also include targeted milestones for the short-, medium- and long-term implementation periods.

The Intervention Feasibility Assessment can also be customized based on the municipality's needs and interests. For example, a column with implementation cost could be added to help more explicitly evaluate resource needs. If any socio-economic targets have been set for the Program, an additional column could be added with an estimate of the intervention's contribution towards these targets. The Intervention Feasibility Assessment can be adjusted and modified over time so that it is a useful scoping tool for Program planning purposes.

Table 3-3:
Example of an initial Intervention Feasibility Assessment, which would be enhanced over time as more data is collected and analyzed through the lifetime of the Program

INTERVENTION	**Example Intervention 1**	**Example Intervention 2**
ESTIMATED ANNUAL ER POTENTIAL	More than 50,000 tCO_2e/year	15,000–50,000 tCO_2e/year
RISK RATING (ABILITY TO ACHIEVE ERS; DETERMINED FROM INTERVENTION RISK ASSESSMENT)	Low	Medium
INDICATION OF WHETHER ERS WILL BE RETIRED OR SOLD	Retired	Retired
ESTIMATED CONTRIBUTION TO PROGRAM TARGETS	Medium	Low

3.3.1.3 INTERVENTION RISK ASSESSMENT

Quantification of socio-economic co-benefits can help link the LCCDP's interventions to low-carbon and inclusive growth

The *Intervention Risk Assessment* helps municipalities to identify and evaluate the risks that may hinder the successful implementation of an intervention, thereby affecting its ability to reach its ER potential. When completed for all interventions, the Intervention Risk Assessment provides a snapshot of the overall level of risk for the entire Portfolio of Interventions. It enables the municipality to create a risk matrix that can be used to track interventions and actions needed to address and manage the identified risks. The municipality can then balance the Portfolio of Interventions against its risk management strategy and risk appetite.

The *Risk Types* that are assessed during the Intervention Risk Assessment will vary from municipality to municipality, as each municipality should identify risk types that are specific to the on-the-ground context for implementing its LCCDP (some guiding examples are shown in Table 3-4). Each intervention is then evaluated according to each risk type, and a *Risk Level* is assigned. *Risk Types and Risk Levels* differ between policy and project interventions. For example, policy implementation is dependent on a number of administrative and political processes and, as a result, may require a longer period of time. Policies also take more time to reach their full scale of impact in the municipality. Project interventions are less likely to face the same administrative and political barriers; therefore, they may experience a more straightforward path to implementation. Risk types, such as management or delay risk, will have different impacts on policy and project interventions, as well as on the portfolio as a whole.

Upon completion of the Intervention Risk Assessment, the municipality will have a matrix with risk types and risk levels for all interventions, as well as an overall risk rating for each intervention that can then be inputted into the Intervention Feasibility Assessment. It is good practice to develop a Portfolio of Interventions that distributes and diversifies the risk among all of the identified risk types. This ensures that some interventions can still be implemented should certain risks come to fruition.

The *Intervention Feasibility Assessment and Intervention Risk Assessment* are examples of low-cost, data-minimal methods to help assess and prioritize interventions. These Assessments represent the minimum number of studies a city should conduct when developing an LCCDP. Beyond these assessments, more detailed cost-benefit analyses and intervention prioritization exercises during the Planning stage can also help develop an effective Portfolio of Interventions, and many planning tools designed for cities can be useful. Two examples of planning tools are shown in Case Study 3-6 and Case Study 3-7. In addition, quantification of socio-economic co-benefits can help link the LCCDP's interventions to low-carbon and inclusive growth. Numerous resources exist that can assist cities with quantifying co-benefits for different sectors, such as the US Forest Service tool for calculating the benefits of urban trees, i-Tree (US Forest Service, 2013), as well as the tools outlined in the World Health Organization *Health co-benefits of climate change mitigation – Transport sector* report (World Health Organization, 2011).

Table 3-4:
Example framework for an Intervention Risk Assessment

RISK TYPE	Explanation of risk and justification of assignment of risk levels	Risk Level
MANAGEMENT RISK	If a private company is implementing, there is a risk of change in management or other conditions that may affect project implementation. At a policy level, municipal council approval might be required.	Low/ Medium/ High
FINANCIAL RISK	If an intervention has been identified, defined, and planned, financial constraints could lead to major delays and potential cancellation of the project. The policy's budgetary commitment must also be reviewed. The number and reliability of financers/ funders for a project can have an impact on its risk level.	Low/ Medium/ High
DELAY RISK	An intervention may be facing extreme delays or potential cancellation due to a variety of reasons, the most important being public opinion or emerging environmental/social issues.	Low/ Medium/ High
COMMERCIAL RISK	For activities to be implemented by an external organization, such as a private sector company or an NGO, the municipality will have to enter into a formal contract.	Low/ Medium/ High
OWNERSHIP RISK	Program design should include mechanisms to clearly specify who owns the ERs, which can be done through a contract (in the case of a project) or implementation guidelines (in the case of a policy).	Low/ Medium/ High
MARKET RISK	If the project developer (the municipality or private entity) depends on carbon revenue for project implementation, low prevailing prices or perceived difficulty in raising revenues from ER sales may prompt the developers to abandon the project.	Low/ Medium/ High
QUALITY RISK	ERs for all future interventions will be assessed ex-ante based on the feasibility study or design plans. Any change in the designs or plans may affect the ER volume.	Low/ Medium/ High
TECHNOLOGY RISK	Depending on the project/policy, ERs will depend on adequate availability or correct implementation of technology. In some cases, technology may be scarcely available, uncertain, or even rapidly improving as the project develops.	Low/ Medium/ High

Case Study 3-6:
Carbon Abatement Cost Curve: Example from Shanghai

The Hongqiao region of the Changning District of Shanghai is preparing a low-carbon growth strategy that provides a good example of how a region or city can evaluate and prioritize potential policies and investments using a Carbon Abatement Cost Curve. This tool is used by cities around the world to analyze the cost versus the benefit of interventions, and then prioritize them according to abatement opportunities and cost constraints.

Working with McKinsey to develop a Carbon Abatement Cost Curve (Figure 3-2), the Changning District identified 58 technologies that have the potential to reduce emissions by around 177 $ktCO_2e$ in 2015, or 30 percent of the region's total GHG emissions. It then evaluated the potential technologies using the cost curve methodology, which considers a range of costs and other assumptions to determine the cost-benefit ratio of an intervention. It calculates abatement cost as follows:

Abatement cost = Full cost of abatement ÷ (CO_2e emissions from frozen technology scenario - CO_2e emissions from abatement option)

In this model, full costs include operating and investment costs, as well as savings generated by the actions. They do not include social/transaction costs, communication and information costs, taxes, and consequential impact on the economy. Nevertheless, the model allowed for the clear identification and prioritization of intervention categories by abatement potential, ease of implementation, and the cost/benefit of specific actions taken within each intervention. By comparing cost with abatement potential, policy makers can make smart decisions on contextualized interventions with the greatest impact and least cost.

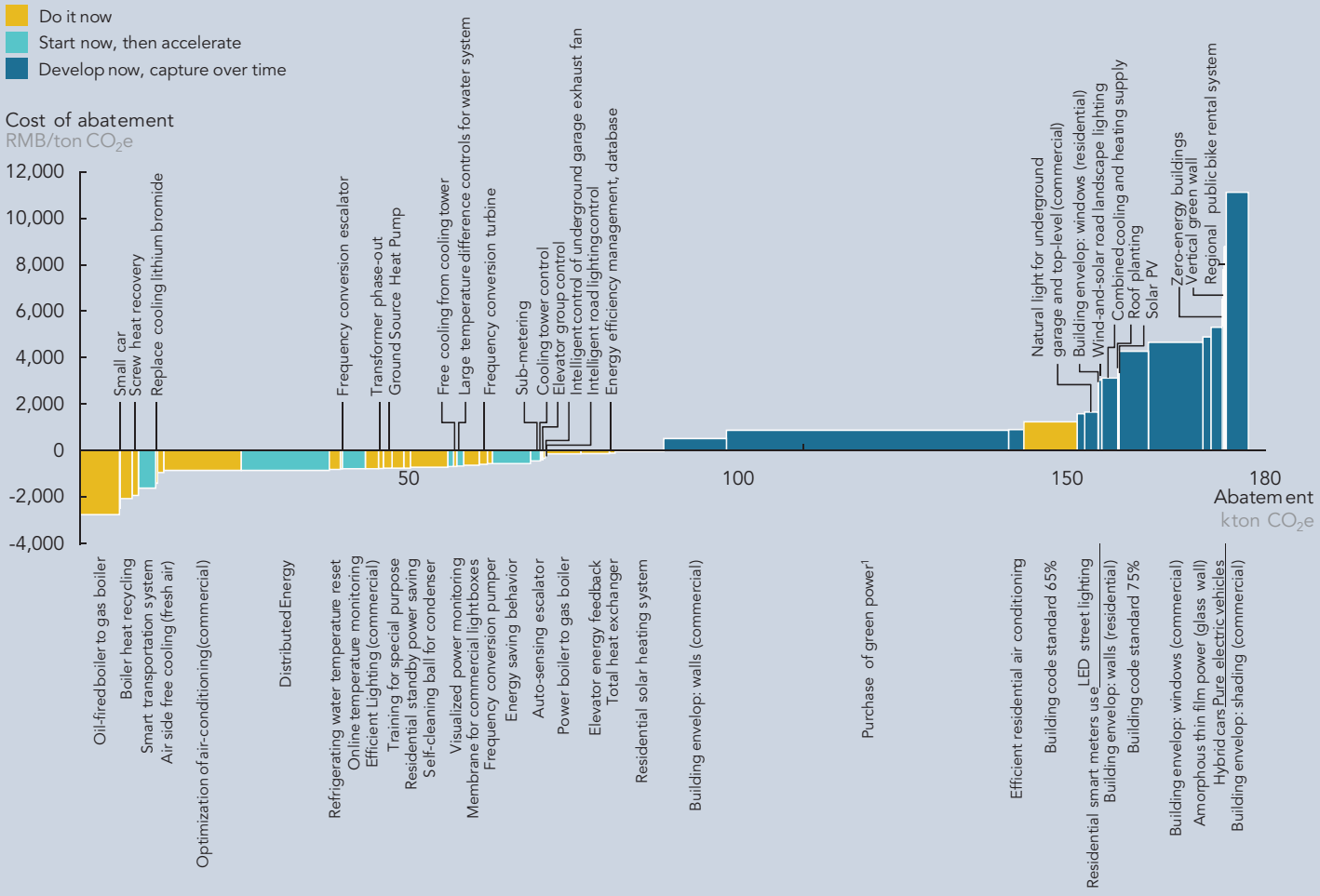
Sources: McKinsey & Company, 2013; and World Bank, 2013.

Case Study 3-7:
Intervention Prioritization: RICAPS Tool

The Regionally Integrated Climate Action Planning Suite (RICAPS) is a user-friendly, Excel-based tool developed by DNV KEMA to help prioritize mitigation actions in US communities, cities, and counties. It proposes an initial menu of about 40 effective measures for GHG reduction. The menu of measures can help cities evaluate interventions via a numerical scoring system. The first step is to indicate the level of importance of several key factors, such as ultimate benefit, implementation cost, and ease of implementation. These factors are divided into three categories—benefit, cost, and feasibility—and represent 16 key performance indicators (KPIs). These KPIs may be quantitative, such as estimated GHG reduction in metric tons, or qualitative, such as "probability of community support or opposition." The tool then provides a cost-benefit analysis for each selected measure. Once data regarding a set of defined assumptions is entered for each measure, the worksheet automatically calculates a value for each KPI (for example, 750 $MtCO_2e$ GHG Reduction). KPI scores are weighted, and each measure receives a total score on a scale of 1 to 5.

Source: San Mateo County Energy Watch, 2012.

Figure 3-2:
Abatement cost curve with ease of implementation in Hongqiao area in 2015



1 Purchase volume is forecasted by surveys. Although emission reduction counts according to statistics rules, it is still debatable
SOURCE: Team analysis

Image source: World Bank, 2013.

3.4 Program Implementation Plan

The LCCDP requires that a number of procedures and systems be in place in order to operate efficiently in the long term, especially as the Program expands and grows in complexity. A *Program Implementation Plan* helps facilitate the implementation of these procedures and systems, sets timelines, and provides a framework for evaluating the success of Program implementation.

Periodic evaluation is important to maintain a roadmap that is relevant to the unique circumstances of each municipality

The Program Implementation Plan should be a dynamic document that can be adjusted over time to meet the needs of the municipality throughout the operational lifetime of the Program. Periodic evaluation is important to maintain a roadmap that is relevant to the unique circumstances of each municipality.

The Program Implementation Plan should outline the municipality's overall strategy to implement the LCCDP, including the following:

1. *Designating authority and work flow between Program Roles* – The level of authority, communication channels, and reporting lines associated with each Program Role should be explicit in order to facilitate effective management of the Program. This structure should be documented within the Program Implementation Plan and revisited during the established evaluation periods to ensure that the information and work flows are functioning as intended and meeting the Program needs of the municipality.

2. *Method and timeframe to achieve objectives and targets* – The municipality should determine its short-term (0–5 years), medium-term (5–10 years), and long-term (10+ years) goals for achieving Program objectives and targets. These goals can be refined by modeling ER potential in different scenarios, ranging from not implementing additional mitigation actions to implementing a very aggressive Portfolio of Interventions. Alternatively, the municipality can work backwards from the ultimate Program targets, setting short-, medium-, and long-term targets in a phased manner (for this method, it is important to note that often achieving GHG reductions at exponential levels in the short term is possible, with the reduction potential tapering off in the long term). The stepwise goals for achieving targets can be set through a sector-by-sector approach, an intervention-by-intervention approach, or a combination of the two.

3. *Benchmarks for the Program interventions* – The Program interventions should have short-, medium-, and long-term benchmarks, which will feed into the goals for achieving the Program objectives and targets. During the evaluation process, these benchmarks will allow the municipality to determine whether the intervention is having its intended effect in terms of achieving ERs. Ahead of the Program launch, benchmarks should be established for those interventions that will be implemented immediately (not necessarily for the entire Portfolio of Interventions).

4. *Timeline for stakeholder engagement, including a reasonable comment period* – The municipality should outline its timeline for stakeholder engagement. Each intervention should undergo a stakeholder consultation process prior to its design to provide additional assurance that the municipality has selected an appropriate range of intervention types. The municipality will have the opportunity to improve the intervention design through this feedback process. Stakeholder engagement can also increase public awareness of the LCCDP itself.

In addition to clarifying the strategic elements above, the Program Implementation Plan should include a short- and long-term timeline for defining specific procedures related to:

- Documentation
- The MRV system for the Program
- The Program Registry
- Periodic evaluations of the Program and Intervention Feasibility Assessment
- Intervention registration under the Program

Table 3-5 provides a sample overview of a timeline for the tasks related to these procedures.

Table 3-5:
Example timeline in a Program Implementation Plan

TASK	SHORT TERM (0–6 MONTHS)	MEDIUM-LONG TERM (6 MONTHS+)
Documentation	Determine how program and intervention documentation will be handled and where it will be housed.	Develop documentation procedures that correspond to key activities in the Program MRV system.
Program MRV System	Determine the data collection and data flow process. Assign responsibility to house data.	Design and implement MRV databases, software, and data delivery protocols to create consistency throughout the Program.
The Program Registry	Determine how ERs generated and verified are handled. Document the decision to retire or sell, as well as the coordination of the retirement or sale. Determine where documentation tracking final destination will be housed.	Determine where retired ERs will reside and the procedure for selling ERs.
Periodic Evaluation of Program and Intervention Feasibility Assessment	Develop initial Program Implementation Plan and determine when the first reevaluation of the Program will occur. Develop timeline for initial Intervention Feasibility Assessment and evaluation of all new projects. Determine frequency of reevaluation.	Determine the frequency of periodic evaluation to ensure it meets the planning needs of the municipality.
Registration of Interventions	List initial interventions to be registered under the Program and projected timeline for registration/implementation.	List additional interventions to be registered under the Program and projected timeline for registration/ implementation.

INITIATION

PLANNING

Section

4

EXECUTION

Intervention design and registration

Monitoring, reporting and evaluation

Program registry

ASSESSMENT/
EVALUATION

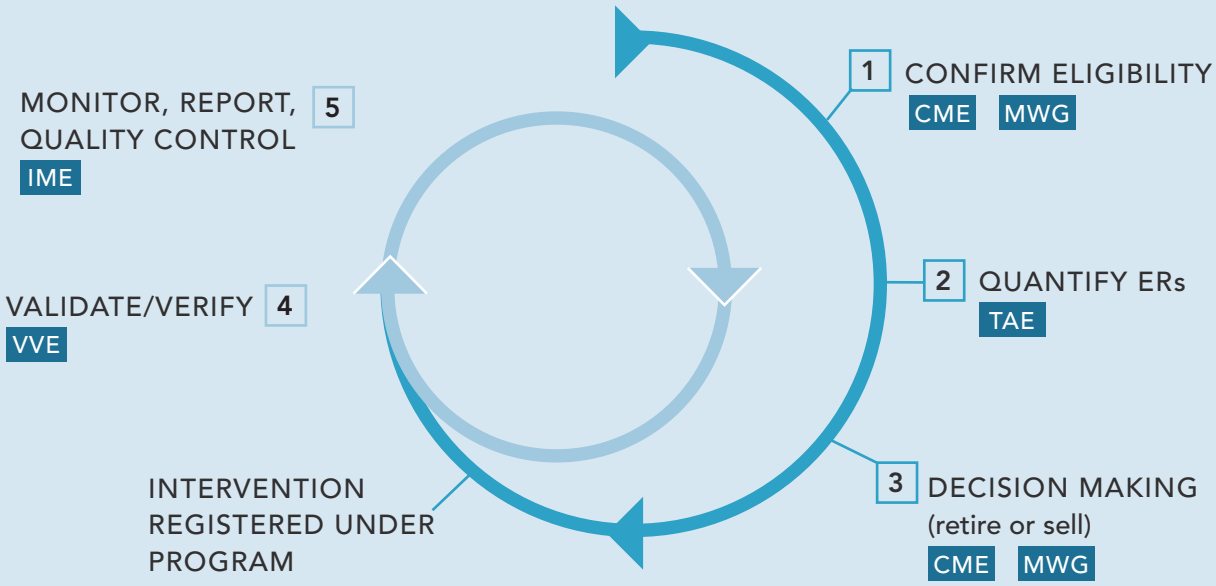
Two main components will require active management once the Program is up and running: the registration of interventions and the management of information generated within the Program. The Execution section describes the principles and processes for intervention registration, as well as the MRV of interventions. Finally, this section provides an overview of the Program Registry's characteristics.

The "project cycle" of each intervention, including its development, approval, implementation, and evaluation, can be divided into two key sub-processes: the Intervention Registration Process and the Intervention MRV Process. These processes are interrelated and flow as shown in Figure 4-1.

During the Intervention Registration Process, every new intervention will undergo an in-depth assessment to determine whether it fulfills the eligibility criteria, select an appropriate methodology to measure ERs, and establish whether the ERs will be retired or sold. The Intervention MRV Process outlines how information and data are managed and then verified to determine the intervention's contribution to the Program targets and objectives. The Program Registry serves as the "bank account" of ERs generated under the Program.

Figure 4-1:
The "project cycle" each intervention follows under the LCCDP. Steps 1–4 relate to the Intervention Registration Process, while steps 4–5 relate to the Intervention MRV Process

Program Roles with responsibilities at each step are shown in the blue boxes.



4.1 Intervention Design and Registration

4.1.1 Principles of Intervention Design

Several critical principles must be taken into consideration when designing a Program intervention, such as:

- *Interventions must be aligned with Program objectives* – Knowing where an intervention stands in relation to targets and objectives (such as whether ERs are retired or sold) will indicate the level of accuracy and detail needed in its design.
- *The scope of the intervention must be clearly set* – The scope includes elements, such as geographical boundaries and type of GHGs to be reduced.
- *ER assumptions should be conservative* – Maintaining conservativeness avoids overstating the intervention's impact and ensures that ERs are not overestimated (Climate Action Reserve, 2011; UNFCCC, 2012).
- *A baseline should be developed for each intervention* – The baseline or a BAU emissions scenario will be the starting point from which ERs are calculated. In general, the baseline or BAU scenario represents the emissions that would have occurred in the absence of the intervention.

- *The methodology to be used in the ER calculations should be defined.*
- *The result of successful implementation should be defined* – Success can be defined in a number of ways, including by the intervention reaching an ER threshold. The municipality should determine the estimated timeline for reaching ex-ante ER targets.

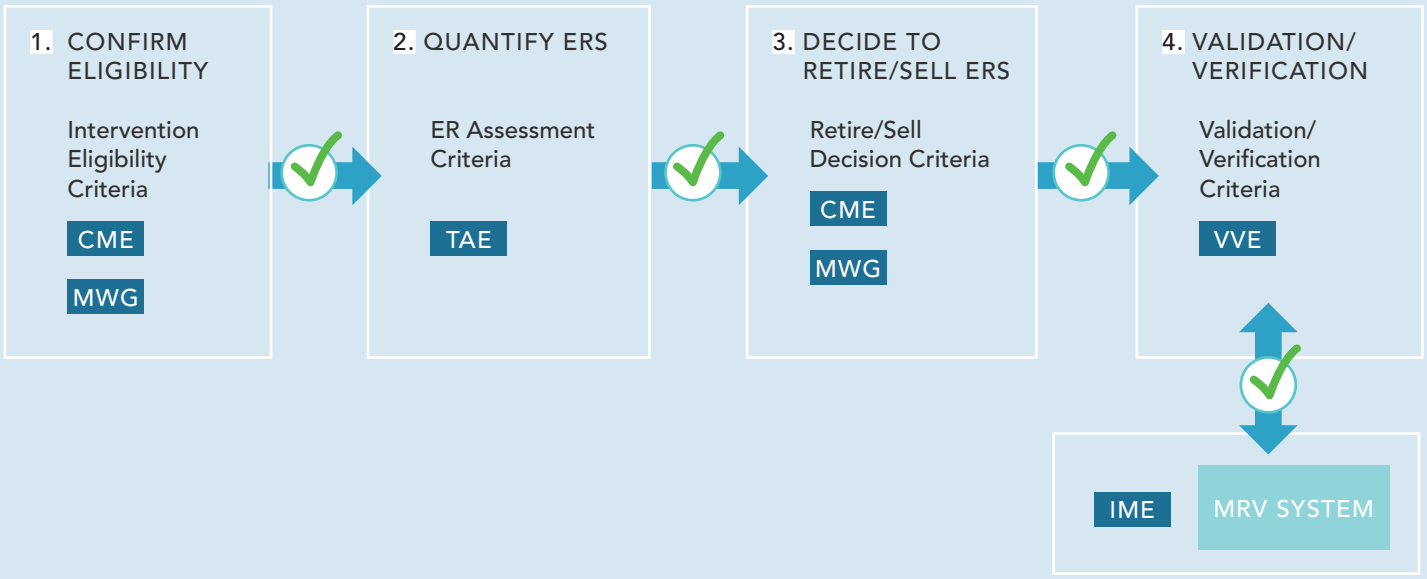
The Intervention Design Document should be a dynamic document that is revisited and updated as the intervention is implemented

The *Intervention Registration Process* captures each of these principles in a comprehensive set of criteria and assigns them to the various Program Roles. Each intervention is defined by an Intervention Design Document that includes a description of the intervention, the initial results of its Intervention Feasibility Assessment, and the documentation that demonstrates fulfillment of all criteria required in the Intervention Registration Process. The Intervention Design Document should demonstrate how the intervention has relevance, completeness, consistency, comparability, and transparency. This should be a dynamic document that is revisited and updated as the intervention is implemented.

4.1.2 The Intervention Registration Process

The Intervention Registration Process, shown in Figure 4-2, consists of four stages: Confirm Eligibility; Quantify ERs; Decision Making (Retire or Sell); and Validation/ Verification (also repeated during the Intervention MRV Process). Advancing from one stage to the next requires satisfactory fulfillment of the corresponding criteria, which must be captured in appropriate documentation, such as criteria checklists, and approved by the CME. The specific criteria for each stage are defined during the design phase of Program development, common to all interventions, and validated against the LCCDP Assessment Protocol by a third party prior to Program implementation.

Figure 4-2: The Intervention Registration Process



4.1.2.1 CONFIRM ELIGIBILITY

This step of the Intervention Registration Process revisits the initial intervention planning and Intervention Feasibility Assessment that was completed during the development of the Portfolio of Interventions. In this more rigorous process, eligibility is established by the CME based on input by the MWG, which assesses intervention eligibility based on the Eligibility Criteria. As described in Section 3.3.1.1, the *Eligibility Criteria* are a set of requirements an intervention must meet in order to be registered under the municipality's LCCDP. If the intervention does not fulfill or is not transparent about all the eligibility criteria, it should not be included under the Program. Through this mechanism, the municipality can ensure the interventions fulfill certain requirements of the LCCDP Assessment Protocol, particularly those related to prevention of double counting and dual ownership of an intervention and its ERs. All interventions must be assessed against the LCCDP's Eligibility Criteria during this step of the Intervention Registration Process.

4.1.2.2 QUANTIFY ERS

The Methodology Assessment Criteria ensure that calculations for the baseline and intervention emissions are more or less consistent across all interventions

Once an intervention has been deemed eligible to be included under the Program, it must undergo an ex-ante assessment of the ERs it will generate. This assessment is completed by the TAE, and includes meeting all of the following *ER Assessment Criteria:*

- A methodology that complies with the *Methodology Assessment Criteria* (see below) is recommended.
- The intervention complies with the applicability conditions of the chosen methodology.
- The initial estimate of ERs to be generated is provided and available data and/or reasonable estimates are used.
- A monitoring plan is provided.
- A recommendation is provided as to which asset class to pursue for the ERs. If the recommendation includes carbon assets, such as certified emissions reductions (CERs) or verified carbon units (VCUs), an assessment of the feasibility and fulfillment of the criteria imposed by the relevant regulatory body is provided.

A methodology establishes the baseline scenario and the requirements for quantifying the ERs of the intervention over time. The *Methodology Assessment Criteria* are used to determine whether a particular methodology should be included under the LCCDP. For example, the following set of criteria is based on international best practices:

- Integrity and avoidance of politically and ethically contentious issues
- Applicability of methodology for the specific intervention type
- Appropriate definition of the intervention's physical boundary

- Procedure for determining the baseline scenario
- Method for calculating the baseline and intervention emissions
- Adequacy of the monitoring methodology, data, and parameters
- Relationship to methodologies already in use by interventions under the Program

Interventions that seek to generate carbon assets, such as CERs or VCUs, will be required to fulfill all of the criteria imposed by the relevant regulatory body

These criteria ensure that calculations for the baseline and intervention emissions are more or less consistent across all interventions. It is another mechanism that helps avoid double counting by making attribution of ERs clear and transparent, as well as increasing methodological consistency among interventions and preventing different interventions from counteracting one another. It allows the municipality to ensure that the claimed ERs, with a reasonable level of assurance, add carbon reduction value, and are real, verifiable, and conservative in nature. Standardized calculations and consistency also provide the technical backbone that makes carbon pricing frameworks possible.

According to these criteria, methodologies developed for and approved by the Boards of carbon finance programs, such as the CDM, Gold Standard, and VCS, can be accepted under the LCCDP. When assessing these methodologies, it is necessary to be confident that the assumptions, values, and procedures used to determine the ERs in the methodology are in sync with the Program guidelines on conservativeness. Interventions that seek to generate carbon assets, such as CERs or VCUs, will be required to fulfill all of the criteria imposed by the relevant regulatory body; for example, the concept of additionality[2] may require considerable attention in this regard.

Regarding the above-mentioned carbon finance programs, the monitoring methodology is often included along with the baseline methodology. The monitoring requirements and metrics of these methodologies should be aligned with the Program's monitoring requirements. This ensures that performance evaluation of individual interventions can be aggregated to assess overall Program performance.

Establishing a baseline for a policy can be more complex than for project interventions, and the *GHG Protocol Policy and Action Accounting and Reporting Standard* (WRI, 2013b) is a good source of recommendations and guidelines in this regard. Alternatively, the baseline may be estimated from similar mitigation policies or projects that have been implemented in other cities or countries with similar conditions.

If an applicable methodology for a particular intervention does not exist, the TAE can identify or develop an alternate one based on global best practices. The new methodology must be assessed according to the principles of the *Methodology Assessment Criteria* described above, and must receive recommendations from both the MWG and a VVE. In the case of new methodologies, some guiding principles for setting baselines can be found in resources such as the WRI and World Business Council for Sustainable Development (WBCSD) *GHG Protocol for Project Accounting* (WRI and WBCSD, 2005) and the technical notes produced by the GHG Baselines Working Group of the Partnership for Market Readiness (for example: PMR, 2013).

2. As per the CDM Executive Board: "The effect of the CDM project activity to reduce anthropogenic GHG emissions below the level that would have occurred in the absence of the CDM project activity." (UNFCCC, 2012).

4.1.2.3 DECISION MAKING: RETIRE OR SELL ERS

A decision must be made to either retire the ERs towards the municipality's self-set ER target or sell the ERs to an outside buyer

Following an initial assessment of the expected amount and asset class of the intervention, a decision must be made to either retire the ERs towards the municipality's self-set ER target or sell the ERs to an outside buyer. The decision to retire or sell follows the *Retire or Sell Decision Criteria*, which include:

- Specifying the amount of ERs generated by the intervention that will be retired and counted towards the municipality's self-set target;
- Specifying the amount of ERs generated by the intervention that will be sold;
- Ensuring the sum of ERs retired and ERs sold equals 100 percent; and
- Confirming that each ER unit generated by the intervention has only ONE final destination—it will either be retired or sold.

It is good practice to also include information about why a particular retire/sell decision was taken, to contribute to the transparency of the LCCDP. This information, as well as the asset type if the ER will be sold, could be of interest for different types of project investors and funders as well.

4.1.2.4 VALIDATE/VERIFY

Before registration, the intervention should undergo validation to ensure quality and integrity. Validation/verification may be conducted at a frequency determined by the CME or the relevant carbon asset regulatory body, if applicable, depending on the methodology used and the chosen asset class. In some cases, validation and verification will be a one-time assessment, while in other cases, a validation process will evaluate the design of a specific procedure and a later verification process will assess whether the results are accurately measured according to that design (verification is described further in Section 4.2). Verifications and/or validations related to ER accounting will always be done by an independent third party, which will check the following *Validation/Verification Criteria*:

- The intervention must comply with the *Eligibility Criteria*.
- The intervention must comply with the *ER Assessment Criteria*.
- The intervention must comply with the *Retire or Sell Decision Criteria*.
- The intervention must be on track to produce/be producing ERs as planned.
- The intervention must fulfill all criteria imposed by the relevant carbon asset regulatory body (if applicable).

Table 4-1 summarizes each step of the Intervention Registration Process and the responsibilities of each Role.

Table 4-1:
Summary of the Intervention Registration Process

	1. CONFIRM ELIGIBILITY	2. QUANTIFY ERS	3. DECIDE TO RETIRE OR SELL ERS	4. VALIDATION/ VERIFICATION
Description	Assessment of the intervention against eligibility criteria for inclusion in the Program	Determination of the methodology and assessment of ERs	Decision to retire or sell ERs	Validation and verification to ensure quality and integrity of the intervention and ERs
Process Criteria	INTERVENTION ELIGIBILITY CRITERIA	ER ASSESSMENT CRITERIA and METHODOLOGY ASSESSMENT CRITERIA	RETIRE OR SELL DECISION CRITERIA	VALIDATION/ VERIFICATION CRITERIA
Roles and Responsibilities	Eligibility is established by the CME based on input by the MWG, which assesses eligibility based on eligibility criteria.	The TAE conducts the assessment of an intervention's ERs. Methodologies under the Program must be assessed and recommended by the MWG. If it is a new methodology, the TAE may work with the MWG and the VVE to identify/develop a methodology based on best practice.	The decision to retire or sell ERs is made by the CME, on behalf of the municipality, with the option of asking for opinions and input by the MWG.	The VVE conducts the validation/ verification with a frequency determined by the CME or the relevant carbon asset regulatory body (if applicable).

**Advancing from one stage to the next requires approval by the CME.*

Each intervention is monitored to quantify ERs generated, as well as any other co-benefits that are tracked as part of the Program targets

4.2 Monitoring, Reporting and Verification

Information and documentation management are keys to demonstrating success of both the Program as a whole and each intervention individually. It is therefore very important that the information generated under the Program be accurate, adequately stored, and accessible. Information and documentation systems can be supported by software tools and can ensure that all metrics are consistent and comparable across interventions as necessary.

MRV has taken an increasingly prominent role in mitigation programs, including national-level LEDS. MRV frameworks provide assurance to stakeholders that the Program meets clear standards and that its implementation is carefully monitored, progress is reported, and results are verified. An effective MRV framework for an LCCDP should be developed in accordance with the municipality's resources and capabilities, while maintaining the high standards necessary for ensuring real mitigation is achieved. Numerous resources are available with guidance about how to establish effective MRV systems, such as the report *Measuring, Reporting, Verifying: A Primer on MRV for Nationally Appropriate Mitigation Actions* (Hinostroza, 2011), *the GHG Protocol Mitigation Goals Accounting and Reporting Standard* (WRI, 2013a), and the *GHG Protocol Policy and Action Accounting and Reporting Standard* (WRI, 2013b).

The LCCDP's MRV system should provide a platform for documenting and reporting information needed to monitor and report, on a regular basis, the key characteristics

of interventions and performance related to the Program's objectives and targets. In this sense, the MRV system is used to track the implementation of interventions, monitor ERs produced by the interventions, enable verification of ERs and issuance of carbon assets to the registry, as well as measure progress towards Program targets. Other metrics related to co-benefits or the Program's implementation, such as financing commitments and disbursements, may also require monitoring.

4.2.1 Principles of Monitoring, Reporting and Verification

4.2.1.1 PRINCIPLES OF MONITORING AND MEASUREMENT

The Program's MRV process serves to evaluate each intervention's performance, as well as the Program's performance as a whole. Each intervention is monitored to quantify ERs generated, as well as any other co-benefits that are tracked as part of the Program targets. The intervention's methodology, established in the "quantify ERs" stage of the Intervention Registration Process, provides the formula for ex-ante ER estimates, which is validated by a third party prior to implementing the intervention. ERs are then verified; depending on the asset class pursued, validation and verification may be merged into one independent evaluation. By comparing ex-ante estimates with actual ERs produced, the municipality can determine whether the intervention is on track to meet the expected ERs over its lifetime.

While it can be relatively easy to quantify ERs for project interventions, quantification can be more challenging for policy interventions, as the causal links between policies and resulting emissions are not always clear. As mentioned above, the *GHG Protocol Policy and Action Accounting and Reporting Standard* (WRI, 2013b) provides recommendations and guidelines for quantifying ERs from policies. Different sets of indicators can also be considered in order to monitor the impacts of policies, as well as co-benefits of interventions.

The MRV structure should be flexible to accommodate a broad set of indicators and metrics that are relevant and applicable to all interventions under the Program. Generally, there are two primary categories of metrics that could be considered in monitoring:

The MRV structure should be flexible to accommodate a broad set of indicators and metrics

- Quantitative metrics, which can be measured using standard measurement units and may include financial, technical, and process data.
- Qualitative metrics, which cannot be measured using standard measurement units, but may likewise include financial, technical, and process data.

Metrics can be further categorized as *inputs* towards low carbon development, or *outputs* of low carbon development activities. For example, inputs might include metrics such as the number of interventions implemented, units constructed, or funds

Case Study 4-1:
Performance Metrics:
Example from Solano County, California

Some counties in the US are implementing climate action plans. Although not as exhaustive and programmatic as the LCCDP, climate action plans incorporate many interesting elements and approaches that can be applicable to the design of an LCCDP. For example, Solano County in California has identified a number of measures (projects and policies) to address climate change and promote sustainable development. To track the performance of these measures once implemented, quantitative indicators have been designed according to a target set for each specific measure. Five of the performance indicators and targets are shown in Table 4-2.

Source: Solano County, 2011.

Table 4-2:
Examples from Solano County Climate Action Plan performance metrics

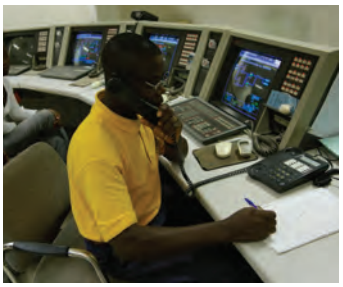
MEASURE	PERFORMANCE INDICATOR	TARGET
Energy Efficiency Program	Percentage of building owners that have performed an energy efficiency retrofit achieving 20% improvement from 2005 efficiency.	40% of Residential by 2020 50% of Low-Income by 2020
New Construction Energy Efficiency	New residential and commercial buildings exceeding Title 24 energy performance by 15%.	100% by 2020
Food-Waste to Energy Biomass Facility	Develop Biomass Facility for a minimum of 3,518 short tons of agricultural by products/ residue and/or municipal solid waste a year.	20% plant efficiency heat to-electricity by 2020
Industrial and Agricultural Energy Efficiency	Percentage of industrial and agricultural processing facilities that increase energy efficiency by 15%.	5% by 2020
Public Transit Mode Shift	Increase in transit mode (that is, bus, rail, ferry).	1% by 2020

Table content from Solano County, 2011.

disbursed for low carbon development activities. Outputs refer instead to the causal relationship between an intervention and the reduction of emissions, for example, the amount of diesel fuel replaced by natural gas in a public transport intervention, from which it is possible to calculate actual ERs. The range of metrics applied to a Program can, and in many instances should, include quantitative and qualitative, as well as input and output metric types. An example of performance metrics used in implementing a climate action plan in Solano County, California, is described in Case Study 4-1 on the left.

The metrics and indicators for monitoring each intervention should mimic the metrics for evaluating performance at the Program level. This will allow for easy data aggregation for all interventions, which is particularly important since different methodologies often require the MRV process to be implemented in a specific manner. Hence, the IME must ensure that the MRV processes of individual interventions are structured in such a way that data aggregation at the Program level is possible. Data collection systems that are applicable across intervention types and sectors facilitate comparison and results aggregation, and should therefore be developed as part of the Program's design and implementation.

4.2.1.2 PRINCIPLES OF REPORTING



Reporting requires systems and resources for data analysis and transfer

The progress on the monitored metrics and indicators should be reported to the CME at regular intervals. In that sense, reporting systems can be anchored in the CME, and potentially be part of open access databases and other transparency initiatives. At the Program level, reporting should focus on delivering an analysis of the results and aggregated progress towards the objectives and targets, as well as other indicators. For example, the reporting process could include the status of elements such as the level of objective achievement, capacity-building efforts related to Program planning and implementation, technical assistance and finance flowing to the municipality from the national level, public funding and private financing, summaries of intervention proposals, and requests for funding. At the intervention level, information related to the implementation of interventions can be reported; for example, links between funding and disbursement for interventions and ERs achieved. Reporting and tracking progress can help the CME avoid duplication of activities in different municipal agencies, as well as obtain the information that needs to be transferred to the Program Registry.

Reporting requires systems and resources for data analysis and transfer, which may be a stretch for some municipalities with insufficient resources. Capacity shortfalls can be addressed by either linking reporting to internal systems, such as financial reporting, or by seeking external assistance within existing administrative structures. For example, the city of Palo Alto in California has its GHG monitoring and reporting electronically tapped into data stored in the city's enterprise management and billing system (Case Study 4-2).

Case Study 4-2:
Automated Information Management Systems: Example from Palo Alto, California

PALO ALTO, CALIFORNIA, is one of the first cities in the US to put in place an automated system for tracking municipal GHG emissions and resource use (electricity, gas, fuel, water, and solid waste).

To achieve the city's ER goals, a "carbon budget" was established for each of the city's 13 departments, each of which was responsible for planning and managing initiatives to achieve GHG reductions. For example, since all resource use is ultimately converted to GHG emissions, the Parks Department may earn GHG savings by reducing water use, whereas the Police Department may earn savings by reduced vehicle use. Each department initially attempted to independently plan and manage its carbon emissions using spreadsheets and other calculation tools, but this quickly became unwieldy. A unified approach was needed—based on the ability to link to common metering data stored in the city's enterprise management and billing system.

Through this software, the city's cost-savings and emissions goals are now monitored and managed, department by department, on a monthly basis. In the first year of usage, the city has saved money and lowered its GHG emissions, thanks to a cleaner mix of transportation fuel and reductions in resource use. In 4–5 months, the system had been loaded with about 100,000 monthly data points by department and spanning from 2005 through the first quarter of 2009. These included solid waste and paper use figures and monthly municipal meter readings for electricity, natural gas, and fleet fuels. By September 2009, Palo Alto's system was managing resource use and emissions data for more than 60 municipal operations, and in the future, the city may investigate expanding this capability to all businesses and residences.

Implementing the program was relatively easy from a technical perspective. The most challenging aspect was establishing detailed departmental baselines, which involved identifying, aligning, and allocating current resource use among specific city departments. Palo Alto's core project team included three or four part-time staff, working over a few months with help from the software provider. An automated interface was developed to load usage data captured in Palo Alto's billing system into the carbon management system.

Source: ALTATERRA Research Network, 2011.

4.2.1.3 PRINCIPLES OF VERIFICATION

Once monitoring and reporting activities have been completed, it must be determined whether the ERs generated have met the compliance criteria set out in the methodology (or standard, etc.) by conducting verification of the ERs. As described above in the Intervention Registration Process (Section 4.1.2), validation evaluates the design of an intervention and its monitoring plan, while verification evaluates the results that are measured (for some carbon finance programs, validation and verification are combined into a single assessment). The MRV process should include provisions for verification of ERs by a third party. In addition, monitoring and reporting activities should themselves be verified, by either an external third party or an entity from within the city government that is independent from the CME and IME. Verification confirms that monitoring and reporting practices are in line with the requirements and needs of the Program, as well as the methodologies used for interventions under the Program. Financial flows relevant to the Program could also undergo verification to promote transparency and prevent corruption. For the LCCDP's MRV system, the verifying body (that is, the VVE) should remain independent from the body that is coordinating and managing the Program (that is, the CME). Many GHG mitigation programs clearly separate the role of verification of the intervention ERs from the actual issuance of the ER assets to the Registry, which provides an opportunity for an additional control check.

4.2.1.4 GOVERNANCE OF MRV SYSTEMS

Every municipality develops policies and legislation in its own way, which will be reflected in the planning and design of its LCCDP, as well as in the implementation of its MRV systems. The legal framework regulating the operation and control of the Program, as well as its ability to interact with other mitigation programs (for example, interventions applying CDM or VCS), will vary from city to city. However, the municipality can begin to create a governance framework for a successful MRV system by considering some key elements, such as:

- Which municipal entities have authority and control over the MRV system and what does that entail?
- Which municipal entities are responsible for implementing which parts of the MRV system?
- Under which system should third parties be accredited (will a municipal entity award accreditation?) and what needs to be demonstrated in order to achieve accreditation?
- Which municipal entity will endorse compliance with the requirements?
- When and with what frequency must reporting be submitted and/or verified?
- What are the consequences of non-compliance with MRV requirements and which municipal entity enforces compliance?

Municipalities will have differing abilities and capacities for establishing the entities and systems needed to perform the MRV tasks. Three levels of institutional maturity should be considered regarding the implementation of MRV systems for an LCCDP:

- *Full capacity:* MRV systems in place (or to be put in place) that are sufficient for reporting and immediately support both the Program and its interventions.
- *Good capacity:* capacity exists, but still requires capacity building to support monitoring and reporting of Program activities and intervention implementation.
- *Limited capacity:* significant capacity building is needed both for the Program and intervention MRV processes.

Developing MRV capacity may require institutional development, education, training, and capacity building

Developing MRV capacity may require institutional development, education, training, and capacity building for the designated municipal departments that will be undertaking evaluation/MRV. Additionally, in order to have an effective MRV system that is taken seriously by all stakeholders, the municipality should consider instituting penalties, which would be imposed when a department does not follow the Program rules and has failed its MRV. These penalties can include payment of a fine for non-compliance, or not recognizing the ERs generated. A penalty system will normally allow the penalized entity to seek recourse on decisions that it believes are incorrect.

4.2.2 The Intervention MRV Process

The *Intervention MRV Process* captures the MRV principles described above in a process and assigns tasks to the various Program Roles. There are five steps in the process, shown in Figure 4-3: Top-down Regulatory Mandate to Deliver Data; Data Delivery; Data Analysis; Results and Compliance Reporting; and Verification of ERs.

4.2.2.1 TOP-DOWN REGULATORY MANDATE TO DELIVER DATA

The CME provides a top-down regulatory mandate to the municipal departments to deliver requested data to the IME. The CME also monitors and enforces compliance.

4.2.2.2 DATA DELIVERY

The IME works with the municipal departments to ensure the necessary data is delivered to quantify ERs and fulfill monitoring plans for the interventions. When fed into the Program MRV, this raw data should provide an early picture of how the overall Portfolio of Interventions is performing. This will give the municipality a sense of the progress made towards objectives and targets, as well as offer an opportunity to recalibrate the portfolio in order to meet the desired goals by adding new interventions.

4.2.2.3 DATA ANALYSIS

The IME conducts analyses according to the chosen methodology to quantify the ERs generated by the interventions, which will enable the municipality to determine whether the intervention is being implemented successfully. If the intervention is not meeting expectations, the municipality will have to review implementation barriers to see whether any adjustments are needed in order to promote behavior change or further support the introduction of new technology, etc.

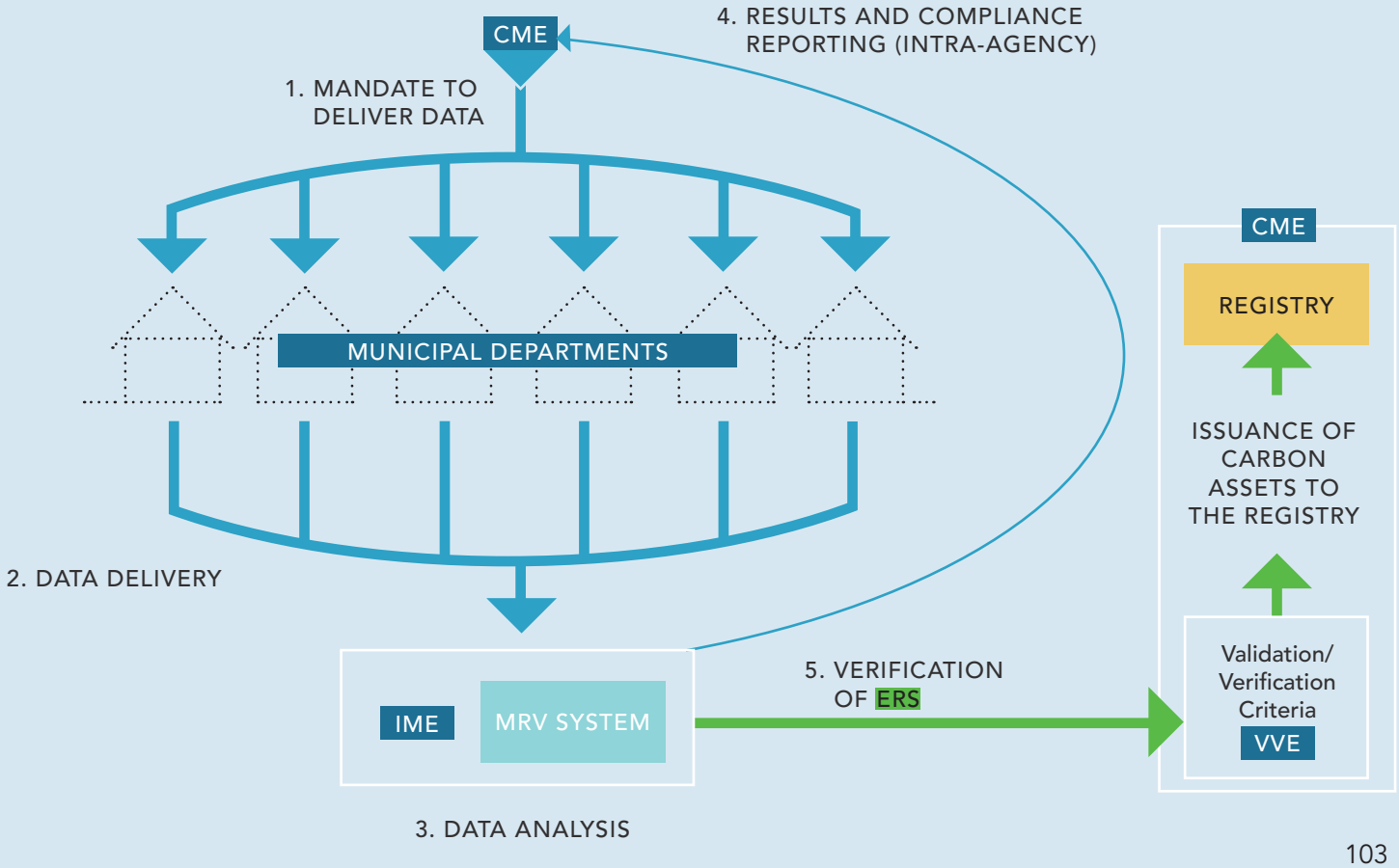
4.2.2.4 RESULTS AND COMPLIANCE REPORTING

Once data has been delivered and analyzed, the IME reports back to the CME on results and compliance. This report should document both expected and unexpected impacts on the environment, society, and economy of the municipality, as well as include any transboundary ER impacts. This occurs at predefined, regular intervals.

4.2.2.5 VERIFICATION OF ERS

Prior to credit issuance, the ERs must undergo verification to ensure quality and integrity. When requested by the CME, a VVE conducts the assessment according to the *Validation /Verification Criteria*. The validation/verification process may be conducted periodically —as determined by the CME or the relevant carbon asset regulatory body, if applicable.

Figure 4-3: The Intervention MRV Process



A Program Registry provides a platform to create, verify, track, and trade/retire ER units, and serves as the bank account of ERs produced by the Program

4.3 Program Registry

A Program Registry provides a platform to create, verify, track, and trade/retire ER units, and serves as the bank account of ERs produced by the Program. The Registry helps prevent double counting and dual ownership, and ensures that each ER has only one final destination: *retired*, and counted toward the Program's ER targets; or *sold*, and therefore not counted towards the Program targets.

The Program Registry should have a consistent method of identifying each ER unit, such as a serial number or other tagging system, which also identifies the ER's asset class. ER transactions will be tracked in the Program Registry as well, and the Registry should also be integrated with regional- or federal-level registries. Again, coordination with higher levels of government is important in this regard: if there is a national crediting program or international pledges exist, approval may be required prior to any issuing of credits for international use.

The information tracked in the Registry must be credible and trustworthy, and the municipality should consider how to support transparency. The level of scrutiny, or precision, of data supporting the verification of ERs required in the registration process will depend on the ER's asset class. For project interventions, this is likely to be more clearly defined through the methodology used to quantify the ERs. However, policy interventions may not have as clear requirements for data precision and detail. The municipality should consider a detail/precision threshold, or benchmark, for including ER units in the Registry to maintain consistency and credibility.

Once Program implementation is under way, the Registry may also serve as the repository of the results of the periodic, city-wide GHG inventory. The Registry could be housed in the inventory in a separate database, and could become an even more powerful tool in informing periodic Program improvements.

The municipality can structure the Registry to be public, partly public, or private. For the purposes of the LCCDP, municipalities should consider a public or partly public Registry so that interested stakeholders can access the information.

In addition to determining the Registry's characteristics, the municipality should clarify which entity will be responsible for maintaining and governing the Registry (that is, where it will be housed). Placing the Registry with an independent institution that has experience with documentation and record keeping will be beneficial—either within the municipality, with another level of government (particularly if ERs are traded as part of a national program), or with an external entity. References such as *The GHG Protocol: Measuring to Manage* report (WRI, 2007) provide good guidance on registry design for corporate GHG management programs, which can also be applicable to the city context. Also, as highlighted in the Planning section, the municipality should determine the timeline for implementing the documentation procedures and for making the Registry operational.

INITIATION

PLANNING

EXECUTION

Section

5

ASSESSMENT AND EVALUATION

Program assessment

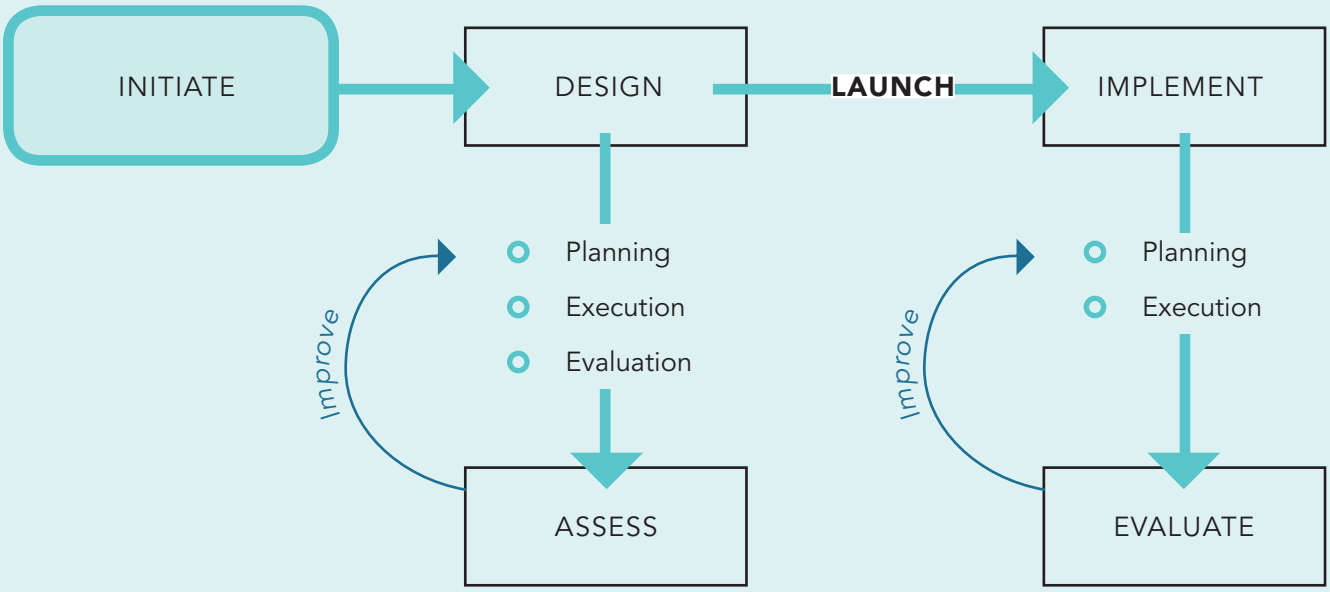
Program/intervention evaluation and adjustment

This section describes the feedback mechanisms that ensure continual Program improvement over time in order to best meet objectives and targets. This stage allows the municipality to assess and learn from the information generated during the previous sections, and is an important part of the systems approach that helps ensure that LCCDP planning and implementation produce successful results.

In this Guidebook, an assessment is conducted to determine the feasibility of implementing the LCCDP and the initial Portfolio of Interventions, *prior to execution*. On the other hand, evaluation is an ongoing process that happens *during or after implementation* and consists of a review of the Program and its stages to determine whether these elements are meeting, or are on track to meet, the Program's established objectives and targets. The relationship between assessment and evaluation is shown in Figure 5-1.

Opportunities for feedback provide insight into whether LCCDP implementation will be or has been successful, and can therefore proceed as planned, or whether any changes are required to ensure that the Program will eventually reach its objectives and targets within the established timeframe.

Figure 5-1:
The design and implementation pathways for the LCCDP, including assessment and evaluation



Flexibility is core to the Protocol design in order to meet the needs of cities globally

5.1 Assessment of an LCCDP against the LCCDP Assessment Protocol

The LCCDP Assessment Protocol, which can be found in full in the Annex, is a list of criteria that, if fulfilled, will determine whether the Program has the necessary components to be successfully launched and implemented. This Guidebook outlines the necessary steps and considerations needed to design and implement an LCCDP that fulfills all requirements of the Assessment Protocol. Once the municipality has developed the LCCDP, an independent and objective assessment of the Program design against Protocol requirements provides an opportunity to improve the Program, as well as to show transparency and obtain stakeholder buy-in.

In 2012, the City of Rio de Janeiro and the World Bank requested an independent third-party review of the design of the Rio de Janeiro Low Carbon City Development Program to assess whether, as documented, it was technically sound and likely to contribute to the achievement of its objectives and targets. Leveraging its expertise in LEDS, working in carbon markets, and designing climate action plans for cities and counties, DNV KEMA developed a protocol with 44 requirements customized for LCCDPs.

The LCCDP Assessment Protocol is aligned with ISO 14064-2, ISO 14001, and the WRI and WBCSD GHG Protocol. Through a review of the Program documents and other information relevant to Program design, the assessment determines whether the Program meets the requirements related to the following aspects: scope and boundary;

objectives and targets; eligibility criteria; roles, responsibilities and authorities; control of records; monitoring and reporting of performance; and compliance with relevant regulations. Flexibility is core to the Protocol design in order to meet the needs of cities globally, regardless of their scale, in developing city-wide, low-emission strategies. The LCCDP Assessment Protocol was created to be an international standard applicable to any LCCDP. As described throughout the Guidebook, the Protocol's requirements help ensure that the Program developers are aware of the key elements that contribute to meeting Program objectives and targets. By including elements such as stakeholder engagement, compliance with regulations, and assessment and evaluation processes, the municipality can overcome some of the barriers to implementation and potentially gain access to new financing sources.

The Protocol is the standard against which a third party will validate a municipality's LCCDP. Third-party validation occurs after LCCDP design, but prior to implementation, thus setting the Program up for success. The validation process is a transparent assessment process in which the audit team documents how each requirement has been fulfilled, or, alternatively, if improvement is needed. Validation ensures that the Program design adequately addresses the 44 requirements of the Protocol.

Commissioning a third-party assessment of the Program supports increased transparency and creates additional value by gaining the perspective of external experts on the design, implementation, and potential barriers to success. This external perspective can help identify new opportunities not previously explored by the Program design team, as well as add credibility to the Program design, objectives and targets, and garner greater support from the municipality's stakeholders.

The typical third-party assessment of an LCCDP will include:

1. *Desk Review of the Program Documentation*

a) **Design documents provided by the municipality (that is, the Program Document and any supplementary information)** – The Program Document provides an overview of the Program design, including elements such as the mission, scope, objectives, targets, implementation plan, and roles and responsibilities. Supplementary information may be provided to offer further insight into those aspects not covered in the Program Document.

Gaining the perspective of external experts on the design, implementation, and potential barriers to success can help improve the Program

b) **Standards, methodologies and tools for assessment (that is, the LCCDP Assessment Protocol)** – An LCCDP should be assessed against the LCCDP Assessment Protocol, which is the standard to be used for this type of program. The Protocol is based on relevant norms, such as: ISO 14064-2:2006 Specification with guidance at the project level for quantification, monitoring, and reporting of GHG ERs or removal enhancements; ISO 14001:2004 Environmental Management Systems – Requirements and guidance for use; and GHG Protocol (Project Accounting Protocol and Guidelines). Program developers should use the Protocol to inform the technical design of the

LCCDP (as described in this Guidebook). As new norms appear and new challenges arise, the Protocol may be updated or expanded. For example, GHG inventories can be assessed according to the GPC, and policies can be evaluated using the *GHG Protocol Policy and Action Accounting and Reporting Standard* (WRI, 2013b).

c) **Documentation used to validate/cross-check the information provided by the municipality** – This can include the municipality's strategic plan, regulations affecting the Program, modeling of ER scenarios, and the city-wide GHG inventory.

2. *Follow-Up Interviews with Program Stakeholders* – Follow-up interviews should be conducted during a site visit to the municipality. The number of days for stakeholder interviews will depend on the size of the municipality, as well as on the complexity of the LCCDP. Stakeholders can confirm or clarify the information in the Program Document and provide further information as needed. The interviews should reflect a broad representation of stakeholders (NGOs, government officials, community members, etc.).

3. *Resolution of Outstanding Issues* – Once the assessment has been conducted, the municipality should resolve any outstanding issues that require either clarification or action. This provides an opportunity for improvement prior to the third party reaching its final conclusion. The third party should indicate non-conformity if the Program does not fulfill a requirement of the LCCDP Assessment Protocol, or if there is a risk that the provisions proposed in the Program Document cannot be implemented as designed.

4. *Final Conclusion* – A positive conclusion confirms that the LCCDP has fulfilled all 44 requirements satisfactorily. A negative opinion indicates that at least one issue could not be resolved, with potentially negative implications for the Program's ability to meet its objectives and targets.

5.2 Intervention and Program Evaluation and Adjustment

The evaluation process of an LCCDP is carried out in two steps: (1) an ongoing evaluation of the Portfolio of Interventions, which includes a review of the results of the Intervention Feasibility Assessment; and (2) a periodic evaluation and adjustment of the Program, based on the Program's performance.

The evaluation of the Portfolio of Interventions compares updated data generated during the MRV process with the original estimates made during the Intervention Feasibility Assessment, which will demonstrate whether the Portfolio has performed as expected and, if not, will identify areas where adjustments are needed. During the first years of implementation, the Portfolio of Interventions may need to be reviewed more often (for instance, every six months) in order to reflect any changes to the Program Implementation Plan. However, as Program implementation continues, the municipality can change this frequency in order to meet its planning needs.

The second step is an evaluation and adjustment of the overall Program. The aggregated performance of the Portfolio of Interventions can provide an overall understanding of the Program's performance against its targets and objectives. Program evaluation should dive deeper and explore the suitability of the Program design for meeting the municipality's needs. This will allow for the Program to be revised and adjusted as needed. Program evaluation and adjustment should be done considering results against scope, objectives, targets, relevance to evolving market conditions and incentive

instruments, and status of the Program Implementation Plan. Conducting stakeholder consultations again at this stage can be a useful way to gather valuable suggestions for Program improvement.

This process of continual evaluation and improvement ensures that the Program stays relevant over its operational lifetime

The municipality should establish, implement, and maintain a procedure for periodic updates and evaluation of compliance with the plans and targets of the Program, and, when applicable, with legal requirements for achieving ERs. Evaluation parameters and frequency should be established before Program implementation. This process of continual evaluation and improvement ensures that the Program stays relevant over its operational lifetime. For an illustrative example, see Case Study 5-1.

Case Study 5-1:
Cape Town's Action Plan for Energy and Climate Change: Moving Mountains

Moving Mountains, Cape Town's Action Plan for Energy and Climate Change, addresses the challenges the city faces in trying to be a low-carbon and resilient city. Cape Town has begun to reduce what is considered a high-carbon footprint when compared to similar cities. In doing so, it has to contemplate challenges such as energy security, and rapid urbanization and associated energy poverty, and evaluate urban sprawl patterns and growing populations in areas vulnerable to climate change. Given the rapidly changing circumstances in the city, Cape Town has readjusted its climate change policy and practice on many occasions to ensure its approach is relevant and effective.

Cape Town adopted its Integrated Metropolitan Environmental Policy in 2001, recognizing the need for an active shift from BAU to a focused sustainability agenda. This approach highlighted the need for integration to increase the city's commitment to resource conservation. In 2003, after the city's *State of Energy Report* was released, the city developed the 2006 *Energy and Climate Change Strategy*, which established a clear vision with measurable targets and objectives for all energy activities, and responded to the energy supply and demand profile developed in the *State of Energy Report*. As a result of the 2006 Strategy, the city included "Energy for a sustainable city" as one of eight priority areas in its 5-year *Integrated Development Plan*. This led to the creation of an Energy Committee in 2008, which reports directly to the Executive Mayor. In 2009, the Executive Management Team Subcommittee on Energy and Climate Change was established. As part of this evolving process, the Council approved the *Energy and Climate Action Plan* in May 2010, making Cape Town's commitments operational and providing a flexible framework that allowed the city to prioritize, budget for, implement, monitor, and evaluate its energy and climate change program. The Action Plan is managed and coordinated across all directorates by the city's Energy and Climate Change Unit, and includes 11 objectives with targets and detailed implementation plans that involve 40 programs and over 120 projects.

As emerging data and analysis have revealed new challenges that must be overcome in order to accomplish low-carbon, resilient growth, Cape Town has remained flexible. The city has undergone significant institutional changes to ensure proper alignment, ownership, accountability, and adequate resourcing for the Action Plan to be successful.

Sources: City of Cape Town, 2011; Resilience Alliance, 2006.

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Annex
LCCDP Assessment Protocol

The LCCDP Assessment Protocol is aligned with ISO 14064-2, ISO 14001, and the WRI and WBCSD GHG Protocol. Flexibility is core to the Protocol design and its application, in order to meet the needs of cities globally in developing city-wide, low-emission strategies, regardless of their scale. The 44 requirements of the LCCDP Assessment Protocol are as follows:

PARTICIPATING MUNICIPALITIES AND SCOPE OF THE LOW CARBON CITY DEVELOPMENT PROGRAM

1. The Low Carbon City Development Program (LCCDP) shall assist the Municipality in achieving sustainable development through the implementation of an LCCDP that includes specific reduction targets based on a municipal-wide emissions inventory that upon implementation allows for periodic evaluation.

   The Municipality has defined the scope of the LCCDP within the possible contributions to sustainable development and the development of a low carbon Municipality, including the start date and length of the Program.

3. The boundary for the LCCDP, in terms of a geographical area within which the Program will be implemented, is defined.

4. The LCCDP shall have been developed and implemented with the approval of the Municipal authorities.

5. The LCCDP shall include provisions to ensure that future political changes will not affect the existence of the Program.

6. The LCCDP includes a process for involving local stakeholders in developing policies and projects under the Program, including a public comment period.

7. The LCCDP aims to develop measures for reducing greenhouse gas (GHG) emissions that add carbon reduction value, which is demonstrated as outlined below.

   When in the absence of the Program:
   a) the proposed voluntary measure would not be implemented; or
   b) the mandatory policy/regulation would not be enforced systematically and non-compliance with those requirements is widespread in the Municipality.

   —OR—

When the Program:

a) leads to a greater level of enforcement of the existing mandatory policy/ regulation; or
b) allows for emission reductions (ERs) exceeding the mandatory reductions required under existing policy or regulations.

8. The Municipality has taken into account an initial GHG emissions level, which is defined in either absolute or relative terms and serves as the baseline for implementation of the GHG ER objectives and targets to contribute to low carbon city development.

   The Municipality has developed, or over time intends to develop, a municipality-wide GHG inventory to evaluate the effectiveness of the actions implemented towards real low carbon city development. The GHG inventory shall provide sectoral data, including the most representative sectors present in the Municipality. The GHG inventory includes data allowing for the reasonable calculation of a business-as-usual (BAU) emissions growth.

9. The Municipality has established a process for calculating the GHG emissions inventory and updating it periodically. This process includes: definition of responsibilities and authorities; data collection and consolidation; quality control; and periodic review. The GHG inventory shall be third-party verified.

PROGRAM POLICY, OBJECTIVES AND TARGETS

10. The Program identifies the responsibility for defining the Municipality policy, objectives and targets for low carbon city development.

11. The Program defines a Municipality commitment declaration towards low-carbon city development and, within the scope of the Program, that:
    a) is appropriate to the Municipality and its main environmental, social and economic impacts;
    b) includes a commitment to continued improvement;
    c) considers strategies for decoupling GHG emissions from economic growth within the largest emitting economic sectors as defined within the Municipal city inventory;
    d) includes a commitment to comply with applicable legal and other requirements;
    e) subscribes to its own ER commitments;
    f) provides the framework for setting and reviewing low carbon city development objectives and targets;
    g) ensures ERs are not double counted;
    h) is documented, implemented and maintained;
    i) is communicated to all stakeholders; and
    j) is available to the public.

12. The Municipality shall establish, implement and maintain documented low carbon city development objectives and targets.

13. Objectives and targets shall be measurable, where practicable, and consistent with the low carbon city development declaration, including commitments to:
    a) reduce GHG emissions;
    b) comply with applicable legal requirements related to GHG emissions, and with other requirements to which the Municipality subscribes; and
    c) continual improvement.

14. The Program's objectives and targets shall cover different major emitting sectors as defined by the Municipality's GHG inventory. The final decision process to establish the objectives and targets shall consider, among other things, a cost-benefit analysis of the potential achievement through interventions in different sectors, technological options, financial, sectorial development goals and business requirements, and views of interested parties.

    Upon developing policies or projects outside of the top emitting sectors, the Municipality should execute a cost-benefit analysis of the potential achievement through interventions in lower-emitting sectors compared to higher-emitting sectors. This analysis shall include:
    a) technological options;
    b) financial considerations;
    c) potential contribution to sustainable economic development; and
    d) stakeholder input.

15. The achievement of the Program objectives and targets is planned through the implementation of a portfolio of policies and projects over a defined time period. The portfolio shall represent a combination of cost-effective, implementable actions, representative of the major GHG emitting sectors based on the Municipality-wide inventory.

16. The Municipality shall establish, implement and maintain a plan(s) for achieving its objectives and targets, which shall include:
    a) designation of responsibility for achieving objectives and targets at relevant functions and levels of the Municipal organization;
    b) the means and timeframe for achievement;
    c) benchmarks for selected policies and projects; and
    d) a process for stakeholder engagement, including a reasonable public comment period.

17. The Plan shall include the following aspects for the implementation of policies and projects to be incorporated in the Program:

a) timeline for incorporation;
b) estimated mitigation potential;
c) analysis of implementation barriers, which allow planning to be classified in short-term (1–3 years) and long-term (>3 years) execution;
d) periodic (e.g., annual) targets for the each policy/project;
e) monitoring and reporting system; and
f) assessment processes (e.g., third-party verification) for progress achieved by each policy/project.

ROLES, RESPONSIBILITIES AND AUTHORITIES

18. The Municipality shall ensure the availability of resources essential to establish, implement, maintain and improve the LCCDP. Resources include human resources and specialized skills, organizational infrastructure, technology and financial resources.

19. Roles, responsibilities and authorities shall be defined, documented and communicated in order to facilitate effective management.

20. The Municipality shall appoint a coordinating management entity that, irrespective of other responsibilities, shall have defined roles, responsibilities and authority for:
    a) ensuring an LCCDP is established, implemented and maintained in accordance with the requirements of this Protocol;
    b) ensuring ERs are not double counted; and
    c) reporting to a selected entity appointed by the Municipality on the performance of the Program for review, including recommendations for improvement.

DOCUMENTATION, DOCUMENT CONTROL AND CONTROL OF RECORDS

21. The coordinating management entity shall establish an operational and management system, including documented procedures when appropriate, for Program implementation. Program documentation shall include or refer to other documents that include:
    a) documentation of the Program boundary in terms of a geographical area within which all policies and projects will be implemented;
    b) length of the Program;
    c) Program policy, objectives, targets and plans;
    d) a description of responsibilities and authorities;
    e) document and record keeping procedures for the Program and each policy/project to demonstrate conformity with the Protocol's requirements;
    f) documented procedure to avoid double counting; and
    g) documented procedures for periodic evaluation of the impact of policies and projects implemented under the Program.

22. A Program Registry, which tracks offsets that are either cancelled or sold, is periodically updated, and serves as the record of all transactions of ERs from interventions included in the Program.

POLICIES DEVELOPED UNDER THE PROGRAM

23. The Program includes the implementation of Policy interventions that contribute to the objectives and targets agreed to in line with the LCCDP of the Municipality.

24. A documented procedure to develop, approve, implement and periodically evaluate Policy interventions, including the definition of responsibilities and authorities.

25. The Program objectives and targets include conservative ER estimates from Program policies.

26. A baseline shall be established for each of the policy interventions implemented, in a transparent manner and taking into account relevant, national/local and/or sectoral policies and circumstances.

27. The ERs achieved through policy intervention implementation shall be additional to those in the baseline scenario, real and measurable, and provide long-term benefits related to climate change mitigation.

EMISSION REDUCTION OFFSET PROJECTS DEVELOPED UNDER THE PROGRAM

28. The Program includes the implementation of project types that contribute to the objectives and targets developed in line with the Municipality's LCCDP.

29. A documented procedure to develop, approve, implement and periodically evaluate those projects participating in the Program was developed.

30. Eligibility criteria for each project type allowed under the Program are defined, which shall address the demonstration of additionality, and the type and/or extent of information (e.g., criteria, indicators, variables, parameters or measurements) that shall be provided by each project to ensure its eligibility.

31. The Program establishes the ER methodologies, which can be applied to offset projects under the Program.

32. In the case of ER methodologies approved by other programs, the LCCDP documentation established an evaluation procedure of other programs/methodologies to ensure that those accepted under the LCCDP are cohesive with respect to:

a) additionality;
b) conservativeness of the ER estimation/calculation; and
c) monitoring requirements.

33. The Program defines the level of accuracy/precision accepted for the ERs calculated with the approved methodologies.

34. In the case of methodologies not approved by an accepted program, the LCCDP documentation establishes a process for approving a methodology, which includes the minimum criteria that all methodologies shall comply with so that ERs claimed using those methodologies are additional, real, verifiable and conservatively calculated with a reasonable level of assurance.

35. The Program objectives and targets include ER estimates from projects under the Program that are conservatively calculated.

36. The ERs achieved through offset projects shall be additional, real and measurable, and have long-term benefits related to the mitigation of climate change.

37. The Program includes provisions to ensure that ER projects under the Program are in compliance with ISO 14064-2.

38. Additionality of a specific project is demonstrated using the procedure provided in the baseline and monitoring methodology applied.

39. A baseline shall be established on a project basis, in a transparent manner and taking into account relevant national/local and/or sectoral policies and circumstances.

40. The Program shall ensure that the evaluation of environmental impacts of the projects, including transboundary impacts, is undertaken, when applicable, and is in accordance with the applicable regulations.

MONITORING AND REPORTING ON PROGRAM PERFORMANCE

41. The Municipality shall establish, implement and maintain a procedure or procedures to monitor, on a regular basis, the key characteristics of its activities that can have a significant impact on low carbon city development, including:
    a) city-wide GHG inventories; and
    b) policies and projects implemented under the Program

    The procedure(s) shall include the documenting of information to monitor performance and conformity with the Program objectives and targets.

42. Consistent with its commitment to compliance, the Municipality shall establish, implement and maintain a procedure or procedures for periodically evaluating compliance, when applicable, with legal requirements for GHG ERs. The Municipality shall evaluate compliance with other voluntary requirements to which it subscribes.

43. The Municipality shall review Program performance at planned intervals, to ensure continued suitability, adequacy and effectiveness. Reviews shall include assessing opportunities for improvement and the need for changes to the LCCDP, including policy, objectives and targets.

VERIFICATION OF POLICIES AND PROJECTS UNDER THE PROGRAM

44. The Program includes provisions for the assessment and verification of ERs from policies and projects under the Program by a third independent party against ISO 14064 or other relevant standards.

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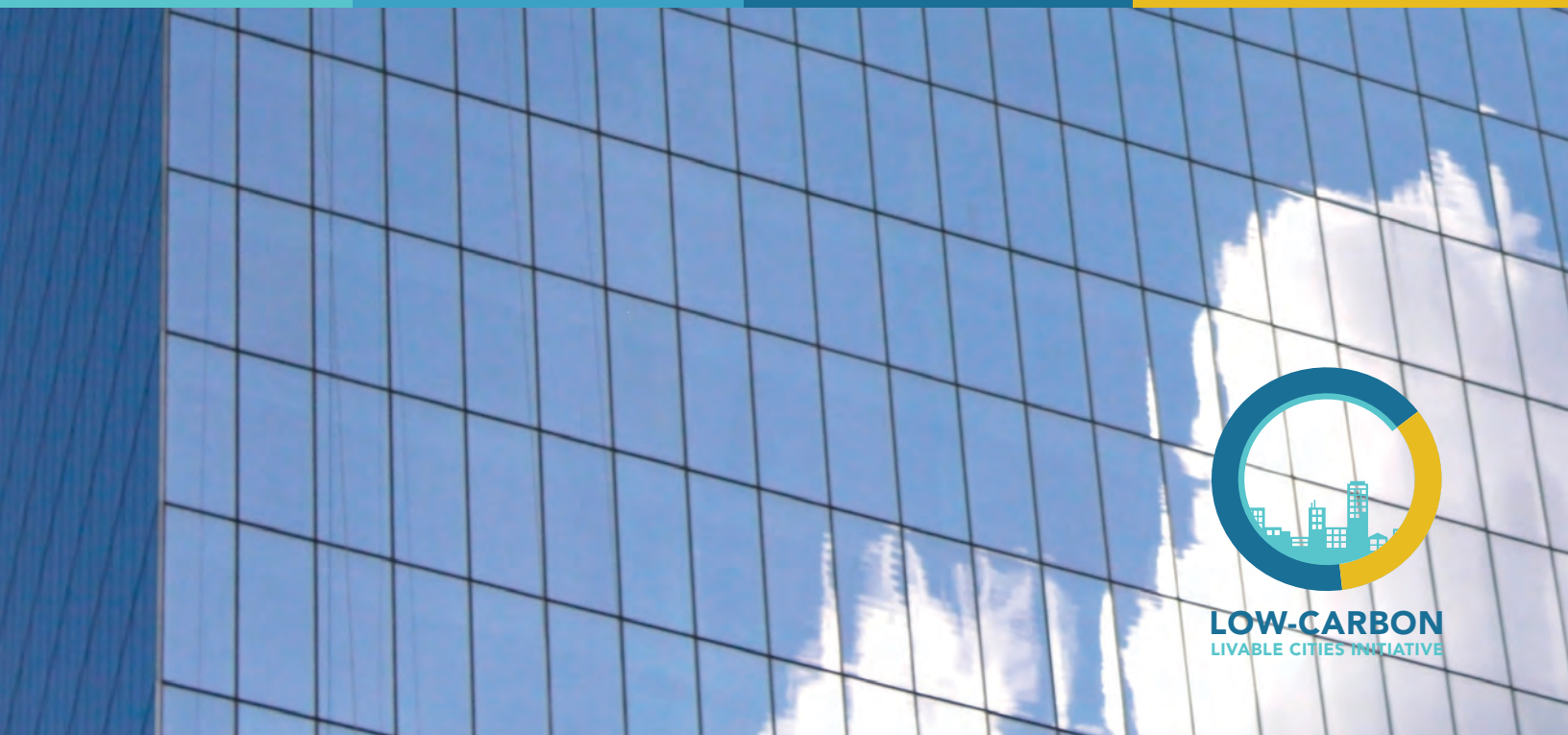

LOW-CARBON
LIVABLE CITIES INITIATIVE