The Power of Cities:

Harnessing Low-carbon Urbanization for Climate Action

WORLD BANK GROUP

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Abbreviations

AMA	Accra Metropolitan Assembly
BAU	Business-as-usual
BRT	Bus rapid transit
BUR	Biennial Update Report
°C	Degree Celsius
CAP	Climate action plan
CBT	Climate budget tagging
CCFLA	Cities Climate Finance Leadership Alliance
CDP	Carbon Disclosure Project
CCFLA	Cities Climate Finance Leadership Alliance
CH_4	Methane
CPEIR	Climate Public Expenditures and Institutional Review
CO_2	Carbon dioxide
COP	Conference of Parties
CRGE	Climate Resilient Green Economy
EBRD	European Bank for Reconstruction and Development
EPA	Environment Protection Agency
EV	Electric vehicle
GACMO	GHG Abatement Cost Model
GCoM	Global Covenant of Mayors for Climate & Energy
GHG	Greenhouse gas
GPC	Global Protocol for Community-scale Greenhouse Gas Inventories
GTP	Growth and Transformation Plan
HIC	High-income country
IAMs	Integrated Assessment Models
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IUDF	Integrated Urban Development Framework
LIC	Low-income country
LMIC	Lower-middle-income country
LT	Long term
LT-LED	Long-Term Low Emissions Development
LTS	Long-term Low Greenhouse Gas Emissions Strategy
LTV-2050	2050 Long-Term Vision for Nigeria
LUSP	Land Use and Spatial Planning
M&E	Monitoring and evaluation
MDB	Multilateral Development Bank
MESTI	Ministry of Environment Science, Technology, and Innovation
MMDA	Metropolitan, Municipal and District Assembly
MoF	Ministry of Finance
MRV	Measurement, Reporting, and Verification
MT	Medium term
MTDPF	Medium-Term Development Policy Framework
NCCP	National Climate Change Policy
NDC	Nationally Determined Contribution
NDP	National Development Plan
NDPC	National Development Planning Commission
NLTDP	Long-Term National Development Plan
NSDF	National Spatial Development Framework
NUP	National Urban Policy
OECD	Organization for Economic Co-operation and Development
OSR	Own-source revenue
PEFA	Public Expenditure and Financial Accountability
PFM	Public financial management
PPP	Public-private partnership
RDTR	Detailed spatial plan
SSA	Sub-Saharan Africa
UMIC	Upper-middle income country
UNFCCC	United Nations Framework Convention on Climate Change
WRI	World Resources Institute

Executive Summary and Recommendations

Extensive systemic transformations of urban areas in rapidly urbanizing developing countries can be a powerful vehicle for advancing low-carbon urban growth that supports global decarbonization goals. Since most of the urban infrastructure and footprint in rapidly urbanizing countries in Asia and Sub-Saharan Africa (SSA) will be built in the next few decades, urban policy decisions made today will have long-lasting implications on the contribution of cities to future global greenhouse gas (GHG) emissions. While the GHG emissions generated by cities in developing countries have been relatively low compared to cities in high- and upper-middle-income countries (HICs and UMICs), given the scale of urban growth anticipated in these countries, pivoting away from high GHG emissions trajectories and pursuing low-carbon urbanization pathways are essential to avoid locking in carbon-intensive development in the long-term.

This report highlights the urgent need to improve the integration of low-carbon urbanization priorities into the Nationally Determined Contributions (NDCs) and Long-Term Low-GHG Emission Development Strategies (LTSs) of rapidly urbanizing countries and outlines the opportunities to leverage them as bridges between national decarbonization and urban development goals and priorities. These key instruments, which outline countries' long-term visions for low-GHG emissions, climate-resilient development (LTS) and medium-term climate priorities (NDC), often overlook the urgency of decarbonizing urban systems. Integrating climate mitigation considerations for urban systems that are synergistic with countries' urban development goals in these strategies could elevate this agenda and accelerate its implementation. As countries strive to embed priorities and targets from national change climate strategies (especially NDCs and LTSs) into their development planning efforts, incorporating low-carbon urban development considerations into NDCs and LTSs can signal strong political commitment to this agenda, foster coordination with urban governments and other local stakeholders, facilitate access to finance, and enable effective implementation of multi-sectoral urban policies and actions. Considering the impact of urbanization and urban mitigation measures on national GHG emissions can also help leverage the potential of such measures and their spillover effects to achieve national (and global) climate goals and progressively raise ambition.

To bolster the integration of low-carbon urbanization priorities into NDCs and LTSs, this report identifies numerous integrative solutions across countries' policy frameworks and institutional structures; finance mobilization efforts; evidence-based policy processes; and measurement, reporting, and verification (MRV) systems. The integration process should account for the contextual differences and characteristics across countries and their urban areas emerging from varied policy frameworks, institutional structures, and financial and technical capacities. It is also crucial to recognize the pressures of rapid urbanization, especially in low-income countries and lower-middle-income countries (LICs and LMICs) and associated challenges such as infrastructure deficits and high levels of urban informality. The proposed solutions address several key barriers to integration arising from context-specific challenges that limit inclusion of low-carbon urbanization considerations into NDCs and LTSs and hinder their effective implementation.

The authors propose that the integration journey start with a country- and city-specific readiness diagnostic developed for this report—the *Readiness Diagnostic Framework*. This Framework can help identify changes required in policy processes, institutions, finance mobilization efforts, and climate action planning and tracking to inform decision makers in rapidly urbanizing countries at both national and city levels about the actions needed to pursue integration of low-carbon urbanization priorities into national climate change strategies, including NDCs and LTSs.

I Untapped climate mitigation opportunities in rapidly urbanizing countries in Asia and Africa[1]

Rapid urbanization in countries in Asia and SSA will have significant and long-lasting impacts on their cities' carbon footprint and resilience to climate change. Currently, urban population growth in these regions is accompanied by sizeable urban land area expansion, especially in small- and medium-sized cities. Continuation of such urban spatial growth trends could significantly increase GHG emissions. Rapidly growing cities in these regions risk locking in more resource- and GHG emissions-intensive development and consumption patterns in the long-term, particularly in the housing and transportation sectors. Further, high rates of poverty and informality and limited access to basic services, coupled with low emergency preparedness, make these cities highly vulnerable to climate change-related shocks (adapted from Mukim and Roberts 2023).

Rapidly urbanizing LICs and LMICs have an unprecedented opportunity to avoid conventional urban development patterns. According to the Intergovernmental Panel on Climate Change (IPCC), rapidly growing small- and medium-sized cities, whose urban form is still evolving and where most of the urban infrastructure is yet to be built, hold some of the highest climate mitigation potential (Seto et al. 2014). Given the pace of urban growth in these cities, early and urgent climate action is crucial. Pursuing low-carbon urban growth can also contribute to addressing immediate local priorities such as reducing traffic congestion, curbing air pollution, enhancing public health, and improving overall productivity of urban areas. Moreover, reducing energy demand and promoting resource efficiency can enhance the resilience of cities to climate hazards such as extreme heat and drought.

With urbanization pressures magnifying the urgency to simultaneously achieve multiple development priorities, cities in LICs and LMICs face numerous constraints in moderating their long-term GHG emissions trajectories. Underinvestment in infrastructure and services, high levels of informality, low levels of access to electricity, water, and sanitation, and weak or poorly enforced urban spatial planning regulations significantly constrain the livability of cities in LICs and LMICs and limit their potential to contribute to inclusive economic growth. Climate action in such contexts is hindered by financing gaps, institutional and technical capacity constraints, and limited knowledge of, and access to, low-carbon solutions. Furthermore, over half the urban population in Asia and SSA is either already living or projected to live in smaller cities and towns, which typically have the most acute institutional, technical, and financial capacity gaps.

[1] This report focuses on LICs and LMICs in Sub-Saharan Africa and Asia.

Low-carbon urbanization in LICs and LMICs should advance both urban development and climate-related priorities. In the near-term, countries and cities should prioritize opportunities to pursue investments that meet their immediate development needs yet result in a lower carbon footprint without compromising affordability or access (e.g., public housing incorporating passive design techniques to reduce energy use, improving waste collection and segregation to facilitate recycling) and over time invest in more ambitious actions and expensive low-carbon infrastructure (e.g., net-zero buildings, gas-to-energy systems in landfills). This can be achieved by simultaneously developing and strengthening policy frameworks that lay the foundation for more ambitious climate-related policies in the medium-to-long term (e.g., spatial planning frameworks, urban design regulations, building codes).

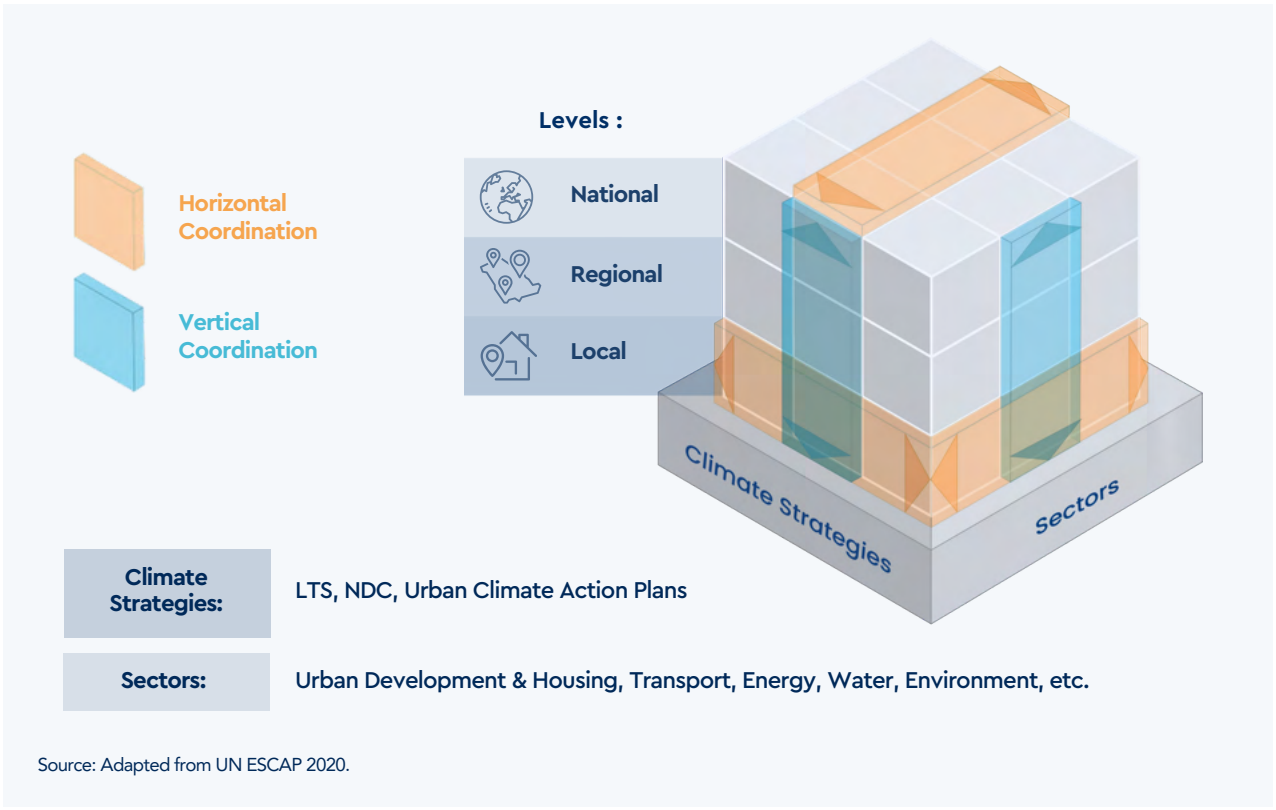
II Vertical and horizontal integration across climate and urban development policy agendas is crucial to enable the low-carbon transition in urban areas

Avoiding long-term carbon lock-in and achieving deep decarbonization in urban areas requires system-wide transitions across key GHG emissions drivers such as transportation, buildings, waste, and land use. Urban areas are complex systems with multiple interdependent sectors and infrastructure that constitute their built environment and contribute to service provision. As a result, realizing and implementing urban mitigation action at the pace and magnitude needed to meet global net-zero emissions goals will require coordinated efforts and integration of sectors, strategies, and innovations. Moreover, complementing sectoral climate mitigation measures with cross-sectoral or system-wide efforts to advance actions that have cascading effects across key emissive sectors (e.g., transportation, energy, housing, land use) can help achieve deep GHG emissions reduction (Lwasa et al. 2022).

Given the complex and multi-sectoral nature of urban systems, realizing climate and urban development objectives simultaneously requires effective coordination of efforts between national and subnational levels of governments and across sectors. Multiple public, private, and non-state entities and actors (e.g., city governments, public transit agencies, water utilities, power distribution companies, private developers, equipment manufacturers, local stakeholders) are involved in planning and implementing urban climate action, with each playing a unique role. Additionally, many urban mitigation actions go beyond cities' jurisdiction and are linked to national climate priorities and the country's long-term decarbonization vision (e.g., deployment of electric vehicles [EV]). Undertaking such actions requires coordination between entities at various levels of government (e.g., ministry of environment, ministry of planning, state and metropolitan-level entities, city departments in charge of capital investment planning) to mobilize institutional, technical, and financial resources.

Integration of climate and urban development policy agendas can be facilitated by policy frameworks, institutional structures, and financing and tracking mechanisms that are integrated *vertically* and *horizontally*. *Vertical integration* involves aligning and coordinating strategies and policy reforms and their implementation across different government levels (Figure ES.1). For example, city-level climate action plans should be aligned with NDCs and LTSs. Vertical integration leverages the potential of each level through collective efforts and promotes top-down and bottom-up information exchange. *Horizontal integration* involves coordinating efforts between core government entities (e.g., ministries or departments of planning or finance), sectoral entities (e.g., urban development and housing, transportation, energy, water, environment), and external stakeholders (e.g., academia, business and industry, private investors, non-profit organizations, citizen groups) (Adapted from C40 2020).

Figure ES.1: Integrating low-carbon urbanization considerations across climate and urban development policy and implementation processes



Source: Adapted from UN ESCAP 2020.

III NDCs and LTSs reflecting the low-carbon urbanization agenda can provide an impetus to broader integration between urbanization and decarbonization goals

National climate change strategies currently lack robust consideration of challenges and opportunities of low-carbon urbanization. The share of NDCs with urban content submitted to the United Nations Framework on Climate Change (UNFCCC) by June 2022 increased marginally compared to NDCs submitted in 2017. The nature of this content ranges from a high-level description of climate vulnerability and GHG emissions from urban areas to specific actions and targets dedicated to urban sub-sectors. Further, most NDCs with urban content focus on mitigation responses without discussing mitigation-related risks of urban growth, making it difficult to track progress and evaluate the impact of these responses (UN Habitat 2022b). The integration of urban climate action into existing LTSs remains equally limited. As of July 2023, all 66 LTSs submitted to UNFCCC[2] included mitigation responses in key urban sub-sectors such as buildings, energy supply, transportation, and waste. All LTSs highlight the importance of subnational governments, including cities, in achieving their long-term goals, but largely don't recognize the significant risk of carbon lock-in or the mitigation potential of urban areas, settlements, and the housing sector, only identifying these as adaptation priorities (UNFCCC 2022).

NDCs and LTSs that effectively integrate the low-carbon urbanization agenda can be important vehicles for advancing broader integration efforts. This report shows that NDCs and LTSs can act as bridges between national decarbonization goals and urban development priorities, underscoring the integrated approach needed for achieving the low-carbon urban transition. It outlines five main benefits of such integration (Figure ES.2):

- **Collaboration across government levels based on clearly defined roles and mandates for urban areas to deliver NDC priorities can facilitate NDC implementation and enhance access to finance.** Pursuing alignment of urban climate action with national climate priorities can increase the contribution of urban areas to achieving national climate goals and enable them to access domestic public and private financing for climate projects. Further, NDCs reflecting robust and concrete mitigation measures at city level that are aligned with both national climate goals and local development needs can send a strong signal to investors and development partners and help mobilize external resources.

- **LTSs can provide key insights about feasible early actions and longer-term enabling conditions that can help avoid lock-in of GHG emissions-intensive development in urban areas.** Considering impacts of urbanization in LTS design can facilitate (i) the formulation of low-carbon urban development pathways consistent with relevant sectoral decarbonization strategies and (ii) identification of city-level mitigation actions that can feed into sectoral decarbonization strategies and implementation plans and contribute to LTS targets. In some developing countries, a robust long-term net-zero strategy for the capital city or a group of major cities can deliver a substantial share of GHG emissions reduction and establish models for replication in other cities. In countries that don't have an LTS, developing low-carbon urbanization pathways can trigger and inform LTS development.

- **Cities and other subnational actors can bring valuable insights to the national decarbonization vision by playing an active role in the co-creation of LTSs.** Subnational entities and local stakeholders can offer insights on slow-onset impacts of urbanization on GHG emissions (e.g., evolving urban forms and land use, rate of construction of new building stock, travel demand patterns). Such inputs can help prioritize interventions and policy reforms that have substantial long-term benefits, prevent costly lock-in, and have positive spillover effects beyond urban areas. Co-creation of LTSs can enable better articulation of needs for policy reforms and resource mobilization to facilitate long-term systems, technology, and behavior shifts in urban areas. Additionally, systematic involvement of subnational actors in LTS processes can promote strong local ownership and buy-in and enable a more just transition, especially for urban population groups that are likely to be most affected by LTS implementation.

- **Improved harmonization of NDCs and LTSs facilitates integration of low-carbon urban development considerations into national climate change strategies.** Coordinated development of a country's LTS and NDC can leverage the many interdependencies in policy reforms and mitigation responses across different planning horizons, create a reciprocal relationship, and increase consensus around policy priorities. Longer-term policy signals emerging from the LTS can guide short-to-medium-term actions, which can be pursued through NDCs and their subsequent updates. Such coordination helps prioritize concrete climate-informed policies and measures that are expected to lead to long-term system-wide effects in urban areas (e.g., integrated urban planning). It also guides sectoral policy reforms and investments that can contribute to decarbonizing urban sub-sectors (e.g., adopting energy performance standards and increasing their stringency over time).

- **Mainstreaming priorities and targets of NDCs and LTSs that reflect the low-carbon urban development agenda into countries' national development planning can strengthen implementation of urban climate action.** With several countries making efforts to integrate their national climate goals into their development planning processes and pursue climate change mainstreaming, including robust low-carbon urbanization considerations in NDCs and LTSs can provide significant momentum for integrating this agenda into economy-wide and sectoral development plans and cascade it down to subnational level, facilitating its implementation.

IV How this report supports development and implementation of climate action reflecting the priorities of the low-carbon urbanization agenda

To support development and implementation of climate policies and strategies that integrate low-carbon urban development considerations, this report discusses three main pillars of integration: (i) integrated policy frameworks and institutional structures, (ii) strengthened finance mobilization, and (iii) evidence-based policy processes and integrated MRV systems. These pillars represent the points at which integration would typically be required—from both content and process perspectives—to achieve more cohesive policy and institutional frameworks, reduce financing gaps for climate actions, and enable design of robust evidence-based climate policy and infrastructure solutions.

[2] This number includes three LTSs from countries in South Asia (India, Nepal, and Sri Lanka) and five in Sub-Saharan Africa (Benin, Ethiopia, The Gambia, South Africa, and Zimbabwe). Nigeria has published a long-term development vision that will inform the development of its LTS.

Figure ES.2: NDCs and LTSs can be important impetuses for prioritizing the low-carbon urban development agenda

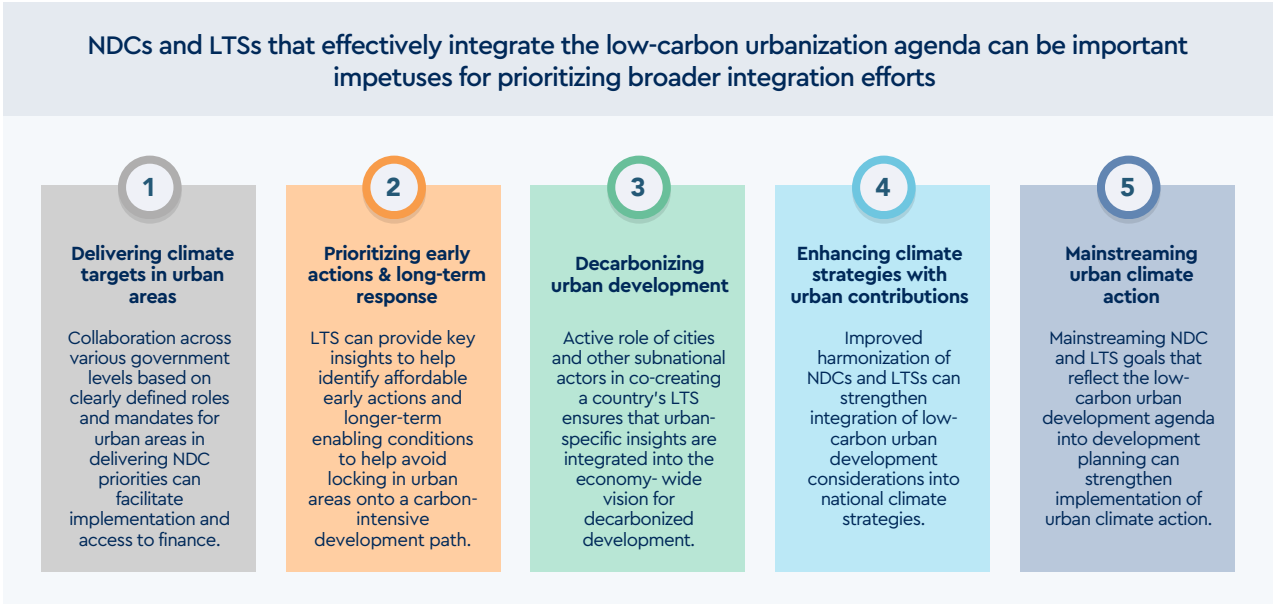
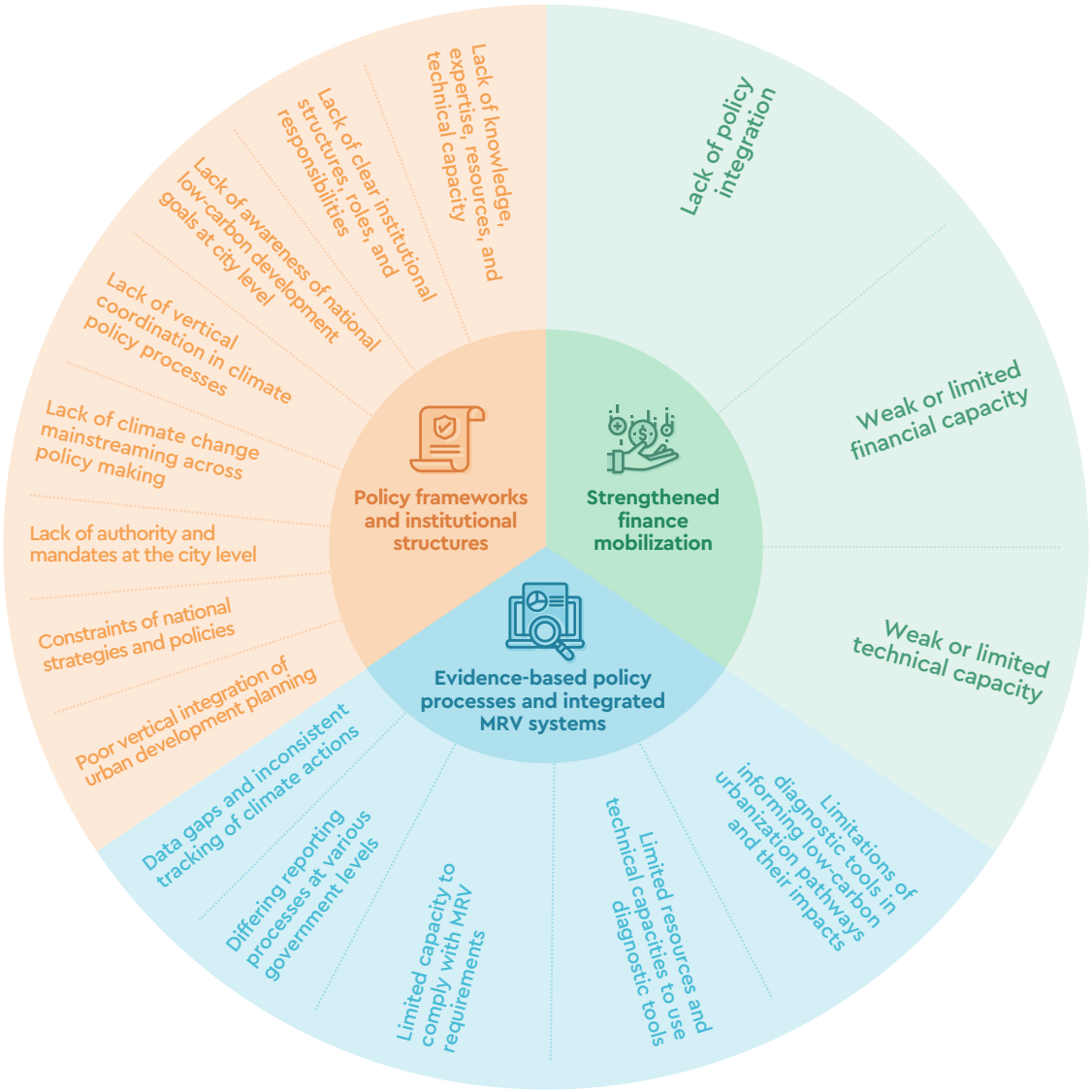


Figure ES.3: Barriers for integrating low-carbon urbanization across climate and urban development planning and implementation processes



These actions should be supported by transparent monitoring and evaluation of the achieved outcomes across the climate and urban development policy agendas. In many developing countries, the policy frameworks, institutional structures, financing, and progress tracking mechanisms that are integrated vertically (across different levels of government) and horizontally (across relevant sectors) are either not in place or in nascent stages. This report discusses approaches for advancing the integration process across each pillar, building on a detailed analysis of gaps and barriers (summarized in Figure ES.3), opportunities, and integrative solutions. Other areas that are not discussed in detail in this report but that provide important enabling solutions for integration may include communication and engagement approaches, capacity building, legal frameworks and tools, and implementation modalities.

The *Readiness Diagnostic Framework* proposed in this report recognizes countries' varied urbanization contexts and levels of readiness for integration of low-carbon urbanization considerations and can help urban and national decision makers tailor integrative solutions to their specific circumstances. Examples of integration between local and national strategies analyzed in the report show that integration is highly context-driven, as it depends on a combination of policies, administrative structures, distribution of mandates, and decision-making practices that differ across countries. In addition, country and city contexts are characterized by levels of readiness based on their current state of policy alignment, institutional capacities, and efforts needed to change the status quo that will determine achievable near- and longer-term milestones for the integration process. The report discusses several country and city examples to illustrate these aspects and includes a detailed case study of Ghana's readiness for urban climate action integration.

V Main integration pillars and current gaps and barriers to their achievement

Pillar 1: Integrated policy frameworks and institutional structures

An *integrated policy framework* facilitates alignment of objectives between two or more interlinked policy agendas and coordinated development, implementation, and monitoring and evaluation of actions across these agendas. Such coordination is pursued across national and subnational levels[3] (vertical integration) and relevant entities functioning within each level (horizontal integration) and pertains to the development and enhancement of strategies and policies that advance the climate and urban development agenda—translating them into laws and regulations, establishing institutional structures, and allocating financial and other resources to support implementation.

Effective cooperation between different government levels in setting up policy processes and institutional structures is crucial for strengthening the link between national and urban climate planning. Depending on a country's climate governance structures and the level of advancement of city-level climate strategies, integration can combine elements of locally led ('bottom-up') and nationally led ('top-down') approaches. This means that city initiatives actively contribute to and influence national climate action, while national-level policy frameworks and institutions cascade down national climate objectives to city level and empower local actors.

The extent to which a national government can facilitate integration across different levels of government and actors, either simply through information sharing (e.g., without formal structures) or through decentralizing mandates and responsibilities (e.g., formal legislative integration, devolution, decentralization) will differ based on countries' governance contexts.

Limitations in the structure and functioning of urban policy processes and/or climate policy processes relevant for urban climate action can impede the achievement of integrated policy frameworks. Poor vertical integration of urban development planning, constraints of national strategies and policies that may hinder advancement of the urban climate agenda, and/or lack of requisite authority and mandates at city level are the main urban policy process barriers that impede integration. Countries facing these barriers would typically have a weak foundation for integration of urban and national climate agendas. The typical limitations in climate policy processes that hinder integration include (i) absent or weak climate change mainstreaming across policymaking, (ii) limited vertical coordination of climate policy processes (misalignment between climate action at different government levels), and (iii) lack of awareness of national low-carbon development goals at city level.

Integration calls for a clear allocation of responsibilities to specific administrative functions within government institutions for implementing climate strategies. To ensure that governments perform these functions efficiently and that the personnel implementing them are empowered to fulfill climate-related responsibilities, governments should establish or revamp institutional structures. There are no optimal organizational structures that are conducive to integrated urban climate action and establishing entirely new (formal) structures is often challenging or unrealistic. A feasible approach could be to embed climate change-specific functions within existing institutional structures while proactively promoting a shared understanding of objectives and available resources.

Strengthening coordination and fostering collaboration between institutions can help overcome resource and capacity gaps, especially at city level. Lack of formal, permanent, and predictable structures and functions hinders coordination between government entities, potentially impeding allocation of institutional and financial resources and technical expertise to support climate-related functions at city level. In addition to improving structures and coordination, it is important to create mechanisms that facilitate collaboration between personnel carrying out inter-linked functions or working in areas with overlapping mandates across government levels.

Pillar 2: Strengthened finance mobilization

Cities often face significant challenges in accessing climate finance because of capacity constraints. Cities in LICs and LMICs are often constrained in mobilizing financing for climate-related investments from their own-source revenues (OSR). They are also unable to raise capital on financial markets because of factors such as a low degree of financial autonomy, limited creditworthiness, and lack of a borrowing track record. Insufficient financial expertise and technical skills to identify, develop, and effectively implement climate projects are other important barriers to finance mobilization (including from international climate finance sources). In small and medium cities, this gap is often compounded by numerous capacity constraints in dispensing core urban development-related functions. In addition to these limitations, lack of coordination with the national government on urban climate action coupled with competing urgent urban service provision needs can limit regular and consistent funding for climate-related projects.

[3] There may be additional scales, such as 'regional,' that are applicable in different contexts. These might represent a separate scale in certain contexts or be considered part of 'subnational' in others. For simplicity here, only national and subnational scales are identified.

Integration of urban climate action into national climate change strategies can enable city governments to gain sustained support from their national government for undertaking climate action. A recent assessment of urban climate finance flows by the Cities Climate Finance Leadership Alliance (CCFLA) (2021) highlights the vastly insufficient amounts of urban climate finance invested in developing countries, including South Asia and SSA. This analysis also determined that national governments financing domestic projects were the largest finance providers overall, playing a crucial role in supporting climate action in urban areas. Integration of low-carbon urban considerations in national climate change strategies such as NDCs and LTSs can demonstrate countries' long-term commitment to this agenda, ensuring policy predictability and reliable financial support. Explicit inclusion of urban climate action in funding needs assessments, investment plans, and subsequent finance mobilization strategies in NDCs can facilitate the allocation of funding resources at city level to support actions that will deliver the greatest benefits. Similarly, LTS processes can help embed both near- and long-term climate investment needs at city level into countries' low-carbon transition priorities and translate them into specific implementation plans and financing models.

Integration efforts are critical for cities in LICs and LMICs to receive adequate intergovernmental transfers for climate action. The volume and flow of intergovernmental transfers can significantly impact the scope of climate-related urban interventions in these cities. Regular and consistent funding from the national budget, underpinned by vertically integrated planning and policy processes, is a key enabler for cities to implement climate-related projects and attract international funding and private finance. In countries where climate change is mainstreamed into national development planning, integration of the low-carbon urbanization agenda can enhance targeted finance mobilization and facilitate national funding allocations to cities for climate action, bringing dependability to intergovernmental transfers.

Pillar 3: Evidence-based policy processes and integrated MRV systems

Robust data, diagnostics, and tracking approaches are crucial elements for integrating the low-carbon urbanization agenda across climate and urban development policy planning and implementation processes. Consistent data and diagnostics approaches can support vertical integration between city-level climate action and national climate and urban development strategies. In addition, they are critical for facilitating horizontally integrated planning and implementation of mitigation efforts across different sectors in cities. Urban diagnostics can provide critical insights to policymakers on the medium- and long-term impacts of urbanization trends and mitigation policies on GHG emissions along with their socio-economic implications. Where available, such information can improve the evidence base underpinning urban policy decisions and support the scaling up of ambition of national- and city-level climate interventions.

Integrated MRV systems across policy processes and government levels enable consistent tracking of GHG emissions, outcomes of urban mitigation actions, and climate finance flows to support decision making. Integrated or aligned MRV systems ensure the use of consistent methodologies, data, assumptions, and parameters across different levels of government and entities and are supported by clear institutional and incentive structures. Reliable and timely collection, consolidation, and analysis of data generated by such systems can enhance planning and policy design and enable a robust assessment of the country's progress toward its GHG emissions reduction goals.

With urbanization playing a prominent role in the low-carbon transition in LICs and LMICs, there is an urgent need to improve their data and diagnostic capabilities at both city and national levels. Given the complex interaction between different sectors and actors in urban areas along with diverging policy and investment priorities, decision makers at both national and city levels need to strengthen their understanding of low-carbon urban development pathways and the levers to achieve them. In addition, high-quality data and analytics can enable city governments to assess the impacts of city-level climate interventions and effectively communicate their costs and benefits to national governments to facilitate their integration into national climate change strategies such as NDCs and LTSs.

Limitations of urban diagnostic tools, limited capacities to use them, and low data availability are key gaps in undertaking evidence-based policy processes in LICs and LMICs. While many diagnostic tools are available in developed countries, there is a significant lack of models that have been calibrated to cities in Africa, Asia, or other developing regions. Models often provide limited insights on potential impacts of climate mitigation measures on poverty and equity, or trade-offs and synergies with other development priorities. They also have an uneven capacity to quantify co-benefits of low-carbon interventions. Further, entities at different government levels often have limited capacity and resources to identify and apply appropriate diagnostic tools to address policy questions, especially for larger, system-wide interventions and complex projects (e.g., those that require more modelling expertise and external support). Cities and national governments also face significant data gaps arising from challenges in compiling GHG inventories within city boundaries and inconsistent approaches for tracking climate actions and climate finance flows. These are compounded by the lack of incentives for data collection, weak institutional structures, and limited accountability at various levels of government.

To enhance evidence-based policy processes, a dedicated user *Guide for selecting urban diagnostic tools and models* was developed for this report. This guide can direct users and decision makers toward relevant groups or 'families' of urban tools and models to address their policy objectives, depending on the priorities of the diagnostic being undertaken and available resources. It also outlines a set of criteria, such as sector coverage, technical abilities, and usability and robustness of models in addressing specific policy-relevant questions in the context of rapidly urbanizing countries, that can be used to arrive at a specific model choice.

VI Integrative solutions and diagnostic framework

This report proposes a set of nine integrative solutions to support policymakers in developing and implementing national climate change strategies that integrate the low-carbon urbanization agenda (Figure ES.4). The report discusses how these solutions can help overcome the common integration-related gaps and barriers identified under each of the three pillars of integration, namely integrated policy frameworks and institutional structures (Pillar 1), strengthened finance mobilization (Pillar 2), and evidence-based policy processes and integrated MRV systems (Pillar 3). The proposed solutions are cross-cutting and applicable across all three pillars.

Effective integration of low-carbon urbanization considerations is achieved when national policy frameworks and institutions facilitate vertical and horizontal coordination across all three pillars and when cities are well-equipped and receive support for contributing to national climate goals.

This is enabled when:

- Climate change is mainstreamed in national development planning and budgeting processes to achieve the goals and targets of the country's national climate change strategies (NDCs and LTSs).
- The country's NDCs and LTSs and associated financing plans reflect low-carbon urban development priorities, including the main drivers of the carbon footprint of urban areas and related GHG emissions reduction measures.
- Cities' mandates for climate action are well-established and supported by clear policy frameworks that cascade down national climate mitigation targets to various government levels.
- The national government is supporting cities in accessing domestic and international sources of climate finance through dedicated programs and financing mechanisms.
- Appropriate institutional frameworks and governance structures facilitate effective coordination between national- and city-level entities on such aspects as climate planning and policy development, budgeting, implementation, and tracking of urban climate action and its impacts through aligned or integrated MRV systems.
- Climate policy processes across government levels are underpinned by evidence-based decision making that allows for periodic revisions of strategies and gradual scaling up of the ambition of NDCs and LTSs.
- Cities are experienced in developing and implementing climate change plans that are aligned with national climate change strategies and urban development priorities.
- Cities have robust technical and financial capacities and a well-developed knowledge base on climate mitigation that is regularly updated and communicated to the national level to support coordinated climate policy processes.

Figure ES.4: Integrative solutions across the three pillars

Recommendations

Given the sizeable potential in LICs and LMICs to transition to decarbonized, climate-resilient development pathways by pursuing low-carbon urbanization, integrating urban considerations into their national climate change strategies and policies can provide a crucial impetus for broader integration efforts. This report identifies 10 key recommendations to support policymakers and practitioners in their efforts to develop and implement NDCs, LTSs, and other national climate change strategies that effectively integrate low-carbon urbanization priorities:

1 Climate change mainstreaming in national development planning and budgeting processes is crucial for achieving countries' climate change commitments while also advancing their development priorities.

Economy-wide development planning that reflects low-carbon urbanization considerations can help overcome sectoral and institutional silos, avoid policy conflicts, and reduce potential trade-offs between the urban development and decarbonization agendas. Cascading down climate-informed development plans to subnational levels can be an effective vehicle for delivering vertically and horizontally integrated climate action, especially when such plans explicitly consider the financing needs and sources for climate action. Associated climate-informed budgeting processes are equally important to ensure that climate action in urban areas is supported by regular and consistent funding flows (e.g., intergovernmental fiscal transfers, earmarking funding for climate action through conditional transfers to the city level). Mainstreaming of climate action should be reinforced by integrating climate-related performance indicators into national and subnational systems that track progress on development priorities.

2 Integration of low-carbon urbanization considerations in the national urban agenda can harness mitigation potential in urban areas through sectoral and spatial planning processes.

First, this integrative solution can strengthen horizontal coordination between climate and urban development policy agendas. It helps ensure that national urban plans consider the GHG emissions impacts of urbanization trends and translate the country's vision for long-term low-carbon growth into actionable milestones for urban areas. Second, it can augment vertical coordination by cascading down national climate mitigation priorities to city level and providing cities with a foundation to build their climate action plans. Such integration should be supported by a guiding framework for resource allocation to cities to undertake monitorable climate mitigation actions.

3 Explicitly including climate mitigation priorities and targets for urban areas in national climate change strategies can enable their implementation at city level.

NDCs or LTSs that integrate low-carbon urbanization priorities should be accompanied by implementation plans that (i) translate priorities into concrete targets and implementable city-level actions, (ii) assign clear roles and responsibilities to subnational governments for their implementation, (iii) include approaches to mobilize and channel climate finance to city level, and (iv) create specific indicators and MRV processes to measure and report on the progress and impact of actions. The enabling environment for urban climate action can be further strengthened by establishing legal frameworks and incentive structures for their consistent enforcement.

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Lagos, Nigeria © peeterv / Getty

4 Empowering city governments and strengthening intergovernmental coordination in overlapping policy areas helps ensure clarity of mandates for urban climate action.

Effective climate governance can be achieved by (i) delegating mandates for climate action to city governments for areas within their administrative functions; (ii) coordinating planning and implementation functions across government levels in sectors and areas with overlapping mandates; and (iii) empowering cities to mobilize domestic and international climate finance, including by the targeted use of their OSR. Coordination can be augmented across all government levels by undertaking robust diagnostics of urbanization impacts on national GHG emissions reduction efforts and promoting well-aligned or integrated MRV approaches (e.g., using comparable reporting boundaries across different sectors and jurisdictions, timelines, and indicators to track progress and financial flows).

5 Enhancing communication on climate action between national and city levels improves information sharing and gradually addresses integration barriers.

Enhanced communication on urban climate action across government levels can be an initial step toward integration, especially in cases where coordination mechanisms are not yet in place. Consistent top-down communication ensures that city governments are aware of national climate targets and their implication for their jurisdictions, while bottom-up communication provides critical insights on the mitigation efforts undertaken or planned in cities and associated financial needs. Co-creation of NDCs and LTSs with both national and subnational entities engaged in the policy processes relevant to climate action in urban areas can strengthen communication.

6 Clear organizational structures with well-defined roles and responsibilities across government levels ensure that climate-related functions are adequately performed at each level.

Climate change-related functions are usually not clearly attributed within and across different government levels in LICs and LMICs. This can weaken inter-governmental coordination, limit knowledge sharing and capacity building, and impede effective execution of climate functions, especially in small and medium cities. Organizational structures supporting climate-related functions with formally defined roles, responsibilities, and accountability can be an important enabler of integrated climate policy processes across government levels. Allocating formal roles on climate change may require establishing new institutional bodies or expanding mandates of existing institutions and continual capacity building.

7 Undertaking stakeholder engagement ensures that climate action in urban areas is consistent with national priorities and locally appropriate and has buy-in of local communities.

Multi-level stakeholder engagement is an integral part of coordinated policy processes for enabling integration. It helps leverage cross-sectoral efficiencies and attain strategic alignment between city-level planning and national climate change targets. To promote stakeholder engagement, national governments can facilitate participation of subnational stakeholders in the development of NDCs or LTSs by setting up engagement platforms, organizing technical workshops, or establishing working committees dedicated to cross-cutting issues of low-carbon urbanization.

8 Collaboration and sharing of knowledge, tools, and resources across government levels and with other stakeholders can support effective implementation of integrated climate policy processes.

Tools and resources to mainstream climate change in policy processes (e.g., through modelling of low-carbon urbanization scenarios, identification and assessment of mitigation interventions) and knowledge and technical capacity are key components that can be coordinated and shared across government levels (e.g., through knowledge-sharing platforms). Effective collaboration on data, diagnostic and reporting tools, and sharing expertise on climate-related interventions can support integration by promoting efficient knowledge exchange and streamline planning and reporting efforts.

9 There is an urgent need to enhance cities' technical capacity and financial expertise for undertaking climate action.

Technical capacity to design and implement climate policies and measures targeting urban areas is the backbone of integration. Adoption of integrative solutions should be accompanied by a sustained effort and allocation of dedicated resources to improve climate-related technical capacities across all levels of government. For instance, clear allocation of climate-related roles in city governments can empower designated entities to progressively improve their capacity to undertake climate-related functions in-house, including finance mobilization. Cities can strengthen their capacity to deploy in-depth GHG emissions diagnostics, ensuring more comprehensive coverage of key GHG emissions sources and enhanced understanding of wide-ranging impacts of urban climate mitigation measures. Similarly, cities should augment their financial expertise to develop innovative financing instruments and project modalities (e.g., public private partnerships [PPPs]) to mobilize financing for climate action from private sources and international sources of climate finance.

10 This report identifies numerous areas that require urgent support from the international community to facilitate integration of the low-carbon urbanization agenda into countries' climate policies and strategies:

- **Support for integration efforts should be prioritized in rapidly urbanizing LICs and LMICs where capacity gaps are most acute.** The ***Readiness Diagnostic Framework*** proposed in this report can help identify and tailor appropriate integrative solutions to specific country contexts.
- **Promoting knowledge sharing and capacity strengthening across countries, cities, and stakeholders can support policymakers in pursuing integration across the main pillars.** Such efforts could also consolidate resources on other aspects of integration such as communication and engagement, capacity building, legal frameworks and tools, and implementation modalities.
- **Tailoring urban diagnostic tools and models to policy contexts of rapidly urbanizing countries and cities can support the integration of climate and urban development policy agendas.** Concerted efforts from a broader set of stakeholders, supported by international urban initiatives, development partners, and academia is required to continue building the knowledge base on impacts of urban mitigation action (e.g., improving understanding of the impacts of spatial layout of urban infrastructure on GHG emissions) and exploring opportunities of emerging technologies to reduce data gaps.

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Chapter 1

Pursuing low-carbon urban growth in developing countries is critical for the climate transition

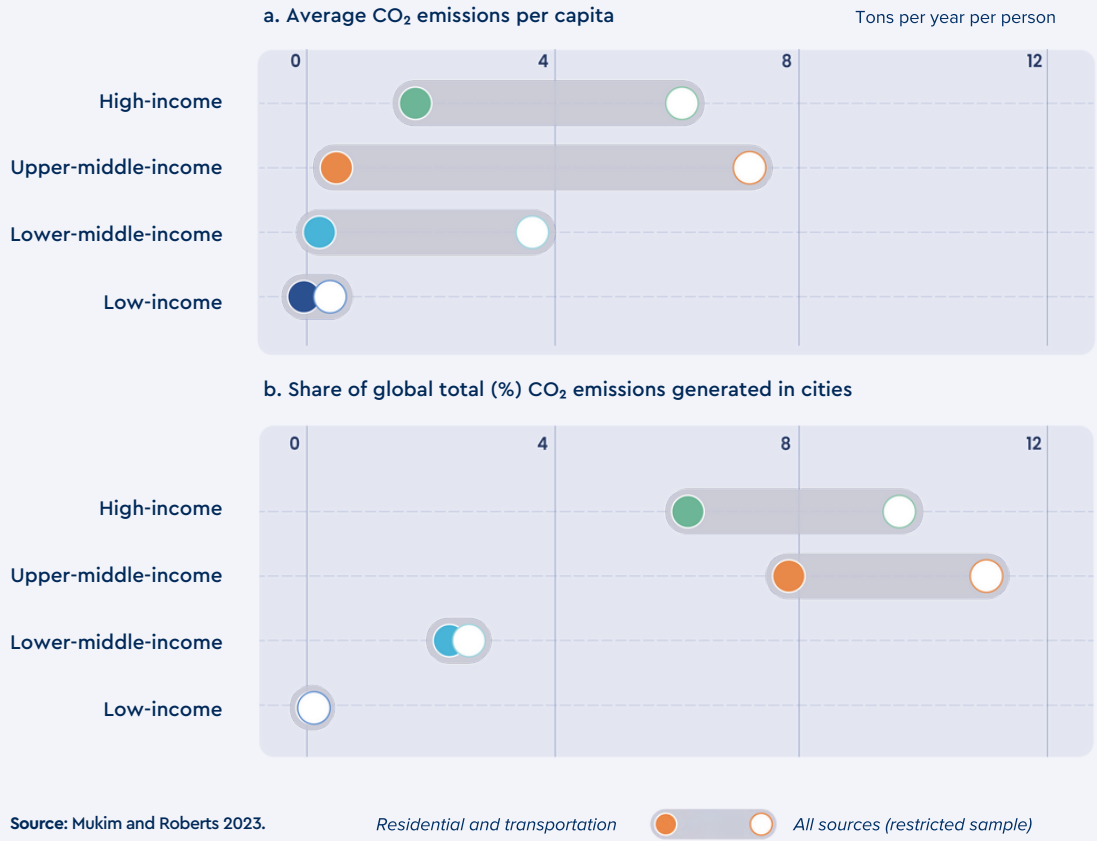
1.1 Impact of urbanization trends on GHG emissions in rapidly urbanizing developing countries

In 2020, urban areas were home to 56 percent of the global population but contributed approximately 70 percent of global GHG emissions (Lwasa et al. 2022, UN Habitat 2022a). The global urban population is expected to grow considerably to 68 percent of the total population by 2050, with negative consequences for the climate. Cities in HICs and UMICs have been major drivers of global urban GHG emissions, while the contribution to emissions from cities in LICs has been negligible. For example, in 2015, cities from developed countries together accounted for almost 86 percent of all global urban carbon dioxide (CO_2) emissions, cities in LMICs contributed almost 13 percent, and cities in LICs accounted for less than 0.2 percent[4] (Figure 1.1) (Mukim and Roberts 2023).

Most future urban growth is expected to take place in the developing regions of Africa and Asia. Africa is currently the least urbanized region in the world but has the highest urban growth rate (3.4 percent per year). Consequently, Africa's urban population is expected to increase exponentially by mid-century, from 587 million people in 2020 to almost 1.5 billion in 2050, while Asia's urban population is projected to increase from 2.4 billion people to 3.5 billion during this period (Figure 1.2) (UN Habitat 2022a).

Urbanization in these regions will be characterized by a substantial increase in the number of cities in addition to expansion of existing ones. Between 2020 and 2070, the number of cities in LICs is projected to grow far more (76 percent) than in UMICs (6 percent). Geographically, this increase will be concentrated in Central and Southern Asia and SSA, which are projected to add 2,500 and 1,800 cities, respectively, by 2070 (UN Habitat 2022a). This anticipated urban growth could significantly increase global GHG emissions, driven by an expanding urban footprint, construction and use of new infrastructure and building stock, growth in economic activity, and changes in incomes and lifestyles (adapted from Lwasa et al. 2022). Furthermore, despite low per capita urban GHG emissions in LICs, the continuous agglomeration of economic activity and population in their urban areas coupled with rising incomes and associated changes in consumption patterns, may drive up the per capita carbon-intensity of urban dwellers. Since most infrastructure in cities in rapidly urbanizing countries in these regions is yet to be built, urban policy decisions made today will have long-lasting implications on these cities' contribution to future global GHG emissions. Pursuing low-carbon urbanization pathways could create new green growth opportunities for these countries and cities, enable them to avoid the CO_2 emissions trajectories historically followed by cities in HICs, and prevent the lock-in of carbon-intensive development in the long-term (Mukim and Roberts 2023).

Figure 1.1: Average CO_2 emissions per capita and share of global CO_2 emissions generated in cities, by country income group, 2015

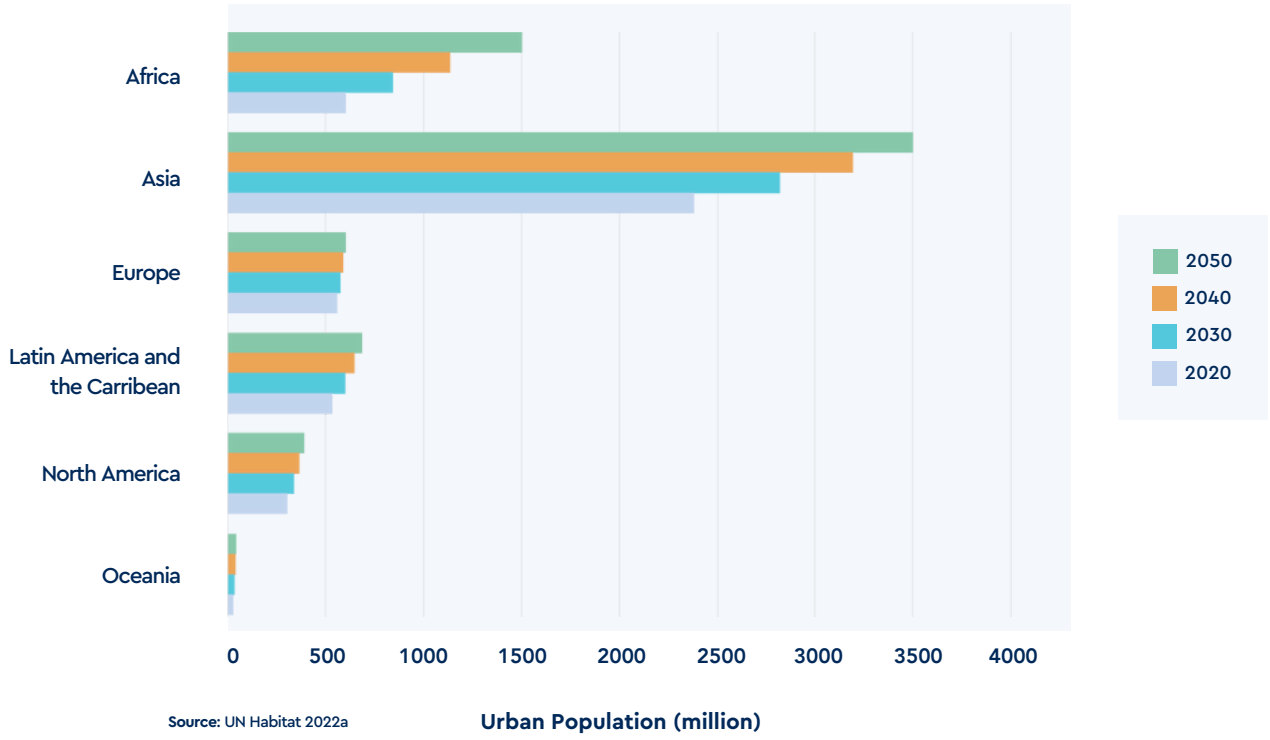


Source: Mukim and Roberts 2023.

Note: For the residential and transportation sectors, the data cover 10,179 cities. For all sources of emissions, the data cover 3,148 cities. In panel a, each marker shows the unweighted average of long-cycle (fossil) CO_2 emissions per capita (measured in tons per year per person) of cities by country income group. In panel b, each marker shows the share of global urban long-cycle (fossil) CO_2 emissions generated in cities classified by country income group.

[4] It is important to note that Figure 1.1 includes only CO_2 emissions, thereby underestimating the overall level of GHG emissions generated in cities (e.g., methane emissions associated with solid waste management and wastewater treatment represent a significant share of GHG emissions in urban areas in developing countries).

Figure 1.2: Urban population 2020 to 2050



Source: UN Habitat 2022a

1.1.1 Rapid urbanization and its impact on cities' carbon footprint and resilience to climate change

Urban growth is usually associated with poverty reduction and economic development. However, cities in SSA and Asia[5] face numerous challenges in reaping the benefits of rapid urbanization. Cities across both regions have often failed to address pressures arising from a growing population on their infrastructure, basic services, land, housing, and environment. Underinvestment in infrastructure and services, limited technical and financial capacities, and weak or poorly enforced urban planning frameworks are significantly affecting the livability of cities and limiting their potential to contribute to inclusive growth (adapted from Ellis and Roberts 2016; Lall et al. 2017; Hommann and Lall 2019). These challenges are compounded by the fact that over half the urban population is already living or projected to live in smaller cities and towns, which typically have the most limited institutional, technical, and financial capacities to address the urgent needs of a rapidly growing population (Box 1.1) (Coalition for Urban Transitions 2021). This section highlights the key characteristics of rapid urbanization in these regions and their implications for cities' carbon footprint and resilience to climate change.

Urban land expansion

Globally, on average, urban land areas are increasing at twice the rate of urban population growth, often resulting in the conversion and loss of agricultural land, forests, and other vegetated areas and a reduction in carbon sinks (Lwasa et al. 2022). The anticipated growth in the global urban population and accompanying increase in urban land area will be especially high in LICs.

SSA is expected to experience some of the largest urban land expansion, with its urban area projected to almost double between 2020 and 2070 (UN Habitat 2022a). Further, cities with populations of less than 2 million people have experienced more declines in urban population densities and higher rates of urban land expansion compared to larger cities (Lwasa et al. 2022). Despite being home to a sizeable proportion of the overall urban population, small- and medium-sized cities in Africa and Asia are trending toward lower population densities, resulting in fragmented and spatially dispersed urban forms—or 'urban sprawl.'

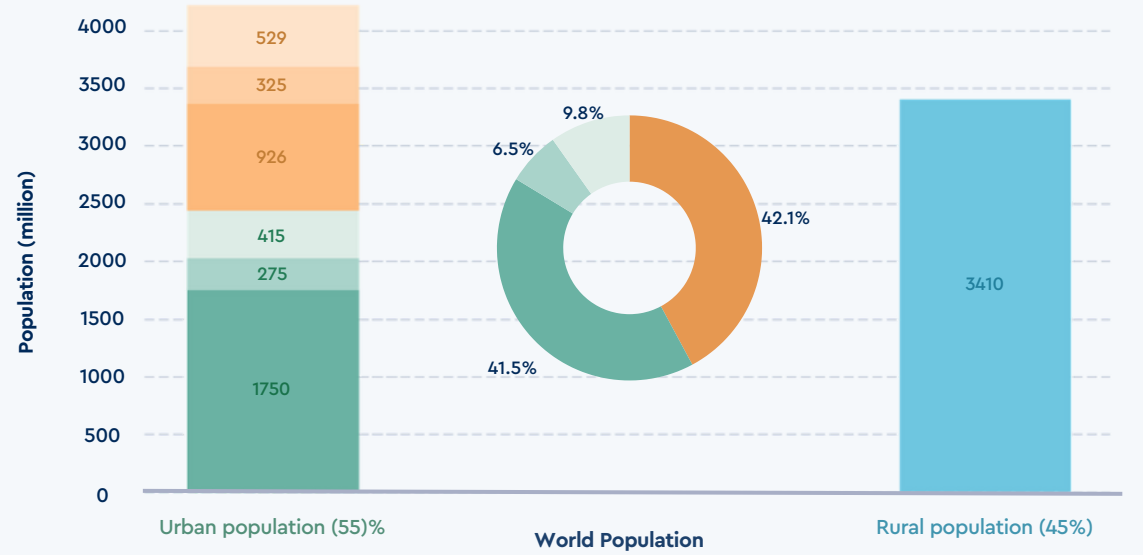
Land-use conversion resulting from urban expansion into forested areas is often permanent and difficult to reverse. Construction of infrastructure on new urban land will lock in patterns of energy consumption that will persist for decades (Lwasa et al. 2022), especially in countries with slower decarbonization of power grids and transportation.[6] Dispersed urban form is typically associated with higher per capita GHG emissions arising primarily from energy use (both embodied[7] and operational) in buildings, service provision, and transportation. For example, in the urban transportation sector, a fragmented urban form results in longer travel distances and difficulty providing affordable mass transit options, a reduction in the feasibility of non-motorized transportation modes such as bicycles, and an increase in private motor vehicle use. In SSA, approximately three-quarters of the urban population already reside in the urban peripheries of the largest city of each country. For instance, the average commute distance for Addis Ababa and Nairobi is estimated at 9.6 km and 7.2 km, respectively, making it challenging to plan for efficient growth through integrated urban and transportation planning (Coalition for Urban Transitions 2021). Further, urban expansion can lead to a significant reduction in carbon sinks from loss of tree cover and forests, destroying natural habitats and worsening vulnerability to hazards such as extreme heat and flooding. If current spatial growth trends continue, urban population growth and urban land area expansion in Africa and Asia, especially in small- and medium-sized cities, could significantly increase GHG emissions.

[5] This report focuses on LICs and LMICs and in Sub-Saharan Africa and Asia.
[6] In some decarbonization scenarios, a dispersed urban form could eventually achieve a lower carbon footprint with electrification of transportation coupled with decarbonization of electric grids in the longer term.
[7] Embodied energy is the total energy required to produce a material or product.

Box 1.1: Emergence of small- and medium sized cities as the dominant urban settlement type

Cities and towns with fewer than 1 million people accounted for more than half (58 percent) of the global urban population in 2018, according to IPCC (Lwasa et al. 2022). Settlements with fewer than 500,000 people accounted for almost half (48 percent) of the global urban population (Figure 1.3). In Asia, over half (54 percent) of the urban population lives in cities and towns with populations of less than 1 million people. In Africa, by 2050, half the urban population is expected to live in cities with less than 300,000 people (Coalition for Urban Transitions 2021). Small- and medium-sized cities are thus both the dominant and fastest-growing type of urban settlements in Africa and Asia.

Figure 1.3: Global population, by area of residence and size of urban settlement in 2018



Source: Lwasa et al. 2022

Infrastructure deficits and informality

Urban households in LICs and LMICs have less access to urban services such as safe drinking water and proper sanitation than households in cities in UMICs, with access to services relatively better in larger cities than in small- and medium-sized ones (Mukim and Roberts 2023). Rapidly growing cities in LICs and LMICs also have high levels of informality, with informal settlements[8] experiencing the most acute service deficits. Africa has the lowest level of infrastructure provision, with only 54 percent of the urban population having access to safe drinking water and only 32 percent to sanitation (UN Habitat 2022a). Approximately 61 percent of Africa's urban population lives in informal settlements, and Africa also has the world's highest share of informality in the economy, estimated at 76 percent (Lwasa et al. 2022; Coalition for Urban Transitions 2021). To meet the needs of a burgeoning population and reduce service delivery gaps, rapidly growing cities in Africa and Asia need to substantially augment infrastructure in their cities and make considerable investments in new infrastructure in emerging ones. Additionally, expanding affordable formal housing will be crucial for tackling challenges related to urban informality and improving the quality of life of urban dwellers.

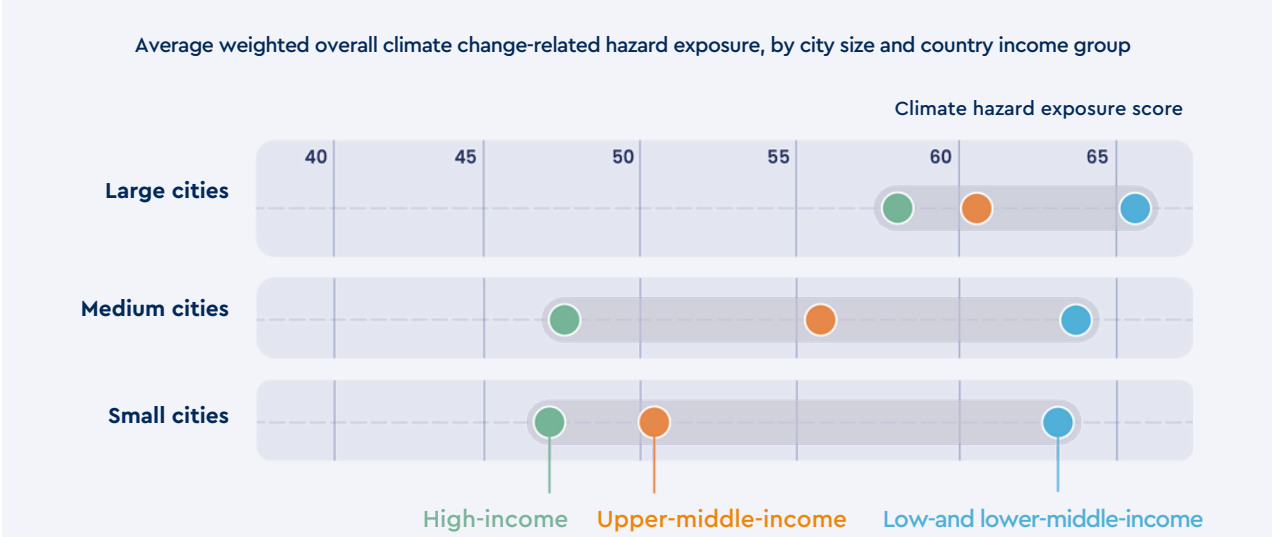
Upgrading existing urban infrastructure and constructing new infrastructure using conventional practices and technologies can significantly increase CO_2 emissions, given the massive scale of needed investments (Lwasa et al. 2022)

High exposure to climate hazards

Cities in LICs and LMICs have the highest overall exposure to six key climate change-related hazards than cities in HICs—floods, heat stress, tropical cyclones, sea-level rise, water stress, and wildfires (Figure 1.4). While floods pose the highest risk for medium and large cities, water stress, sea-level rise, and heat stress are the key hazards affecting small and medium cities (adapted from Mukim and Roberts 2023). Studies also suggest that some of the most rapid expansion in urban land areas is occurring in low-elevation coastal zones (Mogelgaard et al. 2018), which could potentially expose much of the urban population to climate hazards. In addition, extreme weather events such as tropical cyclones that are caused by climate change and increasing in frequency and intensity have larger negative impacts on the economic activity of cities in these countries than in cities in higher-income countries. High rates of poverty and lower levels of access to basic services, especially water, electricity, and sanitation, coupled with low emergency preparedness, make these cities less resilient to climate change-related stresses and shocks (adapted from Mukim and Roberts 2023).

[8] According to UN Habitat, informal settlements are residential areas where 1) inhabitants have no security of tenure regarding the land or dwellings they inhabit, with modalities ranging from squatting to informal rental housing, 2) the neighborhoods usually lack, or are cut off from, basic services and city infrastructure, and 3) the housing may not comply with current planning and building regulations and is often situated in geographically and environmentally hazardous areas (UN Habitat 2015).

Figure 1.4: Exposure to climate change-related hazards, by city size



Note: The figure reports the mean projected climate hazard exposure scores for cities that belong to a given type. Small, medium, and large cities are those that in 2015 had a population of less than 50,000–199,999; 200,000–1.4999 million; and 1.5 million or more, respectively.

Source: Mukim and Roberts 2023.

1.1.2 Pursuing low-carbon urban growth in developing countries is critical for the climate transition

Poorly managed urban development in LICs and LMICs results in a rapid increase in urban land area and sprawl, proliferation of informal urban settlements, overburdened infrastructure, and deterioration in the quality of life of urban dwellers. Additionally, insufficient or poorly enforced urban development regulations, underdeveloped markets, investment gaps, and capacity constraints coupled with limited access to, and awareness of, affordable low-carbon solutions could lock in carbon-intensive urban form and infrastructure. This would worsen congestion and air pollution in these cities while increasing their climate vulnerability and overall carbon footprint. Even though CO_2 emissions from these cities currently is less than a quarter of global urban CO_2 emissions, this share is expected to more than double by 2050 (to 56 percent) if current urbanization trends continue (Mahendra et al. 2021). Pivoting away from high GHG emissions trajectories historically followed by cities in HICs and pursuing low-carbon urban development are essential to contain future increases in global GHG emissions. However, cities in LICs and LMICs face numerous constraints in acting fast enough to moderate their GHG emissions trajectories, which, if left unchecked, may eventually offset any reductions in global emissions made by cities in HICs and fail to limit global warming to 1.5°C (adapted from Mukim and Roberts 2023).

1.2 Opportunities and challenges in advancing low-carbon growth in cities in rapidly urbanizing countries

Cities in rapidly urbanizing LICs and LMICs have a unique opportunity to avoid conventional urban development patterns by proactively making climate-informed choices about their urban infrastructure and its spatial layout. According to IPCC, rapidly growing small- and medium-sized cities, whose urban form is still evolving and where most of the urban infrastructure is yet to be built, hold some of the highest climate mitigation potential (Seto et al. 2014).

Given the pace of urban growth in these cities, early and urgent climate action is crucial. The design and spatial organization of infrastructure such as buildings and transportation networks shape the overall urban form in cities over time. Since such infrastructure has high capital costs and operational lifetimes spanning several decades, lock-in of carbon-intensive infrastructure and urban form is difficult and expensive to reverse. Early action by (i) adopting integrated urban spatial planning frameworks that promote energy- and resource-efficient urban development, (ii) embracing affordable low-carbon technologies, (iii) creating enabling conditions for electrification of all urban services, (iv) improving wastewater and solid waste management infrastructure, and (v) preserving and managing existing green and blue assets can be cost-effective in the near-term and lead to longer-term savings by optimizing energy use and future investment needs (adapted from Lwasa et al. 2022). Pursuing low-carbon urban growth can also help address immediate local priorities such as reducing traffic congestion, curbing air pollution, enhancing public health, and improving overall productivity of urban areas. Moreover, reducing energy demand and promoting resource efficiency can reduce the climate vulnerability of cities to extreme heat, droughts, and water scarcity.

1.2.1 Need for system-wide urban transformation

With cities accounting for over two-thirds of future GHG emissions, urban areas will be pivotal in meeting global climate change goals and country climate priorities if current urbanization trends continue. The transformation of urban systems will have a significant impact on global net-zero emissions trajectories. Several cities are already acting on this opportunity by adopting ambitious commitments to reduce GHG emissions (Box 1.2). Urban areas are complex systems with multiple interdependent sectors that contribute to infrastructure and service provision. As a result, realizing and implementing these targets at the pace and magnitude needed to meet global net-zero emissions goals will require coordinated efforts and integration of sectors, strategies, and innovations (Lwasa et al. 2022).

Box 1.2: City-level climate mitigation commitments

At least 826 cities and 103 regions across six continents that are home to 846 million people, representing 11 percent of the global population, have adopted net-zero emissions targets, either economy-wide or targeting a specific sector (e.g., transportation, buildings) or emissions scope (e.g., scope 1, or both scope 1 and 2)[9] (Lwasa et al. 2022). In some countries, the share of such cities and regions has reached a critical mass, representing more than 70 percent of their total population. These commitments range from 'carbon neutrality' or net-zero GHG emissions targets, which entail near-elimination of cities' own direct or electricity-based emissions (and could include some type of carbon offsetting), to more stringent emissions reduction goals. Currently, 43 percent of urban areas with net-zero emissions targets have also adopted associated action plans, while almost a quarter have integrated net-zero emissions targets into formal policies and legislation. Moreover, thousands of urban areas have adopted renewable energy-specific targets for power, heating/cooling, and transportation, and about 600 cities are pursuing 100 percent renewable energy targets, with some cities in developed countries (e.g., Basel, Reykjavik) already achieving them.

Source: Lwasa et al. 2022; C40 2021.

Historically, urban climate action has been addressed through individual infrastructure sectors such as buildings, transportation, and waste, mainly to align with city-level governance structures (World Economic Forum 2022). Complementing sectoral climate mitigation measures by leveraging cross-sectoral or system-wide synergies in urban areas to advance actions that have cascading effects across key emissive sectors (e.g., transportation, energy, buildings, land use) can help achieve deep GHG emissions reductions (Lwasa et al 2022). Evidence from a systematic scoping of urban solutions shows that the GHG emissions reduction potential of integrating measures across urban sectors is greater than the net sum of individual interventions (Lwasa et al. 2022). Key areas of integration are renewable energy, electrification, and optimization of demand for energy in transportation, heating, and cooking. The relationship between urban form and energy demand is another important nexus. In addition to reducing travel demand and energy use in urban service provision, the efficiencies introduced by integrated urban spatial planning approaches can reduce GHG emissions from embodied carbon in construction material. Deploying strategies that combine electrification with energy demand reduction through a compact and walkable urban form can accelerate decarbonization of cities. Similarly, conservation and restoration of terrestrial, freshwater, and coastal ecosystems in urban areas can generate multiple benefits, such as enhancing food security and biodiversity conservation while protecting carbon sinks.

Since numerous natural and man-made systems interface in urban areas, multi-sectoral and system-wide actions can facilitate both climate mitigation and adaptation. For instance, in addition to reducing GHG emissions from an expanding urban footprint, compact and mixed-use urban development approaches can contribute to climate resilience.

Curbing urban expansion can facilitate the protection of ecosystems such as forests and wetlands, which soak up excess rainwater and prevent runoff, help avoid locating settlements in risk-prone areas, and reduce vulnerability to flooding and extreme precipitation. Adopting resource-efficient technologies and passive design features in buildings can promote efficient water use and improve thermal comfort, reducing heat stress during heat waves. Adopting green infrastructure such as green roofs and increasing urban tree cover also have dual benefits (Sharifi 2021).

1.2.2 Key challenges in avoiding rapid growth of GHG emissions and risk of carbon lock-in

Curbing a significant increase in GHG emissions and avoiding locking in GHG emissions-intensive development may, however, be particularly challenging in rapidly urbanizing LICs and LMICs, where urbanization pressures are magnified by the urgency to simultaneously achieve multiple development priorities. Urgent climate action in such contexts is primarily hindered by financing gaps, institutional and technical capacity constraints, and limited availability and knowledge about low-carbon solutions. Pursuing low-carbon urbanization in these countries would require developing and strengthening policy frameworks that are crucial for advancing both urban development and climate-related priorities (e.g., spatial planning frameworks, urban design regulations, building codes) to lay the foundation for more ambitious climate-related policies in the medium-to-long-term. Similarly, in the near-term, these cities can pursue investments that meet their immediate development needs yet result in a lower carbon footprint without compromising affordability or access (e.g., public housing incorporating passive design techniques to reduce energy use, improving waste collection and segregation to facilitate recycling) and over time invest in more ambitious and expensive low-carbon infrastructure and solutions (e.g., net-zero buildings, gas-to-energy systems in landfills, increasing circularity of the urban economy). Some key challenges that need to be considered when developing and adopting low-carbon urban development trajectories for these countries are briefly discussed below.

Godar, Ethiopia © GlobalP / iStock

[9] Scope 1 emissions are direct emissions from owned or controlled sources, and scope 2 emissions are indirect emissions from the generation of purchased energy (Source: WRI/C40 2014).

Rapid physical expansion of cities and weak urban spatial planning mechanisms

Spatial planning policies, such as land-use and zoning regulations that influence the urban footprint and built form, have significant potential to curb both land-use change and energy-related GHG emissions. However, urban spatial planning mechanisms are typically lacking, weak, or poorly enforced in most cities in Sub-Saharan Africa and Asia. While several cities in these regions are working to strengthen their spatial planning frameworks, these efforts are in nascent stages. Countries and cities that have not adopted robust spatial planning mechanisms or that have weak or poorly enforced spatial policies cannot contain urban expansion or harness the efficiencies arising from compact urban growth and risk locking in a carbon-intensive urban form. For example, policies to stimulate new development in urban areas by increasing the development potential of urban land may lead to a GHG emissions-intensive urban form in the absence of policy and regulatory frameworks guiding such growth (e.g., integrated land-use and transportation plans). Similarly, lack of spatial planning frameworks in urban areas with limited development potential or high land prices in central neighborhoods could result in new development largely locating in urban peripheries, leading to urban sprawl. Concentration of much residential development in the urban periphery could hinder future mixed-use development or affect the feasibility of low-carbon transportation modes such as bicycles or public transit.

Low access to electricity in urban areas

Currently, on average, only 58 percent of the urban population in LICs has formal access to electricity and, even in those cases, people experience frequent and regular power outages, with as many as 25 outages per month in South Asian cities and every day in African cities (Westphal et al. 2017). Unreliable electricity supply drives urban dwellers to use inefficient fossil fuel-based options such as diesel generators and kerosene lamps to meet their power needs, contributing to higher GHG emissions. The expansion of urban services and associated energy demand in these cities, coupled with already increasing energy consumption and population growth, will likely increase GHG emissions if the power supply doesn't keep pace with demand and national electricity grids are carbon intensive (Westphal et al. 2017). This can also significantly limit the deployment of electrification solutions throughout various urban sectors.

Acute service delivery gaps in informal settlements

According to UN Habitat, 1 billion people live in informal settlements globally. SSA has the highest concentration of urban dwellers living in informal settlements (59 percent), followed by Asia (28 percent) (UN Habitat 2018). There are several factors that limit the carbon footprint of informal settlements, which is generally lower than that of other parts of cities with conventional housing and infrastructure (UN Habitat 2018; City Climate Finance Gap Fund 2023):

- Lacking conventional infrastructure and basic services such as durable housing, water supply, and sanitation, informal settlements generally consume less energy. Because of limited or no access to formal electricity, use of appliances and systems such as space heaters and water heating and cooling, which are the primary drivers of energy demand in buildings, is low.

- A high density of dwellings and other structures often constructed using locally available temporary or recycled material is typically less carbon-intensive compared to formal settlements that use conventional building materials such as concrete and steel. The density of informal settlements also contributes to containing their physical footprint.

Given the scale of informal urban settlements in developing countries, upgrading these settlements to improve the quality of life of their residents through the construction of new infrastructure could result in a significant increase in GHG emissions if conventional practices and technologies are used. On the other hand, informal settlements could contribute to significant GHG emissions reduction if they are upgraded in a low-carbon manner (Lwasa et al. 2022). Addressing the current infrastructure deficits in these settlements—by deploying affordable lower-carbon technologies and planning approaches and creating policy and incentive structures to further increase their accessibility and market penetration—provides opportunities to 'leapfrog' to low- or zero-GHG emissions systems and structures. For example, adopting energy-efficient housing solutions that incorporate such measures as passive design, use of renewable energy, and improved waste management can enhance access to services while realizing co-benefits by improving air quality and public health. Furthermore, these efforts can leverage the existing high-density and mixed-use nature of these settlements to promote a more compact urban form and curb urban expansion (UN Habitat 2018).

Rapid growth in carbon-intensive transportation modes

In recent years, a rapid increase in motorization has significantly increased transportation-related GHG emissions in LICs. While emissions from the transportation sector are growing, access to public transportation is declining considerably. With limited access to efficient public transportation systems, most urban residents in LICs rely on informal transportation, which accounts for up to 95 percent of all public transport trips in African cities. The projected increase in GHG emissions in the transportation sector will be primarily driven by the mismatch between infrastructure being built and what is needed. While walking is the most important transportation mode in African and Asian cities, typically accounting for between 35 and 90 percent of trips made, most infrastructure investment is directed toward supporting cars and two-wheeler transportation modes. These transportation methods currently account for 86 percent of all vehicles in LICs but only 29 percent of trips, while receiving 62 percent of transportation investment. In contrast, in cities where walking, cycling, and public transportation account for about two-thirds of trips made, these modes received only one-third of transportation funding (Venter et al. 2019).

Untapped mitigation potential in the waste sector

The urban waste sector is a significant contributor to GHG emissions, particularly methane (CH_4), and the second largest contributor to global urban GHG emissions after the energy sector (Lwasa et al. 2022). Emissions in this sector are primarily driven by open burning of waste and waste disposal in landfills without landfill gas capture systems. LICs account for approximately 5 percent of globally generated waste, which is projected to increase more than threefold by the 2050s (Kaza et al. 2018). The fastest growth in waste generation is expected in SSA and South Asia, where most of the waste is managed through open dumping (City Climate Finance Gap Fund 2023), which contributes to air, water, and soil pollution. A rapidly increasing urban population with rising incomes and resource-intensive consumption patterns could exacerbate waste management challenges in LICs, where safe waste collection and disposal is already limited, contributing to a significant increase in CH_4 emissions. Improving the rate of recycling and promoting circular economy approaches are often challenging, as these cities lack basic waste collection services and infrastructure.

Lagos, Nigeria © peeterv / iStock

Lack of strong building regulations

The buildings sector accounts directly and indirectly for 30 percent of the energy consumed globally, including almost 55 percent of electricity consumption (GlobalABC/IEA/UNEP 2020). The carbon footprint of buildings depends on a combination of factors such as the need for cooling and heating, energy mix, and energy intensity of equipment and appliances. With substantial new building stock being constructed in urban areas in LICs and LMICs to accommodate growing urban populations, cities need building design regulations that require a combination of measures that are both passive (daylight optimization) and active (energy efficiency requirements for appliances such as water heaters) to reduce energy demand. However, many countries lack building regulations or face challenges enforcing them. In cases where building regulations are enforced, energy performance requirements are either absent or not mandated. Where such regulations exist, effective policies are needed to support market penetration of affordable energy-efficient/low-carbon equipment and appliances. In addition, policymakers and building owners need more knowledge about the energy performance of different solutions, the capacity to deploy them, and financial incentives for undertaking such investments. The lack of energy performance requirements for buildings and policies supporting their uptake could lock in energy-intensive building stock in these countries for decades.

1.3 Role of multi-level climate governance in harnessing urban climate action

Rapidly urbanizing cities in LICs and LMICs have significant potential for integrating low-carbon growth considerations in earlier stages of development, which could prevent carbon lock-in and enable them to shift toward net-zero GHG emissions in the longer term. However, they face a range of challenges in undertaking climate mitigation action. Planning and implementing comprehensive and ambitious sectoral and system-wide climate mitigation activities are complex processes that require political commitment and follow-through, buy-in of stakeholders, access to finance and financing instruments, and integrated action across sectors and actors. Developing and strengthening institutional structures, governance frameworks, and mechanisms for cross-sectoral coordination across multiple policy domains will be crucial for enabling and accelerating rapid decarbonization in cities.

This will also contribute to creating and strengthening institutional, regulatory, and market conditions to drive low-carbon choices and stimulate necessary public and private investment flows.

1.3.1 Enabling the urban low-carbon transition through vertical and horizontal integration

Given the complex and multi-sectoral nature of urban systems, realizing ambitious GHG emissions reductions and system-wide transition in urban areas requires contributions from public, private, and non-state actors (e.g., city governments, public transit agencies, water utilities, power distribution companies, private developers, equipment manufacturers), with each playing a unique role. Additionally, since many urban mitigation actions go beyond cities' jurisdiction and are linked with national-level climate actions and the country's long-term vision for decarbonized development, they need to be coordinated with various levels of government (e.g., ministry of environment, ministry of planning, ministry of finance, state-level entities). For instance, undertaking large and complex low-carbon urban infrastructure projects are often beyond the capacity of local jurisdictions, institutions, and budgets. Electrification is another example where actions at different levels of government and across sectors must be coordinated (e.g., development of power and transportation infrastructure to enable the deployment of EVs). Coordinated efforts across urban jurisdictions, transit agencies, and utilities and collaboration with national and regional governments and local stakeholders are important for mobilizing institutional, technical, and financial resources.

As such, effective coordination of efforts is essential for planning and implementing integrated urban climate action. This can be facilitated by policy frameworks, institutional structures, and financing and tracking mechanisms that are integrated vertically (across different levels of governments) and horizontally (across relevant sectors) (Figure ES.1). **Vertical integration** involves aligning and coordinating climate policies, strategies, and implementation (e.g., NDCs, LTSs, city-level climate action plans) across different government levels, leveraging the potential of each through collective efforts and promoting top-down and bottom-up information exchange. **Horizontal integration** involves coordinating efforts across government ministries and sectoral departments (e.g., urban, transportation, energy, water, environment) and external stakeholders (e.g., academia, business and industry, private investors, non-profit organizations, citizen groups) (Adapted from C40 2020).

Multi-level climate governance is key for planning and implementing urban mitigation action

The IPCC Special Report on Global Warming of 1.5°C (SR1.5) identified multi-level climate governance[10] as an enabling condition that facilitates systemic integration and transformation to keep global temperature rise below 1.5°C (Lwasa et al. 2022). Climate goals at regional, national, and international levels are most effective when local governments are involved in their creation and implementation along with higher-level actors (Fuhr et al. 2018; Kern 2019; Hsu et al. 2020). Smoke and Cook (2022) argue that the potential comparative advantage of subnational governments in planning for public functions within their territories in an integrated way is highly relevant to climate change. They suggest that subnational governments, regardless of their current role in climate-informed planning and/or investments, may often have a better sense of how such interventions can be synergistically planned and implemented in specific locations to reduce carbon footprint, enhance resilience, or yield other co-benefits. Lastly, the involvement of governments at multiple levels is crucial for cities to plan and implement GHG emissions reduction targets (Seto et al. 2021). When actors work across multiple scales of governance, urban interventions can have cascading effects across sectors and help reduce emissions outside a city's administrative boundaries. Currently, multi-level climate governance frameworks and structures are either not in place, non-functional, or in nascent stages in many LICs and LMICs. Concerted efforts are needed to establish and strengthen such frameworks to enable these countries to pursue low-carbon urbanization.

Augmenting capacities of cities to undertake integrated climate action

The effectiveness of multi-level governance in advancing integrated climate action depends on the capacity of individual entities (e.g., national, state, and city governments) to develop and coordinate mitigation action within their jurisdictions. Capacities of city governments in developing countries to plan and implement urban mitigation action are especially constrained. Smaller urban settlements that may dominate the urban landscapes of LICs and LMICs need targeted coordination and support from regional and national entities. A 2022 analysis by the NDC Partnership[11] states that between 2018 and 2022, one of 10 requests for support received were from cities and sub-national governments, about half of which were from SSA. Further, 70 percent of these requests sought technical assistance related to policy, strategy, legislation, knowledge products, monitoring and evaluation (M&E), budgeting, and investments (NDC Partnership 2022). Addressing these capacity gaps is crucial for cities to productively participate in multi-level governance structures.

Governments need easy-to-use assessment frameworks that can support policymakers and practitioners to identify the main gaps and barriers for integration at different levels and those related to capacity at the city level. Such a context-specific diagnostic can then be used to create a roadmap that takes a systematic and staged approach to addressing the issues identified. The subsequent chapters of this report propose such a diagnostic framework and illustrate how it can be applied to a specific governance context to identify tailored issues and solutions.

Kigali, Rwanda © narvikk / iStock

[10] Multi-level governance is defined as a framework for understanding the complex interaction of the many players involved in GHG generation and mitigation across geographic scales—the 'vertical' levels of governance from neighborhoods to national and international levels, 'horizontal' networks of non-state and subnational actors at various scales, and the complex linkages between them. This more inclusive understanding of climate governance provides multiple pathways through which urban actors can engage in climate policy to reduce emissions (Lwasa et al. 2022).

[11] The NDC Partnership supports countries in implementing their NDC—commitments made by countries under the Paris Agreement to reduce national GHG emissions and adapt to the impacts of climate change.

Chapter 2

National climate change strategies lack robust consideration of urban climate action

With urban areas in developing countries expected to be significant drivers of GHG emissions growth, it is urgent to factor the long-term impacts of urbanization and near-term efforts cities are taking to pursue low-carbon growth into countries' climate planning efforts. Undertaking integrated mitigation action through coordinated planning, target setting, policy development, implementation, and monitoring across different levels of government can elevate the urban climate action agenda to the national level. For instance, this can help ensure that sectors or measures prioritized for mitigation action at the city level based on local conditions are also prioritized in national climate change strategies such as NDCs. National climate planning that reflects the impact of transformative actions in urban areas such as climate-informed spatial planning can help shape national decarbonization pathways. In turn, countries' LTSs can create the enabling conditions to avoid future emissions by accounting for the risks of locking in carbon-intensive urban infrastructure and built form that could create significant socio-economic barriers for GHG emissions reduction in the longer term. Incorporating urban mitigation considerations and actions into the development of, and subsequent updates to, medium- and long-term national climate strategies could help scale up their ambition and potentially reduce efforts needed to decarbonize other sectors. More importantly, by aligning and integrating city-level climate measures with efforts at the national level, city governments can acquire the mandates and resources to implement them and benefit from capacity and financial support from higher levels of government.

2.1 NDCs and LTSs as bridges between national and urban decarbonization goals

The broad landscape of climate strategies at multiple levels of governance typically includes national climate change action plans, sectoral decarbonization or climate resilience strategies or plans, and state/province and city-level climate action plans. Within this broad landscape, NDCs and LTSs stand out as critical instruments that (i) consolidate and communicate a country's vision for long-term low-carbon development (LTS) and (ii) support a timely climate transition through short- and medium-term targets, policies, and actions (NDC) (Box 2.1). According to IPCC, pursuing horizontal and vertical integration to reflect the impact of urbanization and potential urban mitigation measures on national GHG emissions trajectories can help (i) leverage spillover effects of urban mitigation measures in achieving national (and global) climate goals and (ii) stimulate the creation of well-aligned multi-level climate policy and institutional frameworks in countries. NDCs and LTSs can thus be important instruments that link national decarbonization goals with efforts to advance low-carbon urban growth. Importantly, they can send clear signals both nationally and to the international development community on specific needs for urban climate action. Including low-carbon urbanization considerations in NDCs and LTSs can enable the identification and tailoring of mitigation actions that can be implemented in urban areas; reflect local priorities, capacities, and needs in national climate planning; and facilitate securing finance for urban climate action. Moreover, it can foster innovative and ambitious mitigation solutions in cities with greater capacities.

Box 2.1: NDC and LTS: Key country-specific instruments for achieving Paris Agreement goals

The Paris Agreement, a legally binding international treaty on climate change, requires each country to periodically communicate, through an NDC, its contribution to global GHG emissions reduction efforts to achieve the Agreement's goals. The process is complemented by an 'ambition ratcheting mechanism' that allows each country to take stock of progress achieved every five years and offer more ambitious actions through an update to its NDC.

Article 4.19 of the Paris Agreement states that all countries "should strive to formulate and communicate long-term low greenhouse gas (GHG) emission development strategies (LTS) mindful of the long-term goals of the Paris Agreement." This was reiterated at the Conference of Parties (COP) 27, the 2022 United Nations Climate Change Conference, by its decision 1/CMA4, which urges Parties to communicate new or updated LTSs aimed at enhancing contributions to global net-zero emissions by or around mid-century, aligned with the best available science and with their NDCs, considering different national circumstances.

2.1.1 Status of integration of urban considerations in NDCs

With most countries still in the process of developing their long-term decarbonization strategies, NDCs produced in the first two rounds reflected a shorter-term view on reducing GHG emissions and showed a lack of actions at the scale and pace necessary to achieve the Paris Agreement's long-term temperature goals. Although there is a general increase in the level of ambition in the updated NDCs submitted in the latest round (before COP27 in 2022), the estimated reduction in emissions falls far short of what was established under the Paris Agreement.[12] The policies and laws adopted or planned in countries and the investments made to achieve inadequate short-term targets could create technical and economic obstacles to achieving Paris Agreement goals and impose higher costs to economies and societies in the long run. To address this issue, the next round of NDCs (to be submitted by 2025) needs to reflect actions that could lead to the substantial reduction in emissions required by 2030 to stay on track to limit global temperature rise to well below 2°C. Establishing climate-compatible, long-term development visions and associated transformation pathways can help national and subnational governments identify and sequence actions, which can then be integrated into shorter-term commitments in subsequent NDC submissions.

Urban content in current NDCs

A 2022 UN Habitat analysis of the urban content of 193 NDCs submitted between March 2017 and June 2022 showed that the overall number of NDCs with urban content increased marginally (64 percent in 2022 from 60 percent in 2017). The nature of this content ranges from a high-level description of climate vulnerability and GHG emissions from urban areas to specific actions and targets dedicated to urban sub-sectors (UN Habitat 2022b).

[12] Full implementation of all latest NDCs (including conditional elements) is estimated to lead to a 3.6 percent emissions reduction by 2030 relative to 2019 levels; taking this into account, the best estimate of peak temperature increase in the 21st Century is in the range of 2.1°-2.9°C, depending on underlying assumptions (UNFCCC Secretariat 2022a).

For example, Indonesia's NDC identifies a series of measures to reduce GHG emissions in the sanitation sector that will need to be implemented in urban areas but doesn't include specific targets (Republic of Indonesia 2022). In contrast, Colombia's NDC has specified at-source separation of solid waste in municipalities with populations of less than 20,000 individuals through the creation of 38 recovery organizations (Government of Colombia 2020). Between 2017 and 2022, the number of NDCs with specific actions dedicated to urban sub-sectors or where urban sectors are identified as a priority increased from 14 percent to 24 percent. While this increase is a step in the right direction, the analysis highlighted a large gap between mitigation responses and mitigation-related risks of urban growth. Most NDCs (74 percent) with urban content focus on mitigation responses and only about half (47 percent) on mitigation-related risks, making it difficult to track progress and evaluate the impact of mitigation responses. Further, only about one of four NDCs include mitigation responses for specific urban sub-sectors such as energy, transportation, and sanitation, and very few include responses in other key urban sub-sectors that have high emissions reduction potential, such as land-use change. Lastly, the risks and responses are mentioned largely at the national level instead of at urban levels. Overall, the analysis shows that there is significant potential for raising the climate mitigation ambition of NDCs by including more scaled-up urban mitigation action and aligning it with already identified mitigation risks and responses at the national level (UN Habitat 2022b).

Benefits of aligning urban climate action and national climate priorities

Making concerted efforts to align climate mitigation priorities and action at the urban level with national climate change strategies such as NDCs can have several benefits:·

- Aligning policies can increase the contribution of urban areas to achieving national climate goals.
- Alignment with NDCs can help cities access domestic public and private financing for climate projects. Limited inclusion of urban climate action in national climate strategies or misalignment between national- and city-level strategies is likely to constrain cities' ability to mobilize climate finance.
- Robust climate policies and concrete mitigation measures at city level that are aligned with both national goals and local development needs can send a strong signal to investors and development partners and help mobilize external resources.

Such policy alignment can be achieved by promoting collaboration across various government levels and should be accompanied by clearly defined roles and mandates for urban areas for delivering NDC priorities.

2.1.2 Role of LTSs in enhancing linkages between long-term urban development and decarbonization goals

An LTS describes a country's long-term strategy for decarbonized, climate-resilient development and lays out the nature and sequence of the physical transformations required to achieve it, including medium- and long-term milestones[13] (Box 2.2). LTSs define short- and medium-term actions including those that are urgent and synergistic with other development objectives that must be taken to avoid carbon lock-in and opportunity costs of delayed action. It also identifies conditions, policies, and regulations that enable lasting socio-economic transitions toward countries' long-term net-zero emissions goals. As such, LTSs can inform governments' plans for policy reforms, public investment, and mobilization of financial resources from various sources to deliver the climate transition. In fact, detailed LTSs can serve as a basis for domestic policy design and inform economy-wide and sectoral development strategies, including for urban development.

Box 2.2: Role of LTSs in decarbonizing development

"LTSs are central to achieving ambitious long-term national, subnational, sectoral, and global climate goals, and also to guide near-term investment decisions in both the public and private sectors. LTSs lay out a path for countries to decarbonize in a timely manner to keep global warming well below 2°C (while pursuing efforts to limit it to 1.5°C), build climate resilience, avoid costly stranded assets, and facilitate an orderly transition for all sectors of the economy and society. This not only minimizes climate change impacts and vulnerabilities but opens up new opportunities. LTSs should thus be key reference points for countries' climate and development planning and policy reforms, including updates to NDCs."

MDB Principles for Long-Term Strategy (LTS) Support 2021.

LTSs enable a whole-of-economy approach to decarbonizing development by considering short-to-medium-term targets in the context of a longer-term pathway and facilitating development of new economic models. By using an economy-wide approach, LTSs can help define critical short- and medium-term actions to support timely reform of existing policies to facilitate a just transition for affected workers and communities, address social and fiscal challenges, and lift market and regulatory barriers to needed investments. Governments can use LTSs as overall development strategies with sequential and coordinated sectoral measures and policies to facilitate a transition of their economies toward net-zero emissions by around mid-century.

Several LICs and LMICs have prioritized harnessing the economic potential of urbanization to meet their long-term development goals. As discussed in Chapter 1, given the anticipated magnitude of increase in the urban footprint of these countries, pursuing carbon-intensive urban development could hinder their long-term climate goals, locking in GHG emissions for several decades because of the long lifespan of urban infrastructure (Tong et al. 2019). Such carbon-intensive urban growth will increase the global cost of decarbonization and require greater effort from countries to transition to decarbonized development in the longer-term. LTSs can be key instruments for countries to identify early actions and longer-term enabling conditions to avoid carbon lock-in and stranded assets in urban areas.

LTSs translate economy-wide climate and development objectives into concrete actions by defining clear sectoral decarbonization pathways for a country, especially for key emissive sectors, in line with national development priorities. Assessing the GHG emissions trajectories of different urbanization scenarios (e.g., business as usual vs. low carbon) as part of LTS development can facilitate (i) the formulation of concrete low-carbon urban development pathways consistent with relevant sectoral decarbonization strategies and (ii) identification of city-level mitigation action aligned with interim LTS targets that can feed into these sectoral decarbonization strategies and their implementation plans. In countries that don't have an LTS, developing low-carbon urbanization pathways can trigger and inform their development. In some developing countries, a robust long-term net-zero strategy for the capital city or a group of major cities can deliver a substantial share of GHG emissions reduction needed in their national LTSs. It can also establish models for replication in other cities.

[13] This interpretation is in line with the shared MDB Principles for Long-Term Strategy Support (2021), announced at COP26 in 2021.

Urbanization considerations in LTSs

The integration of urban climate action into LTSs remains limited. While several countries are currently establishing their LTSs, as of July 2023, only 66 had submitted their strategies to the UNFCCC. Of these, three are in South Asia (India, Nepal, and Sri Lanka) and six in Sub-Saharan Africa (Benin, Ethiopia, The Gambia, Nigeria,[14] South Africa, and Zimbabwe).[15] All these LTSs include mitigation options and measures in key urban sub-sectors such as buildings, energy supply, transportation, and waste, yet several have identified urban areas, settlements, and the housing sector as only adaptation priorities, not recognizing their significant mitigation potential or risk of carbon lock-in (UNFCCC Secretariat 2022b). However, all LTSs have highlighted the importance of subnational governments, including cities, in achieving their long-term goals, particularly in areas within their jurisdictions such as spatial and urban planning, housing, transportation infrastructure development, and waste collection and management (UNFCCC Secretariat 2022b). Boxes 2.3, 2.4, and 2.5 provide insights on Ethiopia, India, and Nigeria, respectively, which have included low-carbon urbanization considerations in their long-term decarbonization visions. It is important to note that challenges in integrating urban climate action into LTSs may differ from those for NDCs, as there are more uncertainties, limited understanding of cost implications, and more trade-offs to consider given the economy-wide nature and longer time horizons of LTSs.

Box 2.3: Low GHG emissions interventions for urban areas in Ethiopia's LTS

Ethiopia has recently published its LTS, 'Ethiopia's Long-term Low Emission and Climate Resilient Development Strategy (2020–2050), which outlines net-zero and climate-resilient development pathways for six sectors—energy, transportation, agriculture, forestry and land use, waste management, and industrial processes and product use. While the strategy doesn't include an overarching assessment of the contribution of Ethiopia's urbanization trends to GHG emissions growth, the pathway for the sanitation sector considers the impacts of a growing urban population and changing consumption patterns on waste generation. Additionally, most of the low-emissions interventions identified for the sector focus on diverting organic waste from landfills, landfill gas management, and improving urban domestic wastewater treatment in cities. Ethiopia's LTS also identifies actions in the energy sector (e.g., electrification, promotion of efficient technologies in all end-use services in urban households) and transportation sector (e.g., improvements to mass transit and non-motorized transit) that should be implemented to meet overall GHG emissions reduction targets for these sectors.

Source: Government of Ethiopia 2023.

Box 2.4: Urban mitigation in India's Long-Term Low-Carbon Development Strategy

India's recently published Long-Term Low-Carbon Development Strategy (LT-LEDS) identifies seven key transitions to low-carbon development pathways including promoting adaptation through urban design, energy, and material-efficiency in buildings and sustainable urbanization. The LT-LEDS recognizes that India's cities currently contribute substantially to national GHG emissions, and projected population and economic growth trends for urban areas will be the main drivers of future GHG emissions increase. It also highlights the urban buildings sector as a key area for mitigation action since it accounts for more than 40 percent of energy consumed in cities. India's LT-LEDS identifies city planning, buildings, and municipal services as the three areas that need a directional shift to promote low-carbon urbanization. Climate-responsive urban planning, constructing energy-efficient buildings, and improving efficiency of municipal services including water supply, waste management, and sewage treatment are considered key approaches. The strategy has also identified existing policies and programs to advance these shifts.

Source: Government of India 2022.

Box 2.5: Nigeria's long-term vision for its cities

Nigeria has published the '2050 Long-Term Vision for Nigeria (LTV-2050)' as a preparatory step toward the development of its LTS. LTV-2050 outlines eight sectoral 'visions' that need to be realized to achieve sustainable development goals, one of which focuses on 'Urban Settlements.' LTV-2050 emphasizes that Nigerian cities will play a key role in the country's climate change mitigation efforts because of an increase in GHG emissions from a growing urban population and production activities. The vision is for cities to reduce their carbon footprint by 50 percent by 2050 and become carbon-neutral and climate-resilient by the end of the century. Leveraging synergies between sectors such as electricity, water, wastewater, and transportation along with curbing urban sprawl by promoting compact urban areas and strengthening development regulations are the main strategic approaches for achieving this vision. Nigeria's LTS will likely outline the various GHG emissions scenarios and elaborate on the key interventions that will support this long-term vision.

Source: Government of Nigeria 2021.

[14] Nigeria has published a long-term development vision that will inform the development of its LTS (Federal Government of Nigeria 2021).

[15] UNFCCC Long-term strategies portal. Accessed on: August 31, 2023.

Role of cities and other subnational actors in co-creation of LTSs

Systematically involving subnational and city governments and local stakeholders in the LTS development process can contribute to its robustness and enable successful implementation. Executing economy-wide strategies such as LTSs requires establishing strong linkages between development and climate-related priorities at sectoral, subnational, and city levels. In recent years, sectoral and subnational entities in several developing countries have formulated short- and long-term climate action plans or net-zero strategies (e.g., Urban Low Emissions Development Strategy, state- and city-level climate action plans).[16] Collaborating with sectoral and subnational authorities that have led these efforts can provide important inputs to countries' LTS development or subsequent NDC updates. These entities can help incorporate urban-specific data and transition pathways in long-term modelling, enabling more concrete technological, behavioral, or other factors to be considered in target setting and refinement of monitorable performance indicators for urban climate action. They can support the assessment of slow-onset impacts of GHG emissions that are specific to urban areas (e.g., evolving urban forms and land use, level of informality, travel demand patterns), which may create carbon lock-in or, in contrast, have positive spillover effects beyond urban areas (for further details, see Chapter 5, Section 5.1). In some cases, this information can help prioritize interventions and policies that show substantial long-term benefits and prevent costly lock-in. They can also support the identification of local needs for strengthening the enabling conditions for long-term paradigm, technology, behavior, and system shifts to stimulate low-carbon transition in urban areas. Further, subnational/city governments can integrate LTS long-term goals into urban development planning and budgeting, translate urban mitigation measures into investments, and encourage private sector participation. Additionally, co-creating an LTS with city governments and stakeholders can help align the LTS with urban priorities, promote strong local ownership and buy-in, and enable a more just transition, given city governments' proximity to the communities that are likely to be affected by its implementation.

Participation of subnational governments and local stakeholders in the LTS development process should be supported by a framework that clearly assigns responsibilities, including goals, timeframes, and indicators across different levels of government. National government support is often required for establishing or strengthening local institutional structures for LTS development (e.g., ensuring that local entities have clear roles and responsibilities, political and budgetary support, processes to encourage inclusive and transparent stakeholder engagement).

2.1.3 Limited harmonization of NDCs and LTSs is a barrier to integration of urban climate action

Harmonizing LTSs and NDCs can ensure that they are mutually supportive and that NDC short- and medium-term goals are aligned with the country's long-term objectives. Coordinated development of LTS and NDC can leverage the many interdependencies in the planning of short-, medium-, and long-term policies, create a reciprocal relationship, generate efficiencies, and increase political consensus. For example, a country can formulate its long-term vision and pathway for 2050 while identifying interim targets for NDCs that are aligned with its LTS (Climate Analytics 2022). This can also help optimize the institutional effort required from various ministries and departments involved in their development, implementation, update, and monitoring.

Coherence between NDC and LTS development and implementation processes is especially important for urban climate action in LICs and LMICs, where most mitigation efforts need to focus on avoiding GHG emissions increase and reducing the risk of carbon lock-in. LTSs can advance these long-term outcomes by considering the needs and issues related to low-carbon urbanization against potential trade-offs with other priorities. This also helps create longer-term policy signals for decision makers that can guide short-to-medium-term actions, which can be pursued through NDCs and their subsequent updates, including:

- Prioritizing the set of climate-informed policy processes that are expected to lead to long-term system-wide effects (e.g., integrated urban planning) and/or
- Supporting policies and actions consistent with specific sectoral decarbonization pathways (e.g., adopting energy performance standards and increasing their stringency over time), both of which need to be advanced through NDCs and their subsequent updates.

However, effective integration between LTSs and NDCs is currently limited. There has been little clarity from countries on how their processes for short-to-medium-term climate action and long-term decarbonization planning are linked. According to a 2020 analysis by the Organization for Economic Co-operation and Development (OECD), "more than half of the LTSs submitted by October 2019 do not contain any explicit linkages to the country or region's NDC" (Falduto and Rocha 2020). This could be attributed to the limited experience in developing, and communicating about, NDCs and LTSs, the latter of which is still missing in many developing countries. Some countries have recognized the need for stronger and more explicit alignment between their LTS and NDC (Falduto and Rocha, 2020). This is reflected in the updated NDCs submitted in 2022 and 2023, which show improved alignment with LTSs. For example, Ethiopia's recently submitted LTS establishes clear linkages with its NDC (Box 2.6.).

Box 2.6: Linkages between Ethiopia's NDC and LTS

Submitted in mid-2023, Ethiopia's LTS is fully aligned with the country's 10-Year Development Plan and 2021 updated NDC and includes a mechanism for informing the ambition of targets in subsequent NDC revisions. The LTS compares a business-as-usual (BAU) scenario with three decarbonization scenarios:

- Maximum ambition scenario: Assumes maximizing climate ambition early on, leading to net-zero emissions by 2035.
- NDC-aligned scenario: Factors in NDC's emissions target until 2030 and further increases the ambition of targets by 2035 to achieve net-zero emissions by 2050.
- Late-action scenario: This scenario illustrates how net-zero could be achieved if the fiscal space for early action is not available by assuming that NDC targets for 2030 are missed and most ambition is implemented from 2040 to 2050.

(Continued)

[16] See the example of Accra's Climate Action Plan in Box 3.3.

Box 2.6: Linkages between Ethiopia's NDC and LTS (*continued*)

A cost-benefit analysis undertaken for the three LTS scenarios illustrated that the NDC-aligned scenario presents the best proportion of costs to avoided costs and added benefits. Ethiopia will develop an MRV system to evaluate progress toward implementing the actions to achieve its LTS objectives. This will help the country identify opportunities for increasing the ambition of its next NDC. To this end, Ethiopia plans to eventually fully mainstream the MRV framework in its 10-Year Development Plan and successive development plans with targets and indicators provided for each sector

Source: Federal Democratic Republic of Ethiopia Ministry of Environment and Forest (2015); Government of Federal Democratic Republic of Ethiopia (2023).

There is a growing body of literature on key approaches and processes to strengthen the link between NDCs and LTSs (Falduto and Rocha 2019; Aguilar-Jaber et al. 2020; Hans et al. 2020). The key elements of this effort include defining the integrated vision; enhancing existing policies and legal instruments and ensuring coherence; aligning approaches for GHG emissions modelling and target setting between LTS, NDC, and sectoral decarbonization strategies; and evaluating and aligning M&E processes. Furthermore, harmonization between these two strategies requires clarifying the processes for stakeholder engagement and institutional arrangements for developing plans; ensuring political leadership; securing financial and technical resources; and, finally, establishing timely and aligned processes for updating and revising the plans.

2.2 Supporting integration of urban climate mitigation action into national climate change strategies

As discussed in Chapter 1, rapidly urbanizing LICs and LMICs have an unprecedented opportunity to avoid conventional patterns of urban development by promoting lower-carbon and climate-resilient urban growth. Given their significant socio-economic constraints and acute limitations related to urban governance, institutional, and financial capacities, the climate and urbanization challenges need to be tackled simultaneously. Pursuing climate mitigation action in urban areas that helps reinforce their development priorities while being consistent with countries' overall climate and development priorities is therefore crucial for securing buy-in at the local level and requisite mandates and resources from higher levels of government. This section lays out the analytical approach taken in this report to identify the focus areas and assess the key barriers, enabling conditions, and approaches to support integration of urban climate mitigation action into national climate change strategies and their implementation in developing countries.

2.2.1 Analytical approach—three key pillars of integration

The focus areas to support integration and associated barriers and solutions that are proposed in this report are derived from desk-based research and analysis that revisited recent literature on integration of (i) urban development and climate strategies and (ii) local and national urban climate action.

The literature covered a range of geographies, urban climate issues, key mitigation interventions, and methodologies to assess their impacts and approaches and recommendations to address barriers to the implementation of climate action, focusing on rapidly urbanizing countries in South Asia and SSA.

A range of reference material and tools are available for analyzing and improving urban climate action integration (Solecki et al. 2015; C40 and ARUP 2017; GCOM 2021; GO-Science 2016; NDC Partnership Climate Toolbox;[17] UN-Habitat 2021). Some reviewed approaches target only national governments (Box 2.7) or only city governments (The McKinsey Center for Business and Environment and C40 2017; LSE 2019). Others cover a multitude of barriers and challenges and offer recommendations that may be difficult to tailor to specific countries and local contexts. Still others are too locally specific in their recommendations and adopting them in different contexts may be challenging.

Box 2.7: Climate Action Tracker's approach to assessing readiness of national governments to transition to zero-emissions pathways

The Climate Action Tracker[18] evaluates the ability and readiness of national governments to enable the required economy-wide transformation toward a zero-emissions world. The assessment has four aspects of governance covering key enabling factors for effective climate action:

- The political commitment of the government to decarbonization, including high-level government leadership and quality of decision making.
- The institutional framework to achieve national emissions reduction targets through effective coordination, knowledge infrastructure, and adequate resources.
- The processes to develop, implement, and review mitigation policies in line with the Paris Agreement's temperature goals build on the UNFCCC transparency framework,[19] and include ratchet-up mechanism.
- The ability and willingness to engage with relevant stakeholders on policy development, including level and scope, just transition, and exogenous non-state interests and influence.

Source: Climate Action Tracker 2021a.

Based on the literature review, an analysis was conducted to identify the common challenges and current practices on horizontal and vertical integration of urban climate action in six rapidly urbanizing countries and cities in Asia and Sub-Saharan Africa: Bangladesh (Dhaka), South Africa (Cape Town), Ghana (Accra, Kumasi, and Tamale), Kenya (Nairobi), Ethiopia (Addis Ababa), and Indonesia (Balikpapan, Jakarta, and Semarang). This comprised (i) examples of integrating climate considerations into urban development policy and investment planning and (ii) gaps and barriers to the integration of urban climate action in national climate change strategies.

[17] The Climate Toolbox is a curated, searchable database of tools and resources to support NDC planning and implementation. Available at: https://ndcpartnership.org/knowledge-portal/climate-toolbox.

[18] The Climate Action Tracker is an independent scientific project that tracks government climate action and measures it against the globally agreed Paris Agreement aim of "holding warming well below 2°C and pursuing efforts to limit warming to 1.5°C."

[19] Transparency arrangements under the UNFCCC facilitate the availability of up-to-date data on countries' GHG emissions, policies, and measures, progress toward targets, climate change impacts and adaptation, levels of support, and capacity-building needs.

This report identifies three key pillars for integration of urban climate action into national climate change strategies and its implementation that collectively cover the main themes and findings that emerged from the literature review and analysis of specific countries/cities (Figure 2.1): (i) integrated policy frameworks and institutional structures, (ii) strengthened finance mobilization, and (iii) evidence-based policy processes and integrated MRV systems. Each of these pillars is discussed in subsequent chapters.

The process of integration can be pursued through a robust roadmap that clearly identifies:

- The targeted points at which integration would typically be required—from both content and process perspectives—to achieve more efficient policy processes and outcomes.
- Feasible approaches to achieve integration specific to the country's urbanization context and readiness. Examples of integration processes between local and national strategies indicate that such integration is highly context-driven, as it depends on a combination of policies, administrative structures, and decision-making practices that are country-specific. In addition, each country and local context is characterized by a level of readiness based on the current policy alignment, institutional capacities, and efforts needed to change the status quo, which will determine achievable near-to-longer-term milestones for the integration process.

For each pillar, the report discusses ways to advance the integration process, building on a detailed analysis of gaps, opportunities, and relevant integrative solutions. The report also proposes a ***Readiness Diagnostic Framework*** to assess how prepared national- and city-level entities are to progressively integrate the low-carbon urbanization agenda into national climate and development policies and support its implementation. In addition, to enhance evidence-based policy processes (Pillar 3), a dedicated ***Guide for selecting urban diagnostic tools and models*** was developed for this report.

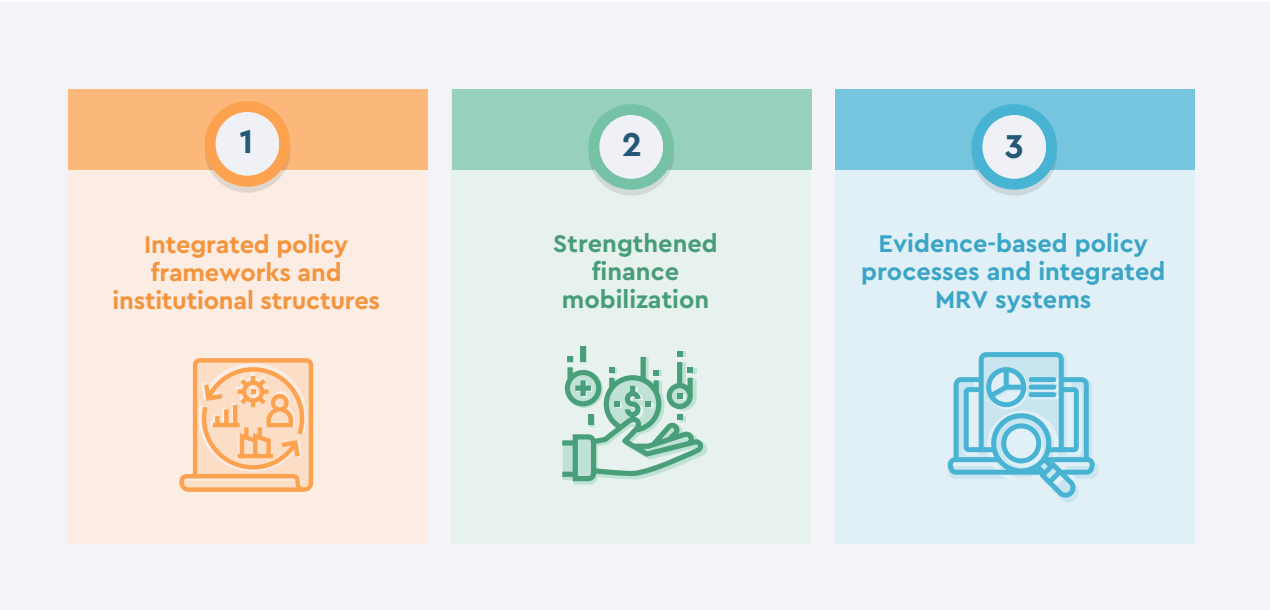
These approaches aim to foster systematic and robust integration of urban considerations into the development and implementation of national climate change and development strategies such as NDCs, LTSs, and other relevant sectoral strategies. The proposed approaches are expected to be applicable across countries with diverse policy, institutional, and capacity contexts and tailored to their specific policy goals, mandates, levels of access to climate finance, and capacity and data gaps. Several country and city examples are included to provide practical illustrations.

Other aspects of integration

Other aspects of integration identified in the literature (Climate Action Tracker 2021a; Lwasa et al. 2022; Smoke and Cook 2022; UN-Habitat 2021; World Bank 2022) that are not explicitly discussed in this report include:

- **Processes of communication and engagement (including stakeholder and citizen engagement):** Existing literature often focuses on engagement processes and tools, but communication is also a key cross-cutting theme.
- **Capacity-building processes:** In addition to being a critical cross-cutting need across both climate and urban development planning, capacity building, particularly at the city level, is also relevant. For a discussion about climate-related capacity building of cities, see UN-Habitat (2021b), which includes examples of policy and capacity-building support provided to several countries as part of the Urban LEDs project.
- **Legal frameworks and legal tools:** These can support integrated planning albeit at the level of broader climate planning.
- **Implementation processes:** This report briefly touches upon implementation in relation to countries' ability to undertake integration of urban climate action into national climate change strategies and implement such integrated action but does not discuss implementation processes in detail.

Figure 2.1: The three key pillars for integration of urban climate action into national climate change strategies



Chapter 3

Enhancing policy frameworks and institutional structures to support integration

As core entities in the functioning of urban areas, subnational governments and institutions facilitate and manage linkages between the urban development and climate agendas across different sectors, geographies, and stakeholders, making them key enablers of climate change mitigation (Lwasa et al. 2022). Integration of urban climate action into national climate change strategies and its effective implementation calls for coordinated planning and policy development processes at both national and city levels. Institutional structures that support these frameworks and processes are equally important as they can facilitate collaboration between national and subnational governments, strengthen local capacity, and enable participation of national, subnational, and non-government stakeholders.

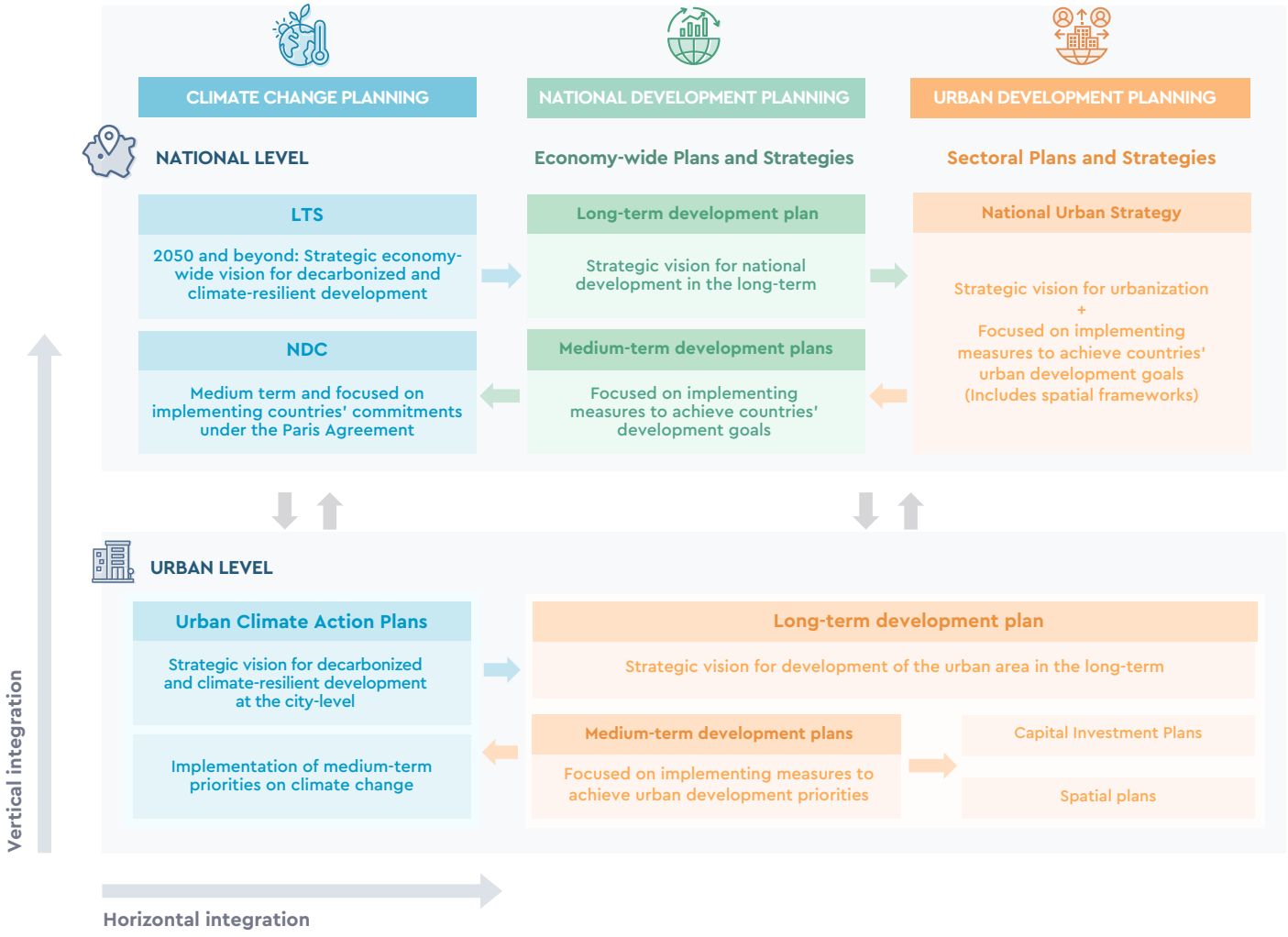
Role of coordinated policies and institutions in facilitating integration of urban climate action

Robust policy processes and institutions support the development, implementation, and updating of policies and plans in an inclusive, participatory, coordinated manner and consider the differing needs and opportunities at each level of government, including for accessing finance. Successful execution of climate policy planning through well-functioning institutions ensures that cities and other subnational stakeholders participate in the NDC and LTS process, 'buy in' to their commitments and implementation strategies, and support their adoption locally.

Such coordinated processes are crucial for shaping local priorities and actions on climate that conform with countries' long-term low-carbon, climate-resilient development pathways. Further, as discussed in Chapter 2, these processes are important to ensure that longer-term climate transitions required in urban areas are reflected in countries' LTSs, which are key to identify the enabling conditions for technological or other systemic shifts required to achieve long-term climate goals. They also facilitate the alignment of city-level climate action plans with the country's climate goals while recognizing opportunities specific to urban areas.

The overall scope of integration across climate and urban development planning is illustrated in Figure 3.1. National development plans serve as the policy planning backbone for most developing countries by consolidating national medium- and long-term development goals. These plans include priorities across key socio-economic sectors including urban development and cross-cutting areas such as climate change. When countries' economy-wide, sectoral, and cross-cutting plans and strategies are aligned and coordinated, they strengthen each other and support effective implementation. City and regional governments have in-depth knowledge of their jurisdictions and their climate-related challenges, which is essential information for developing national policies that respond to local needs. Similarly, country-wide sectoral policies that are not city-specific (e.g., energy standards, transportation regulations, taxation) also influence city-level climate action and need to be designed considering the urbanization context.

Figure 3.1: The scope of integration of climate and development strategies considering urban systems



Depending on a country's climate governance structures and the level of advancement of city-level climate strategies, integration can be **locally led**, ('bottom-up'), in which city initiatives actively contribute to and influence national climate action. Alternatively, it can be **nationally led**, ('top-down'), in which national-level policy frameworks and institutions cascade down national climate objectives to the city level and empower local actors. The extent to which a national government can facilitate integration across different government levels and actors, either simply through information sharing or also through decentralizing mandates and responsibilities, may differ given varying governance contexts. The integration process often has elements of both top-down and bottom-up approaches. However, today, the alignment between national climate and urban development planning is limited, with countries lacking institutional mechanisms for coordination between key ministries (OECD/UN-Habitat/UNOPS 2021).

Effective cooperation between different government levels in setting up policy processes and institutional structures is crucial for strengthening the link between national and urban climate planning. This cooperation can take whichever form is appropriate, depending on country and city circumstances arising from a broad range of legislative, political, social, and economic conditions as seen from emerging practices in cities around the world. In some cases, coordination could consist of formal legislative integration, devolution, and/or decentralization. For instance, Kenya has devolved climate change functions, with its 2016 Climate Change Act (The Republic of Kenya 2016) directing county governments to implement the National Climate Change Action Plan (NCCAP) by mainstreaming climate actions into their county-level development plans, such as Nairobi City County Climate Action Plan 2020-2050 (Nairobi City County, 2022). Ghana also takes a similar approach (see Chapter 6). Alternatively, in contexts without formal structures, cooperation might simply take the form of enhanced communication between the relevant entities within and across different levels of government.

The subsequent sections describe how integrated policy frameworks and institutions can support integration of urban climate action into national climate plans and strategies and its implementation, the key barriers for achieving such integration, and solutions to overcome these barriers.

3.1 Integrated policy frameworks

An *integrated policy framework* facilitates alignment of objectives between two or more interlinked policy agendas and coordinated planning and implementation of actions across (i) national and subnational levels[20] (vertical integration) and (ii) relevant entities functioning within each level (horizontal integration). Such a framework should be pursued across two dimensions: (i) creating policy agendas and (ii) scales at which these agendas are developed, implemented, and monitored and evaluated.

An integrated policy framework in support of urban climate action enables actors at different levels of the government to identify and implement climate-informed interventions that contribute to both climate change and urban development goals at national and subnational levels. This can be achieved throughout the policy process, from developing GHG emissions inventories and setting climate targets to preparing action plans and conducting monitoring, evaluation, and reporting. An integrated policy framework can also facilitate coordinated allocation of resources, ideally resulting in outcomes that maximize synergies and minimize trade-offs between the two policy agendas.

3.1.1 Barriers to policy framework integration

The key barriers to achieving integrated policy frameworks include:

- Weak overall structure and functioning of urban policy processes, such as: (i) poor vertical integration of urban development planning, (ii) constraints of national strategies and policies that may hinder the advancement of the urban climate agenda, and (iii) lack of requisite authority and mandates at the city level. Countries facing these barriers would typically have a weaker foundation for integration of urban and national climate agendas.

- Lack of strong climate policy processes relevant for urban climate action, such as: (i) absent or weak climate change mainstreaming across policymaking, (ii) absence of vertical coordination of climate policy processes (misalignment between climate action at different government levels), and (iii) lack of awareness of national low-carbon development goals at city level.

The implications of these barriers for integration between the urban development and climate policy agendas are discussed below.

Poor vertical integration of urban development planning

Well-functioning urban policies and institutional structures at national and subnational levels provide a solid foundation for implementing climate action in cities, especially for aligning priorities, timeframes, and resources and budgets between different government levels. Poor vertical integration of urban development planning presents significant challenges to city governments, particularly in leveraging sufficient resources, financial and otherwise, to implement their policy priorities. This in turn can affect related priorities such as climate action. Typically, subnational governments in developing countries are dependent on the national government for funding[21] and other kinds of support (e.g., preparation of investment-ready action plans). As a result, it is important for subnational governments (especially in small and medium cities) to align their priorities with national priorities including on climate mitigation efforts to acquire the requisite resources.

Constraints of national strategies and policies

Potential for mitigation action at the city level can be largely dependent on national (and state/provincial) policies and regulations in areas that are outside the scope or mandate of national urban development entities or city governments (e.g., energy performance standards, transportation policies, taxation). Many such strategies and policies consider the need for implementation of climate actions at the urban level. However, they are often not co-created with cities and/or don't translate into specific local targets and action plans that cities can implement (see Section 1.2.1 on climate-informed urban transformations). The absence of mandates at the city level and/or mechanisms to develop such policies and regulations in consultation with relevant subnational entities can be a barrier to integration. For example, a country's national transportation strategy that was not co-created with urban representatives might prioritize scaling up bus rapid transit (BRT) systems in urban areas as one of the key actions to expand access to public transit.

[20] Note that there may be additional scales, such as 'regional' that are applicable in different contexts. These might represent a separate scale in its own right in certain contexts or be considered part of 'subnational' in others. For simplicity only national and subnational are identified here.

[21] The portion of national revenues allocated to subnational governments comprises an average of 74.3 percent of total public revenues globally in the form of grants and subsidies and is the primary source of subnational revenue in most countries (Coalition for Urban Transitions 2019).

However, cities might lack the necessary infrastructure to support BRT systems (e.g., well-developed urban road networks) at the scale targeted in the strategy and need substantial funding and technical support to bridge this gap. Instead, a strategy developed in coordination with urban stakeholders could prioritize achieving similar goals with actions that are more technically and economically feasible such as augmenting existing public bus services while progressively creating the infrastructure required for BRT deployment.

Lack of requisite authority and mandates at the city level

Countries have diverse governance structures with subnational entities having differing degrees of authority within their jurisdictions. The level of involvement of the national government in subnational governance corresponds to the level of decentralization (e.g., deconcentration, delegation, devolution of power through administrative, fiscal, and political dimensions) in the country.[22] While national governments usually have the most resources and access to technical and financial support (e.g., ability to leverage the national budget, access additional sources of finance, and procure technical assistance), their lack of proximity to the local context means that subnational governments are often better suited to tackle local challenges but may not be able to implement policies and actions if relevant mandates, functions, and resources are not decentralized. Similarly, they may also be constrained in implementing actions in urban sectors that are outside their mandates (e.g., power distribution, public transportation), as discussed above. Lack of authority and mandate could deter cities from participating in the development of strategies and policies in areas that are not part of their official functions but will be implemented in their geographic jurisdiction and could therefore benefit from their inputs, hindering integration.

Lack of climate change mainstreaming across policymaking

Mainstreaming of climate change considerations in policymaking ensures that climate-related impacts are systematically assessed across the economy (e.g., in all relevant sectors), and opportunities to avoid or reduce GHG emissions are maximized through coordinated efforts that leverage cross-sectoral synergies. Climate mainstreaming includes (i) incorporating climate considerations into national economy-wide development planning that flows down and translates into climate-informed implementation plans at local levels; (ii) incorporating climate-related responsibilities into the roles and functions of relevant government departments; (iii) including climate-related performance indicators within all departments, especially those responsible for the most GHG-intensive sectors (e.g., energy, buildings, transportation and mobility, land use, waste management); and (iv) climate-informed budgetary allocations (discussed in Chapter 4). Climate change mainstreaming is key for the effective implementation of NDCs and LTSs, which require economy-wide efforts. In recent years, numerous countries have made efforts to mainstream their climate priorities (e.g., NDC targets and measures) in their development planning efforts. However, countries with lower institutional and technical capacities face several implementation challenges (see example of Ghana in Chapter 6).

Lack of vertical coordination in climate policy processes

National and subnational governments often undertake climate action planning independently, a disconnected approach that may lead to several shortcomings in the planning, implementation, and monitoring of actions:

- Misaligned baseline assessments in which national climate planning efforts may not be sufficiently informed by (i) the carbon footprint of urban areas arising from current and projected urbanization trends and (ii) the opportunities and challenges associated with low-carbon urbanization that can impact the achievement of overall national and sector-specific climate and development goals.
- Overlapping or misaligned low-carbon development scenarios and priority actions at different levels, which could result in local plans not aligning with national climate goals and decarbonization scenarios but instead focusing on maximizing shorter-term opportunities at the local level.
- Disconnect between national- and city-level impact indicators to track progress on climate action, which poses significant challenges for comparing and aggregating outcomes and limits integration.

Lack of awareness of national low-carbon development goals at city level

In less hierarchical governance systems or in the absence of adequate communication across government levels or climate legislation that outlines the responsibilities of government entities for achieving national climate goals,[23] city officials may lack awareness of national climate goals and policies, limiting their ability to support their achievement. For instance, a country's national climate change strategy might have GHG emissions reduction targets for the waste sector that are achieved through specific actions in urban areas. If these are not clearly communicated and cascaded down to subnational and city governments, city-level climate action plans may include actions in the waste sector that are not aligned with national goals, hindering integrated implementation and reporting. In this scenario, a country's NDC might identify increased composting of waste to reduce methane emissions in urban areas, while a city might instead prioritize waste-to-energy systems to capture and utilize methane generated in landfills. In such instances, the national government should actively engage with local governments regarding relevant information (e.g., climate-informed targets, policies, strategies).

3.1.2 Integrative solutions

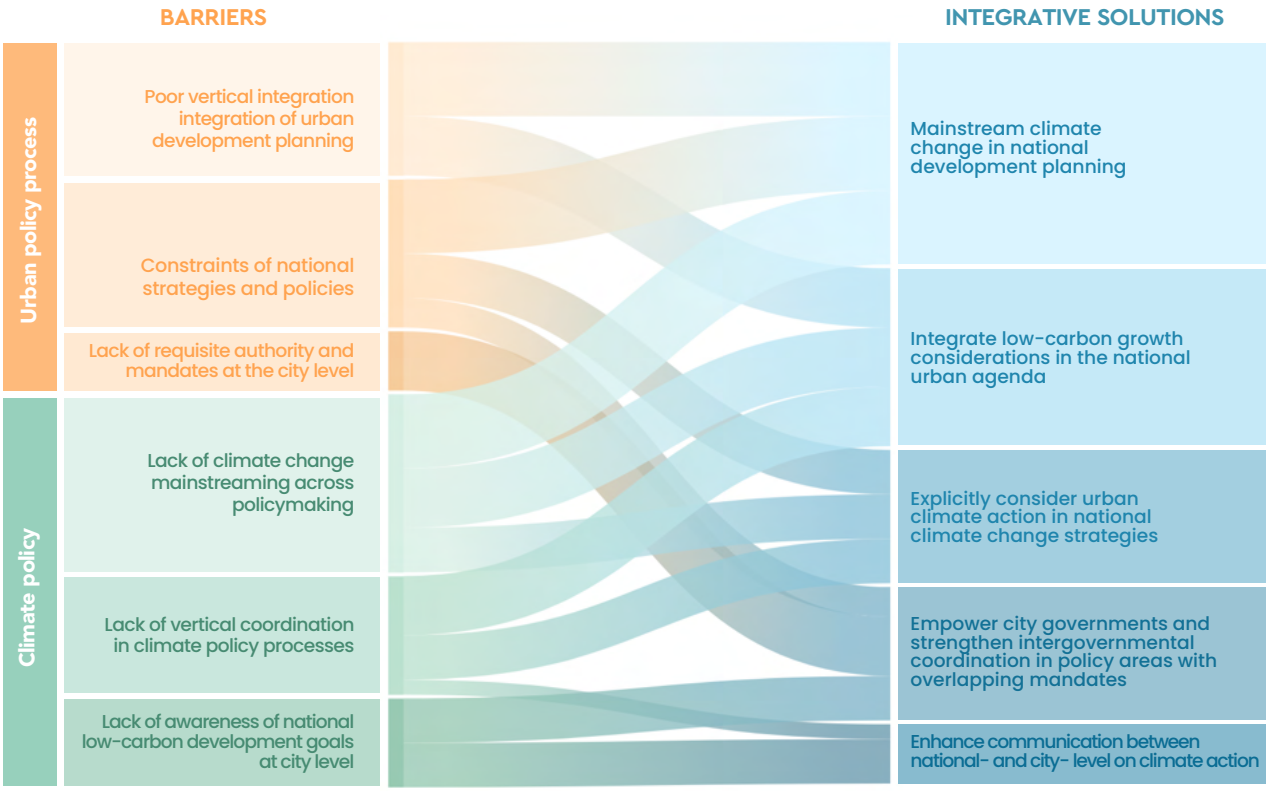
Possible integrative solutions for policy frameworks (Figure 3.2) and examples of their implementation in several countries and cities are described below (Boxes 3.1–3.5). While there is no prescribed method for achieving an integrated policy framework, one or more of these solutions can be adapted to specific country and local contexts. Some of the solutions discussed in this section are cross-cutting and can address barriers across both urban and climate policy agendas while others are specific to one of the two agendas:

Kolkata, India © suprabhat / Shutterstock

[22] See Smoke and Cook (2022) for a high-level summary on decentralization and intergovernmental institutional landscape.

[23] Formally legislated effort-sharing in achieving national climate goals remains rare (Smoke and Cook 2022).

Figure 3.2: Integrative solutions for policy frameworks



Mainstream climate change in national development planning

NDCs and LTSs should fully reflect countries' medium- and long-term development goals to facilitate their successful implementation. In turn, systematically incorporating climate change targets and actions identified in NDCs and LTSs in national medium- and long-term development plans (climate change mainstreaming) is crucial for achieving countries' climate change commitments while also advancing their development priorities. Mainstreaming climate change into economy-wide development planning can help overcome sectoral and institutional silos, avoid policy conflicts, and reduce potential trade-offs between development goals and low-carbon growth efforts that might arise from implementing the two agendas separately. As development plans inform sectoral plans and often have well-developed implementation mechanisms at subnational levels (e.g., subnational entities may be required to create development plans for their own jurisdictions that reflect national development priorities), they are an effective vehicle for delivering vertically and horizontally integrated climate action (adapted from Mogelgaard et al. 2018). Additionally, climate change mainstreaming ensures that subsequent NDC and LTS updates factor in countries' progress on development goals along with new opportunities and trade-offs that are relevant for revising climate targets and implementing them.

Given the numerous cross-sectoral interdependencies of the low-carbon urbanization agenda, mainstreaming climate change in national development planning can be a key enabler of effective coordination between different levels of government (vertical) and across different sectoral entities (horizontal) required for undertaking integrated urban climate action.

Decision making around mainstreaming of low-carbon growth considerations in development planning requires tools and diagnostic approaches that can help policymakers assess associated risks and opportunities (e.g., GHG emissions increase resulting from economic growth, distributional impacts of measures to reduce GHG emissions). Barriers and solutions related to low-carbon urbanization data and diagnostics are at the core of Pillar 3 and discussed in Chapter 5.

Box 3.1: Climate change mainstreaming in national development planning—Bangladesh

The Bangladesh Planning Commission undertakes development planning through five-year national development plans (NDPs). These economy-wide plans are complemented by sectoral development plans issued by ministries. The country first articulated its vision on climate change under this framework in 2009 through the Bangladesh Climate Change Strategy and Action Plan BCCSAP, which identified climate change as a key development issue and focused on pro-poor climate risk management.

Starting with the fifth five-year plan, each successive NDP has progressively mainstreamed climate change into its vision and priorities. Bangladesh's eighth five-year plan (July 2020-June 2025) is aligned with the country's NDC commitments and supports a governance structure outlined in the "Roadmap and Action Plan for Implementing Bangladesh NDC." The plan identifies "improving understanding of climate change of local governments" as one of the activities to be undertaken to address climate change and emphasizes the need for identifying localized solutions.

Source: Government of the People's Republic of Bangladesh 2020; World Bank Group 2022a; Fatemi et al. 2020.

Integrate low-carbon growth considerations in the national urban agenda

Systematic consideration of low-carbon urbanization opportunities in the national urban agenda can harness the potential of urban areas to reduce GHG emissions through both sector-specific pathways and spatial planning processes and strengthen horizontal coordination between climate and urban development policy agendas. It can also augment vertical coordination to cascade down implementation efforts to city level, providing cities with a foundation to build on through their local climate action plans.

Enhance vertical integration and integrate urban development and climate policy agendas through a National Urban Policy

With urbanization emerging as a critical driver of economic growth in developing countries, national governments are increasingly recognizing the role of urban areas in attaining long-term low-carbon development goals. In recent years, urban development has become an important focus area for national governments, both to seize opportunities offered by urban growth but also to address challenges arising from an expanding urban population (UN-Habitat 2014). As discussed in Chapter 1, fragmented and unplanned urbanization in developing countries underscores the need for coherent urban policies that reconcile national development and climate goals with service delivery gaps and infrastructure needs in urban areas in an inclusive manner. For the past decade, UN Habitat and other international initiatives have supported countries in articulating their urban development vision in a national urban policy (NUP)[24] through a collaborative process between the national government and cities (UN Habitat 2014). A NUP can provide an overarching framework for addressing urban challenges while meeting development priorities and considering spatial and institutional dimensions. It can also facilitate sharing of responsibilities and urbanization dividends between national and subnational governments (UN Habitat 2014). As such, a NUP can be an effective instrument for achieving a vertically integrated urban development policy agenda (Coalition for Urban Transitions, 2019). Further, since development planning is a well-established area in most countries, embedding urban development priorities in national development planning processes through NUPs helps leverage their institutional frameworks and funding mechanisms to facilitate their implementation.

NUPs can be an effective platform for integrating urban development and climate policy agendas at national level and support their coordinated implementation at city level. Updating NUPs to include climate mitigation action from countries' NDCs or LTSs that is relevant for urban areas can provide a strong foundation for aligning urban mitigation action with national climate goals. The case of South Africa provides insights on how climate change-related priorities in long-term national development plans are reflected in national urban development policies and translated into city-level priorities (Box 3.2.). NUPs can also provide valuable inputs for integrating urbanization priorities into the LTS development process, by helping capture significant causes of GHG emissions associated with rapid urbanization (as discussed in Chapter 1).

Box 3.2: Advancing urban development consistent with national development and climate priorities—South Africa

South Africa's National Development Plan 2030 is the country's long-term development plan that guides all policy and planning in the country until 2030 (Republic of South Africa 2014). Chapter 5 of its NDP focuses on transitioning to an environmentally sustainable, climate-resilient, low-carbon economy and a just society. Under this objective, the plan emphasizes the need to build sustainable communities by progressively devolving responsibilities to local governments.[25] In this context, it mentions that effective planning can promote urban densification and reduce the environmental footprint associated with delivering services such as waste management, electricity, water and sanitation, and public transportation. It also indicates the need to reduce the carbon footprint and economic costs of transportation for the urban poor by expanding access to public transit and optimizing travel distances through spatial planning approaches. The NDP is incorporated into the Integrated Urban Development Framework (IUDF), which was published by South Africa's National Department of Co-operative Governance and Traditional Affairs in 2016 (Republic of South Africa 2016) and is the government's policy to guide growth and management of urban areas. The IUDF aims for spatial transformation in South African cities and towns by steering urban growth toward a compact, connected, and coordinated form, as envisioned by the NDP. Cape Town's Five-Year Integrated Development Plan (2022-2027) (City of Cape Town 2022) sets out a vision for a more spatially integrated and inclusive city and is well aligned with both the NDP and the IUDF.

Explicitly consider urban climate action in national climate change strategies

Explicit inclusion of climate priorities and targets for urban areas in NDCs and LTSs is crucial to create the enabling environment for realizing their mitigation potential. Similarly, NDC implementation plans and LTS roadmaps should include specific measures to be undertaken in urban areas and be reflected in financing strategies. This can take the form of a published climate change implementation plan supported by a framework for measuring, planning, and achieving GHG emissions reduction. Further, where possible, anchoring these goals and targets in laws and regulations makes them legally binding and can help enforce their implementation at city level. In the absence of systematic integration of urban climate action in national climate plans and strategies, cities' climate action plans should at least be communicated to the national level to facilitate their reflection in NDC goals and targets.

[24] UN Habitat (2014) defines NUP as "a coherent set of decisions through a deliberate government-led process of coordinating and rallying various actors towards a common vision and goal that will promote more transformative, productive, inclusive, and resilient urban development for the long term."

[25] In 2019, South Africa's National Planning Commission organized consultations with civil society, business, government, labor, communities, and experts to identify pathways to achieve this vision. One of the key recommendations included an increased role for local actors in the governance of the just energy transition in South Africa (Urban LEDS 2020). The role of subnational governments is also clearly recognized in South Africa's LTS (Republic of South Africa 2020), which recognizes that in addition to the training and capacity building that will be required to support the transition at national level, infrastructure and skills will need to be developed at subnational level. It also acknowledges that many of the subnational government structures are currently dysfunctional and lack capacity to support implementation of, and manage funding for, the actions required to support the low-carbon transition.

Box 3.3: Alignment between mitigation goals in Ghana's NDC with actions in Accra's Climate Action Plan

The Accra Climate Action Plan (CAP) 2020-2025 prepared by the Accra Metropolitan Assembly (AMA) is Ghana's first subnational climate plan that devolves national climate change targets and ambitions to the metropolitan assembly level. The implementation of CAP will directly contribute to the achievement of Ghana's NDC targets. Ghana's NDC identifies measures such as adopting alternative urban solid waste management and promotion of energy efficiency in homes and industry to achieve its GHG emissions reduction targets. In line with the NDC goal and the country's plan to tackle short-lived climate pollutants, Ghana has set numerous national targets for the solid waste sector by 2030 including doubling composting capacity to 190,000 tons/year and capturing 65 percent of landfill gas. Accra's CAP prioritizes the solid waste and wastewater sector as one of five key areas for climate action. Within this area, (i) diverting organic waste from landfills and doubling composting capacity and (ii) developing a new engineered sanitary landfill with gas capture have been identified as actions that will directly contribute to national solid waste targets and NDC goals. Similarly, Ghana is seeking to achieve energy efficiency improvements of 20 percent in industrial facilities by 2030. In line with this goal, CAP seeks to introduce voluntary targets and incentives for energy efficiency in industrial facilities operating in Accra. Future updates to CAP will be synchronized with the five-year cycle of Ghana's NDC updates.

Source: Accra Metropolitan Assembly, 2020; Government of Ghana, 2021c.

Empower city governments and strengthen intergovernmental coordination in policy areas with overlapping mandates

The functions and mandates for planning and implementing climate action in urban areas are shared between the national government and subnational governments and entities (e.g., state or provincial government, city government, regional transportation authority). City governments often have primary authority over such functions as land use planning, waste management, and urban design regulations. These areas are expected to deliver about one-third of the urban mitigation potential by 2050 after excluding electricity decarbonization (Coalition for Urban Transitions 2019). The remaining major portion of urban mitigation is largely under the regulatory authority of higher-level entities such as national and state governments (e.g., energy efficiency standards for appliances, GHG emissions standards for vehicles, energy performance requirements in building codes). Empowering city governments and improving intergovernmental coordination can enable city governments to:

- Integrate climate considerations in functions within their administrative mandate (e.g., land-use planning, solid waste management).
- Fulfill their responsibilities for implementing and enforcing several economy-wide measures (e.g., enforcement of emissions standards for vehicles, emissions trading schemes).
- Undertake coordinated planning and implementation of measures in sectors and areas that have overlapping mandates across different levels of government (e.g., urban transportation, building energy performance).
- Assess climate mitigation-related risks and potential in their jurisdictions, given their proximity to GHG emissions drivers and urban stakeholders.

To empower city governments, national governments can (i) delegate climate-related functions to them to advance climate action in areas over which they have authority, (ii) realign responsibilities between national and subnational entities by decentralizing certain functions, and (iii) clarify roles and responsibilities of different actors in implementing shared functions. For areas with overlapping mandates, it is imperative to take stock of existing mechanisms for intergovernmental coordination and identify any needs for new arrangements, especially for long-term climate planning and implementation (adapted from Smoke and Cook 2022).

Box 3.4: Assigning key responsibilities for climate action to lower levels of government in Kenya

The Nairobi City Climate Action Plan 2020–2050 says: "The Constitution of Kenya assigns 14 separate responsibilities to Counties, which include but are not limited to health, transport, control of air and noise pollution, trade development and regulation, education, planning (including housing, electricity, and gas), water and sanitation services, and refuse collection. Within this context, Counties are mandated to plan and implement their climate mitigation and adaptation actions and set up the necessary infrastructure to drive their agendas on climate change matters through policies, laws, and strategies which are all developed in the city and are ratified by its law-making arm. In addition to these locally devolved powers, County Governments are responsible for implementing policies that are set primarily at national level, including strategic education, health, and infrastructure initiatives."

Source: Nairobi City County 2022.

Enhance communication on climate action between national and city levels

If there are strong policy or institutional barriers to integrating urban climate action into national climate change planning, gradual improvement in information sharing between city and national levels can be an initial step. Establishing communication mechanisms between the two levels can facilitate exchange of information, constituting an initial phase in the longer-term coordination/harmonization effort on key aspects of the climate policy process (e.g., target setting, policy development, approaches to access financing, using consistent reporting indicators and timelines). This would enable cities' climate action efforts and targets to be informed by climate goals reflected in national climate plans and/or sectoral strategies. Additionally, if a country has climate-relevant M&E or MRV systems, cities could report progress on their mitigation efforts against these indicators, facilitating data aggregation and comparison of outcomes (discussed in detail in Chapter 5). Finally, such mechanisms could foster the creation of an enabling environment at national level over time in the form of relevant legislative and regulatory frameworks that form a foundation for progressively pursuing the integration process.

Box 3.5: Aligning urban climate plans to national strategies—Addis Ababa, Ethiopia

The Addis Ababa Climate Action Plan 2021–2025 outlines a long-term vision to make the city carbon-neutral and climate-resilient. The plan has identified specific mitigation actions along with targets for the years 2030, 2040, and 2050 to deliver its carbon-neutrality goal. These were informed by a BAU scenario and three emissions reduction scenarios developed for Addis Ababa. The first of these was the Existing & Planned Action Scenario based on current policies and plans at national and city levels such as Ethiopia's NDC and Climate Resilient Green Economy (CRGE) Strategy (Federal Democratic Republic of Ethiopia 2012)*. While this scenario was found to reduce future emissions compared to BAU, it fell short of Addis Ababa's carbon-neutrality goals, requiring the city to develop more ambitious scenarios and identify actions that go further than the national strategies. Further, the plan recognizes the lack of coordination between national- and city-level entities on climate action and stipulates that the Addis Ababa City Administration takes a leading role in creating linkages for other Ethiopian cities to contribute to national efforts in implementing the NDC and CRGE Strategy. The plan's MRV framework is intended to be aligned with the national climate action planning process, enabling vertical integration between the city and national government.

**The CRGE Strategy (2012) is the national guiding framework for Ethiopia to achieve its vision of becoming a low-carbon, middle-income economy by 2025 through green economic growth. This strategy aims to enable the country to strengthen its capacity to adapt to the effects of climate change through a sustainable development approach. The CRGE Strategy has been mainstreamed into the Growth and Transformation Plan (GTP II) (Federal Democratic Republic of Ethiopia 2016), which is a five-year development plan that aims to drive the country's ambition to achieve middle-income status by 2025 in a climate-resilient economy.*

Source: Addis Ababa City Plan and Development Commission 2017.

3.2 Integrated institutional structures

The process of integration should encompass a clear allocation of roles for executing and implementing climate action to specific administrative functions within government institutions. To ensure that these functions are executed most efficiently and the personnel undertaking them are empowered to carry out climate-related responsibilities, dedicated institutional structures need to be established. It is equally important to create mechanisms that facilitate collaboration between personnel carrying out inter-linked functions or work in areas with overlapping mandates across different government levels.

Strengthening coordination and promoting collaboration between entities can also help overcome resource and capacity gaps, especially at city level. For example, poor integration between different levels of government, with climate-related processes being carried out in isolation, prevents sharing of knowledge and technical expertise. Often, a higher level of government or larger cities might have the technical expertise to support city governments with lower capacities on such matters as developing GHG emissions inventories and identifying priority interventions and performance indicators and can collaborate to overcome these capacity gaps.

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There are no optimal organizational structures that are conducive to integrated urban climate action and establishing entirely new (formal) structures is often challenging or unrealistic. Therefore, the most feasible approach could be to embed climate change-specific functions within existing institutional structures, while promoting a shared understanding of objectives and available resources through mechanisms such as a climate change coordinating committee to oversee climate efforts across government entities.

3.2.1 Barriers to integrated institutional structures

In contexts with limited climate change mainstreaming across policy agendas, it can be difficult to ensure that climate change is given equal significance to other development imperatives within institutional structures. This often results in a lack of clarity on climate change-related functions, with roles and responsibilities on climate being informally distributed across government entities.

Lack of clear institutional structures, roles, and responsibilities

Absence of formal, permanent, and predictable institutional structures and functions on climate makes coordination of climate action across different government entities challenging and disincentivizes collaboration. Additionally, lack of clearly defined roles and responsibilities on climate hinders governments' ability to secure sustained funding and other resources to recruit and retain personnel with technical expertise to gradually build up in-house capacity on climate change.

Lack of knowledge, expertise, resources, and technical capacity

Since climate change is a relatively new priority for developing countries, government entities often have limited experience in planning and implementing climate action. As discussed in Chapter 1, cities in LICs and LMICs typically lack expertise on climate-related functions. Without adequate technical capacities, it can be challenging to develop and share knowledge, expertise, and resources to pursue the climate change agenda. To fill these gaps, governments often procure external support for fulfilling climate-related tasks (e.g., developing GHG inventories, modelling GHG emissions growth, developing action plans and investment-ready projects) rather than augmenting internal resources and capacity.

3.2.2 Integrative solutions

The integrative solutions for institutional structures are illustrated in Figure 3.3 and discussed below.

Establish organizational structures and functions on climate change within each government level

Adequate human resources, their organization, and systematic engagement are key for strengthening vertical and horizontal coordination across policy processes to plan and implement integrated urban climate action. To ensure that different levels of government can perform climate-related functions and meet targets, organizational structures with formally defined roles and responsibilities should be established at each level. Creating a sufficiently staffed and funded body with a clear role and mandate on climate at subnational level can send an important political signal to the national government about the importance of this policy agenda. The creation of such a body also requires establishing processes and systems, which can be aligned with processes and systems at other government levels, facilitating integration. Depending on the organizational structures of institutions, existing roles and responsibilities could be modified to carry out climate-related functions instead of creating new climate-focused structures. This could mean formalizing climate-related tasks, establishing dedicated reporting chains of command, and introducing accountability.

Promote stakeholder engagement

Integrated urban climate action requires involving stakeholders at all levels in the planning and decision-making process so that measures and interventions are both consistent with national priorities and locally appropriate, with buy-in from the communities where they will occur (Box 3.6). A participatory and collaborative approach is also essential for addressing cross-cutting issues that don't fit within individual sector or agency mandates or that leverage cross-sectoral synergies, such as integrated land-use and transportation planning. Multi-level stakeholder engagement is therefore crucial for attaining strategic alignment between city-level planning and national climate change targets and for achieving coordinated policy processes across interlinked sectors.

Establishing mechanisms that facilitate stakeholder engagement is a necessary step to integrate institutional structures in countries. To this end, national governments can facilitate participation of city governments in the development of NDCs or LTSs by setting up engagement platforms, organizing technical workshops, or establishing working committees dedicated to urban climate risks and investment needs.

Box 3.6: Collaboration and stakeholder engagement on climate at the local level—Cape Town, South Africa

The City of Cape Town recognized the need for undertaking broad stakeholder engagement and consultation as part of its planning process to develop both its new Climate Change Strategy and Climate Change Action Plan (City of Cape Town 2021). Between 2018 and 2020, the city involved stakeholders through public consultations and civil society engagements, focus groups, expert interviews, and technical workshops. This process was seen as crucial for securing widespread stakeholder support and buy-in and gathering data and information to inform climate actions.

It also enabled new partnerships with external actors such as state enterprises and private entities, which the city would need to effectively implement the plan (City of Cape Town 2021).

The City of Cape Town is also part of the provincial-level climate change response forum and work group led by the Western Cape Government, which facilitates collaboration and learning between local governments in the province. The forum also generates information that the Western Cape Government uses to feed into national processes.

Promote collaboration and sharing of knowledge, tools, and resources

Tools and resources to mainstream climate change in policy processes or disseminate knowledge and build capacity are a key component that can be coordinated and shared across government levels. This can include tools that support technical processes such as modelling and scenario-building approaches to develop low-carbon development pathways, identification and assessment of mitigation interventions, and procedures such as stakeholder engagement or information dissemination (e.g., knowledge-sharing platforms). Sharing tools and resources can support integration of policies and plans through consistent structures, approaches, or information; promote efficient knowledge exchange; and streamline reporting efforts (see Chapter 5). Personnel and technical expertise can also be shared across administrative functions and structures. For example, the responsibility for compiling GHG inventories and reporting the impact of climate interventions can rest with a specific administrative function, but the same personnel can provide support to other levels of government or cities to perform the same function, either directly or through quality assurance and guidance (Box 3.7).

Box 3.7: Leveraging knowledge on climate action reporting through collaboration

Various levels of government have different obligations for reporting climate action that can be leveraged to advance climate change mitigation and adaptation. National governments that are party to UNFCCC have explicit reporting obligations. In contrast, cities might choose to be part of an organization such as C40, a global network of mayors that works to solve the climate crisis, or GCoM (Global Covenant of Mayors for Climate & Energy), the largest global alliance for city climate leadership, which includes over 12,500 cities and local governments committed to combatting climate change. Or they might choose to report information on climate action to the global Carbon Disclosure Project (CDP). For example, the City of Cape Town has a well-established, sector-based GHG inventory, which is updated annually and reported to CDP. There is thus a vast pool of knowledge, expertise, resources, and technical capacity available to city governments. Cities with stronger capacities can more readily leverage available tools and resources while facilitating access and sharing experiences to help cities with weaker capacities. This can take the form of a collaboration and knowledge-sharing platform, where entities gather to share experiences and lessons learned.

Figure 3.3: Integrative solutions for institutional structures

Cape Town, South Africa © World Bank

Chapter 4

Strengthening finance mobilization at the local level for climate action

With cities assuming a prominent role in countries' transition to low-carbon development pathways, enhancing access to sufficient financial resources both at national and city levels is crucial for realizing climate goals in urban areas. There is also an urgent need to channel more targeted financing from national and international sources to support low-carbon urban development, especially in rapidly urbanizing countries (World Bank and CCFLA 2021). Evidence suggests that climate finance delivered at the local level produces effective, efficient, and long-term results, maximizing the impact of each dollar spent, including delivering mitigation, resilience, and development benefits (Soanes et al. 2017, CCFLA 2021). However, local governments face significant challenges in accessing domestic and international financing and unlocking private capital because of factors such as budget constraints, high levels of debt, and low creditworthiness. These challenges are often amplified by institutional and political barriers that hinder the ability of cities to mobilize financing to close the investment gap and advance the climate transition (CCFLA 2021; World Bank and CCFLA 2021).

Challenges and opportunities related to financing urban climate action have been addressed in detail in several recent publications such as CCFLA (2021) and CPI (2021), which include a comprehensive discussion of policy, financial, and technical barriers and solutions for subnational actors to access climate finance at scale. This report, therefore, provides a brief overview of the key prerequisites and barriers for cities to access climate finance (Section 4.1) and focuses on how integration of low-carbon urbanization into NDC and LTS policy processes can help mobilize financial flows for urban mitigation action (Section 4.2).

4.1 Limited capacity at city level is a barrier for mobilizing climate finance

Cities can receive climate finance from a variety of sources (Box 4.1). Accessing these funding sources requires city governments to have certain financial and technical capabilities and a conducive policy environment, especially when funds are channeled through national governments.

Box 4.1: Main sources of climate finance available to cities

International sources: Grants and credit from international climate funds and development finance institutions (e.g., Green Climate Fund, Climate Investment Funds, Multilateral Development Banks [MDBs]). International funds are usually channeled through the national government. In the past few years, numerous MDBs have launched initiatives to provide funding for urban climate action (e.g., the European Bank for Reconstruction and Development's EBRD Green Cities).

Intergovernmental transfers from the national budget or state/provincial budgets.

Own-source revenue: Revenue collected by cities from property and business taxes, charges (e.g., congestion pricing, parking), user fees for services, fuel levies and road tolls, fines, and land value capture.

Borrowing instruments such as debt, balance sheet financing, municipal bonds, and credit enhancement mechanisms.

Private sector: In recent years, cities have made concerted efforts to secure private sector investment in climate projects by using mechanisms such as PPPs and special-purpose vehicles.

Source: CCFLA 2021

4.1.1 Financial capacity

Financial capacity refers to cities' ability to mobilize financing for climate-related investments from their OSR or by raising capital on financial markets. Cities' degree of financial autonomy (e.g., level of mandate or authority to generate OSR, spend their own funds, or issue debt-based financing instruments such as municipal bonds) is a key determinant of their financial capacity. Their ability to borrow capital and use debt-based instruments depends on their creditworthiness, borrowing track record, financial expertise, and technical skills to identify, develop, and effectively implement robust investment-ready projects. Cities with a greater degree of financial autonomy coupled with adequate borrowing abilities can attract private capital and mobilize financing from domestic and international sources. Limited financial capacity is therefore an important barrier to access financing for urban climate action.

4.1.2 Technical capacity

Cities need to be able to design, manage, and implement climate-related investments. Their degree of dependence on the national government's institutional and technical resources for undertaking core functions such as spatial planning and service provision can be an indicator of their technical capacity for climate-related functions. Skillsets associated with developing a robust pipeline of investments and preparing, managing, and implementing investment programs and specific projects (e.g., identifying investment needs, appraising proposals, preparing contracts, managing services, undertaking stakeholder engagement, monitoring and reporting performance) are common to both urban and climate policy areas. In addition, climate-specific technical expertise includes:

- Capacity to design and implement GHG emissions-reduction policies and investments that are appropriate for local conditions and capabilities (e.g., developing GHG inventories, evaluating and monitoring emissions impact of interventions, developing business models for low-carbon projects).
- Understanding requirements and eligibility criteria of international climate funds and development partners to prepare compelling funding proposals and setting up robust implementation entities.
- MRV skillsets such as data collection, aggregation, analysis, and selecting and reporting on appropriate performance indicators.

Cities in LICs and LMICs often face significant challenges in meeting these prerequisites because of limited financial and technical capacities. In small and medium cities, this gap is often compounded by numerous constraints in fulfilling core urban development-related functions such as urban service delivery and financial management.

Some of the integrative solutions discussed under Pillar 1 (Chapter 3) can also be deployed to address capacity-related barriers to mobilizing finance at city level. For instance, the national government can empower city governments with mandates to bolster their financial autonomy, while city governments can collaborate with entities with greater capacities to overcome their technical capacity constraints.

4.1.3 Policy integration and coordination

A recent assessment of urban climate finance flows by CCFLA (2021) highlights the vastly insufficient amounts of urban climate finance invested in developing countries, including South Asia and SSA. Of the total estimated urban climate finance in 2017-2018, the largest portion was invested in developed economies and China. Moreover, while the origins of finance providers remain opaque, urban climate finance from emerging markets was committed mainly domestically (97 percent). This assessment also found that national governments financing domestic projects were the largest finance providers overall (CCFLA 2021). This analysis highlights that cities in developing countries primarily depend on the national government for financing climate action.

Given their heavy reliance on intergovernmental transfers from the national budget for both urban development and climate projects, the volume and flow of such transfers can affect the scope of climate-related interventions in cities in LICs and LMICs. As a result, regular and consistent funding from the national budget, underpinned by vertically integrated planning and policy processes, is a key enabler for these cities to implement climate-related projects (and attract international and private finance). Lack of climate change mainstreaming or limited policy integration and coordination between national and subnational governments on urban climate action can constrain funding flows for climate-related projects in urban areas (e.g., intergovernmental fiscal transfers targeted at urban spending categories lack dedicated funding allocations for climate-related interventions). In such instances, the volume of funds flowing to cities may depend on the national government's priorities and other competing urban service provision needs, deprioritizing funding for climate action. This could also undermine investor confidence and be compounded by limited mandates and abilities of city governments to raise revenues both from their own sources (e.g., taxes, fees) or debt-based instruments. Moreover, lack of alignment between city- and national-level climate priorities can be an additional barrier for multi-year low-carbon infrastructure projects that need to overcome the conflict between their long lead times and shorter government budgeting cycles, which can be affected by changes in administrations or shifting political priorities.

Finally, limited policy integration can also impede the transfer of resources, financial or otherwise, from higher levels of government required by city governments to meet capacity-related prerequisites.

4.2 Integration of urban climate action into NDCs and LTSs can boost finance mobilization

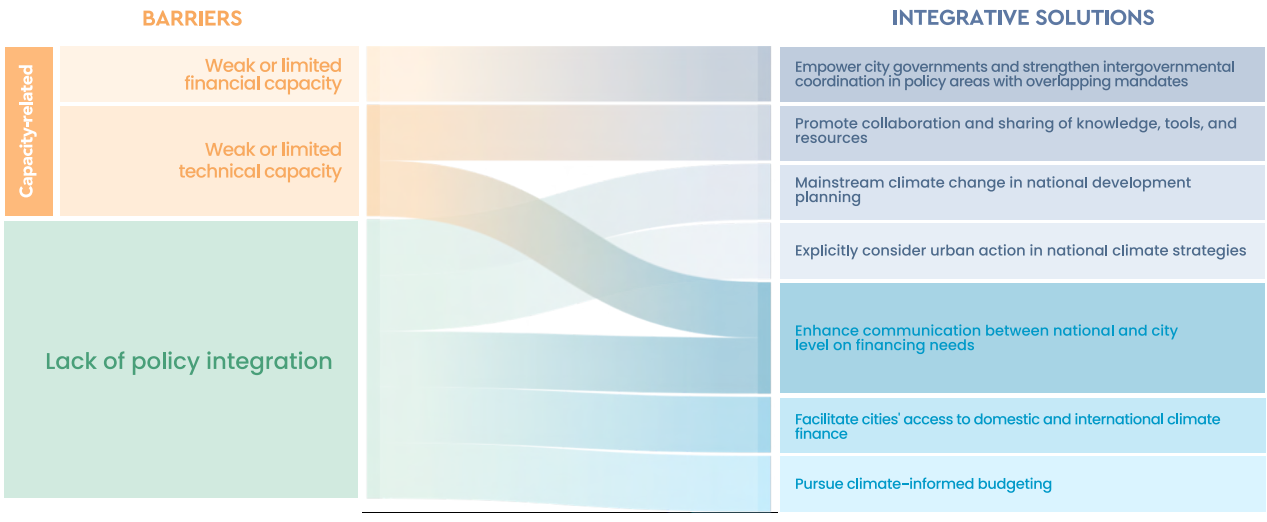
Since national governments in developing countries are the largest finance providers for urban climate action, developing robust and ambitious national climate policies and strategies (e.g., NDCs, LTSs) that integrate low-carbon urban development priorities are crucial, as they are a key signal of the government's sustained commitment to these priorities. Systematic inclusion of city-specific targets in these strategies can enable cities to gain sustained support from the national government for undertaking climate action. Such integration can ensure policy predictability and reliable financial support by making funding flows less sensitive to changes in the country's political landscape.

Clearly reflecting urban climate action in NDC funding needs assessments, investment plans, and subsequent finance mobilization strategies can facilitate the allocation of financial resources at city level to support actions that will deliver the greatest benefits. Considering urbanization-related challenges and opportunities in LTS processes can help embed both near- and long-term climate investment needs at city level into overall green transition priorities and translate them into specific implementation plans and financing models. In countries where climate change is mainstreamed into national development planning (discussed in Section 3.1.2), such integration would result in funding allocations to cities from the national budget for climate action, bringing dependability to intergovernmental transfers.

4.2.1 Integrative solutions

Integrative solutions for finance mobilization illustrated in Figure 4.1 build on solutions related to policy frameworks under Pillar 1 (e.g., mainstreaming climate change in national development planning, empowering city governments, strengthening intergovernmental coordination). In addition, countries that are in the early stages of mainstreaming climate change in their national development planning (e.g., have limited integrated policy frameworks) or are in the process of aligning the climate and urban development policy agendas can use the approaches outlined below to overcome barriers to mobilizing climate finance.

Figure 4.1: Integrative solutions for finance mobilization



Enhance communication on financing needs for urban climate action

Establishing a framework under which cities and the national government can coordinate on climate change policies can help align city-level climate efforts with national climate planning initiatives. This could involve collaboration on the development, update, and implementation of NDCs/LTSs. Within this collaborative framework, cities can provide information on existing and planned urban climate projects and associated financing needs to the national departments responsible for the preparation and implementation of NDCs/LTSs so they can be considered for inclusion in investment plans. Cities can strengthen their negotiating position and value proposition to secure funds for climate action by coordinating their actions and approaching the national government jointly. Establishing a climate-focused network of city representatives can help this process and facilitate discussions with the national government. This would allow smaller cities to become part of the dialogue and benefit from potential funding allocations that would not be possible if they acted on their own. Further, this would enable cities with strong financial capacities to make a case for greater authority to mobilize financing for planned climate-focused actions. Lastly, by strengthening coordination with the national government, cities could seek to streamline approval processes for urban projects that require national approval (e.g., large infrastructure projects), addressing concerns about securing all approvals, which may be a barrier to investor support (CCFLA 2021).

Facilitate cities' access to domestic and international climate finance

National governments can empower cities to access climate finance sources that are beyond their reach through targeted support and dedicated initiatives. International climate funds and development finance institutions have specific eligibility criteria and processes for accessing financing that could be too onerous for individual cities (especially smaller ones) to meet. The national government could create a program/initiative dedicated to aggregated city-level climate action that is consistent with the requirements of international funds and institutions and strategically aligned with national- and city-level priorities on climate. This aggregated approach can enable cities to access funding for climate-related interventions from such sources at a lower transaction cost. Similarly, the national government can facilitate cities' access to domestic funding sources such as national development banks and private investors by deploying innovative financing instruments for de-risking (e.g., guarantee facility).

Pursue climate-informed budgeting

Earmarking governmental transfers (e.g., conditional transfers) for climate-related actions allows cities to have reliable funding flows to support their climate investments. Alternatively, national governments can include climate-related performance criteria for cities in their budgetary allocations to incentivize urban climate action.

Mainstreaming climate change in national development planning and budgeting is an integrative solution that could enable regular and consistent funding flows for urban climate action in the long-term. However, LICs and LMICs need to lay the initial groundwork to allow systematic inclusion of climate considerations in their budgeting process. Instituting climate budget tagging (CBT) can serve as a useful tracking mechanism and be the first step in this direction. CBT is a tool for identifying, classifying, weighting, and marking climate-relevant expenditures in a government's budget system, enabling the estimation, monitoring, and tracking of those expenditures. Such tagging of climate-related expenditures can enable national and local governments to take stock of spending on climate, identify funding gaps in implementing their climate change priorities and plans, and determine the need for mobilizing additional resources (UNDP 2019). Therefore, CBT can underscore cities' roles in delivering climate action.

There are several analytical tools that support governmental budgeting processes, such as the *Public Expenditure and Financial Accountability (PEFA) Program*[26] (Box 4.2) and the UNDP (2015) *Climate Public Expenditures and Institutional Review (CPEIR)*.[27] While these typically target the national level, city-level adaptations of these methodologies are currently being developed to support urban budgeting processes.

Box 4.2: Climate responsive public financial management framework

The PEFA framework for assessing climate responsive public financial management (PEFA Climate) is a set of supplementary indicators to the PEFA framework to collect information on the extent to which a country's public financial management (PFM) system is ready to support the implementation of national climate change policies. The indicators aim to capture current practices in mainstreaming climate change in PFM by tracking aspects such as budget alignment with climate change strategies, climate-responsive public investment management, climate-related liabilities, and climate-responsive procurement. Many of these indicators include questions on activities at subnational level, allowing the assessment of consistency and integration across government levels. Along with checking the applicability to, and interaction with, subnational governments, the PEFA assessment includes a module on a climate-responsive fiscal decentralization framework, which assesses climate-responsive fiscal transfers and PFM arrangements applied by subnational governments. Analysis undertaken in this module and supported by the wider findings of the PEFA Climate Framework can help national governments develop more integrated and climate-aligned public funding systems at national and subnational levels.

Source: PEFA 2020 and UNDP 2015.

[26] PEFA assessments can be carried out both on national and subnational (e.g., city or municipality) levels. As of 2022, 267 national and 166 subnational PEFA assessments have been completed, including 10 countries in South Asia and 47 countries in SSA.

[27] CPEIR is a diagnostic tool used by national governments to understand how well climate change priorities and concerns are integrated within a country's national and subnational budget allocations and expenditure processes. CPEIR methodology (UNDP 2015) allows analysis of both national- and city-level policy objectives and how well their expenditures are aligned with those objectives. It can highlight inconsistencies in climate-focused expenditures allocated to specific sectors, regions, or cities. At city level, CPEIR results can demonstrate how much climate change-aligned funding they receive, which sectors this funding goes to, and how well these patterns are aligned with national and subnational climate change targets, highlighting sectoral and geographical alignment.

Chapter 5

Urban diagnostics and integrated MRV systems to underpin integration

Assessing the impact of urbanization trends and urban policies on current and future GHG emissions and evaluating the expected outcomes of urban climate mitigation interventions require robust data (both national and city level) and sound diagnostic approaches. Country-specific analytics can enhance policymakers' understanding of risks and opportunities associated with urban climate mitigation and help integrate low-carbon urban growth considerations into national climate and development planning processes. High-quality, transparent, and consistent data enables city governments to evaluate the impacts of their climate interventions and effectively communicate their costs and benefits to national governments, paving the way for their inclusion in national climate change strategies such as NDCs and LTSs. In addition to supporting decision making on urban climate action, data and diagnostics are also critical elements for systematically tracking and reporting impacts of low-carbon urban development efforts and associated climate finance flows at different government levels. With cities in LICs and LMICs taking a prominent role in their low-carbon transition, there is an urgent need to improve their data and diagnostic capabilities.

This chapter discusses the role of data-driven decision making and impact tracking in enabling integration of urban climate action into policy processes and its implementation. It proposes ways to improve use of diagnostic tools and enhance integration of MRV systems for urban climate action in developing countries by addressing gaps and barriers.

5.1 Role of diagnostic tools in facilitating integration of urban climate action into NDCs and LTSs

Robust data and diagnostic approaches are crucial elements for integrating the low-carbon urbanization agenda in climate and urban development policy processes. Augmenting such approaches in developing countries can improve the evidence base for urban policy decisions and inform the ambition of national- and city-level climate interventions. For example, urban mitigation diagnostics can provide critical insights to policy makers on the medium- and long-term impacts of technological, behavioral, and land-use trends in urban areas to develop pathways for longer-term economy-wide transitions in LTSs (including through modelling). Such analyses can also highlight new mitigation opportunities in urban areas, which may contribute to enhancing national ambition on climate action (e.g., through more actions) and help identify more granular city-level actions in national climate change strategies. Similarly, strengthening data collection and reporting processes is important for streamlining tracking of progress on achieving medium- and long-term climate goals across different levels of government and entities to feed into the national MRV system.

5.1.1 Enhancing understanding of low-carbon urban development pathways

Urban areas have complex spatial and temporal interactions between economic activity, demographic factors, land-use and transportation systems, employment sectors, and environmental stressors. Influencing these complex interactions and identifying measures to reduce cities' carbon footprint require understanding how they work and impact GHG emissions. This is even more important in LICs and LMICs since, as discussed in Chapter 1, near-term decisions about infrastructure investments in these countries will influence both their urban environment and the quality of life of urban dwellers in the long-term and the efforts needed to transition toward low-carbon urban development.

Interventions in urban areas that have a direct GHG emissions impact include (i) investments in transportation infrastructure and housing development, sanitation, waste management, and green infrastructure and (ii) policies and regulations affecting land-use, housing, and transportation sectors, consumer choices, and energy demand. Socio-economic implications of low-carbon urban growth efforts on aspects such as employment, public health, or urban equality are also important considerations for decision making since climate mitigation actions do not happen in a vacuum and have social and economic impacts on households and firms. It is therefore important to recognize and quantify the potential trade-offs and synergies with other priorities (e.g., poverty reduction, public health, disaster risk management) that might be triggered by climate mitigation action in urban areas.

Given the complex interactions between urban sectors and actors along with diverging policy and investment priorities, national and urban decision makers and regulators need to strengthen their analytical abilities and understanding of low-carbon urban development pathways and the levers to achieve them. This is particularly important since urban climate mitigation action is highly synergistic with other urban development priorities and generates benefits beyond GHG emissions avoidance/reduction, such as improving resilience of households, reducing traffic congestion and pollution, and enhancing the quality of life of urban dwellers (also discussed in Chapter 1).

Numerous models and tools exist for achieving a better quantitative understanding of GHG emissions impacts of urban growth and outcomes of urban climate mitigation interventions. Robust datasets and analytical tools can facilitate (i) the identification of current and future carbon footprints of urban areas (and urban climate risks); (ii) a granular assessment of urban mitigation challenges and responses in key sectors including energy, transportation and mobility, waste, the built environment, and cross-sectoral aspects of urban systems; and (iii) improved understanding of carbon lock-in risks, particularly in rapidly urbanizing areas, along with positive spill-over effects of low-carbon transitions. Such diagnostics can support the consideration of current and future GHG emissions growth in countries' urban areas and their GHG avoidance and abatement potential in both climate planning (e.g., NDC) and urban development planning (e.g., NUP) efforts at national level. They can also enable development of country-specific urbanization scenarios (e.g., by factoring in urban population and economic growth trends and policy, regulatory, and technological changes) that can be reflected in the country's LTS and the identification of concrete short- and medium-term policy and investment milestones.

5.1.2 Improving evidence-based design of climate-related policies and interventions in urban areas

Data and diagnostics are crucial for creating a strong evidence base of urban mitigation challenges and opportunities to advance the design of impactful policies and investments. For instance, GHG inventories help understand the emissions baselines and contribution of key sectors and activities at different levels of aggregation and spatial scales. Projections of emissions using tools or modelling can show how emissions will change in the absence of (or with existing) measures in both national and local contexts under certain assumptions (e.g., population growth trends, income levels, global and national climate ambition). This facilitates setting and allocating targets at different jurisdictions — city, regional, and national—and for different sectors over the medium- and long-term and identification of relevant actions to achieve these targets. Diagnostics can also help quantify the impact of climate mitigation actions, both in terms of expected GHG reductions and wider costs and benefits. This can support decision makers in developing policy and investment choices that minimize trade-offs and achieve the most impact and in tracking overall progress in reducing emissions.

5.1.3 Barriers to evidence-based urban climate policy processes

There is currently a large knowledge base of operational reviews and online resources on the use of tools and models for assessing urban climate mitigation interventions—NDC Climate Toolbox,[28] World Bank Group (2020),[29] City Climate Finance Gap Fund (2021),[30] GCoM for Climate and Energy Resource Library[31] and the World Bank's guide on choosing macroeconomic models for climate policy analysis (World Bank Group 2022c). Tools and models differ in their ability to simulate temporal dynamics and cross-sectoral interactions and in terms of their sectoral coverage and geographic scales. They also vary in their applicability across regions. Some tools and methodologies enable benchmarking of different future scenarios and simulate combinations of policy measures. Certain models specialize in a single task, such as forecasting land-use change and urban growth, analyzing transportation patterns, or assessing energy systems. Other urban models capture more general interactions between processes in urban systems, most notably land use and transportation.

Models range from simple tools that can assess smaller or marginal changes of one intervention to full-scale models that can capture non-linear interactions[32] and project long-term changes to the urban landscape. Urban models and tools can be characterized into 'model families' based on their different characteristics (Box 5.1).[33] Some models enable users to explore the impacts of infrastructure, policy, or technology choices and identify and prioritize investments and policy interventions that will have the greatest impact in terms of avoiding or reducing GHG emissions. Others help identify interventions that can achieve development priorities with lower GHG emissions. Such models can also highlight the potential trade-offs and synergies between these goals and other objectives such as jobs creation or poverty reduction and can be used for scenario testing of the long-term impacts of different urban development pathways on GHG emissions trajectories to avoid undesired carbon lock-in. However, it is important to note that the number of models capable of providing both sophisticated urban development scenarios and the resulting carbon footprint of interventions remains limited.

Limitations of diagnostic tools in informing low-carbon urbanization pathways and their impacts in developing countries

Many models are well-suited for use in developed countries, which have readily available data at high spatial resolution and representative cause-effect relationships or elasticities. There is a significant lack of models tailored to cities in Africa, Asia, or Latin America, limiting practitioners' ability to sufficiently address analytical needs in regions where most urbanization is expected to occur (e.g., in SSA and South Asia).

However, many tools can be adapted to these regions, and several have been developed to address their needs. For example, the *Low Emissions Analysis Platform–Integrated Benefits Calculator* is an accounting tool for air pollution and GHG emissions, which accounts for practices unique to developing regions, such as wood-fired cooking stoves. *The GHG Abatement Cost Model (GACMO)* is a rapid diagnostic tool developed for developing regions with the aim of assessing GHG abatement costs. The easy-to-use spatial tool Urban Performance has also been used in many developing countries. Quantitative urban models that assess the impact of new transportation infrastructure (e.g., BRT) on settlement patterns and spatial income distributions have been piloted in Africa and South America (Tsivanidis 2018; Bird and Venables 2019).

An analysis of a non-exhaustive list of urban tools and models (see Box 5.1) was undertaken for this report to: (i) identify key gaps that hinder data-driven integration of urban climate change action in national climate planning processes in developing countries (discussed below) and (ii) determine if the range of available urban tools and models sufficiently covers the key diagnostics questions relevant to low-carbon urbanization, especially in rapidly urbanizing developing countries (discussed in Table 5.1). This analysis identified several general limitations of tools and models:[34]

- Most tools are focused on earlier phases of planning, including problem definition and formulation of policy proposals, and few are available to support cities in the execution and implementation phases.
- Many tools do not provide comprehensive coverage of potential impacts on poverty and equity. In addition, there is uneven capacity across most model families to quantify co-benefits of low-carbon and deep decarbonization interventions and trade-offs with development priorities.
- Not all tools assess GHG emissions, and not all models that do (e.g., global models) have detailed representation of urban issues (e.g., how the urban form and the extent of urbanized areas influence the distribution and densities of households, jobs, and services and shape energy demand in cities). Therefore, assessing the contributions of different policy interventions to low-carbon development may require translating the outputs of one model into another.
- Very few models have the ability or have been used to assess impacts of synergistic policies and cross-sectoral interventions, which is a significant limitation given the potential enhancing effects of the simultaneous implementation of various policies through spillover effects and co-benefits.
- The significant data requirements associated with a valid model setup may limit the number of tools that can be readily applied in developing countries given the current limitations of local data.

[28] A curated online resource to search for urban tools related to NDC preparation and planning by NDC Partnership. Available at: https://ndcpartnership.org/about-climate-toolbox. Accessed in November 2023.

[29] A World Bank review of Integrated Urban Planning Tools for Greenhouse Gas Mitigation supported by the Global Platform for Sustainable Cities and GEF.

[30] The "Urban Greenhouse Gas Modeling Tools" knowledge note is a primer to help cities and organizations working with cities understand and select available tools, based on their needs.

[31] The library has instruments, applications, and algorithms that better inform decision making for cities and local governments, especially around planning, service provision, and regulatory assessments. This is also supported by an overview of tools prepared by GCoM. Bloomberg Associates and WRI (2021).

[32] In the real world, sectors and activities influence each other and strongly interact with the spatial layout of cities. This means that processes or developments may reinforce or slow each other in non-obvious ways. Such "non-linear" dynamics cannot be represented when sectors and economic activities are modelled independently from each other.

[33] These model families include urban GHG inventory tools, rapid diagnostic tools, non-micro-founded spatial models, and micro-founded urban spatial models.

[34] Several of these findings are in line with outcomes of other reviews on the suitability of modelling tools for developing country contexts, such as GCoM (2021).

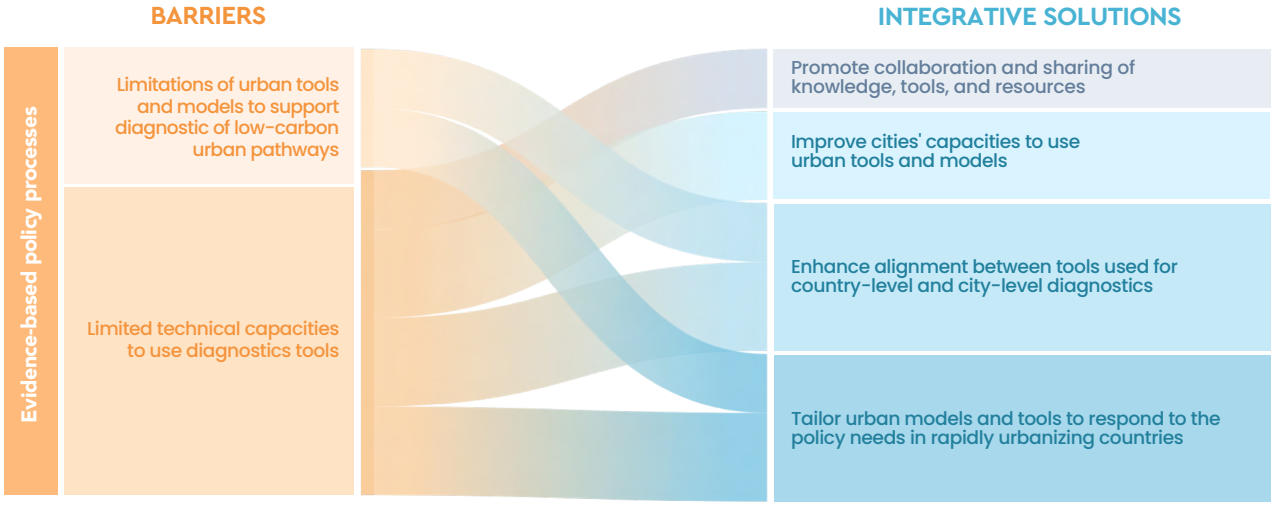
Limited resources and technical capacities to use diagnostic tools

Entities at different government levels engaged in urban climate policy processes may not have the expertise to identify and apply diagnostic tools to address their specific policy needs. It may be difficult for non-specialists with limited climate-related expertise to formulate diagnostic questions that can support integration of low-carbon urban development considerations in national climate planning processes. While rapid diagnostic tools or GHG inventories (which usually feature accessible interfaces and user support) may be sufficient to provide quick assessments of impacts for smaller policy interventions, larger, system-wide interventions and complex projects may require the use of specialized models that are modified/tailored to address targeted and sometimes complicated questions. Setting up and running such models requires modelling expertise, time, and resources, including for obtaining external support (e.g., experts in modelling). However, given the expected long-lasting impacts of urban interventions, mobilizing resources for a robust and comprehensive assessment of their direct and unintended impacts may justify such investment.

5.1.4 Approaches for strengthening evidence-based decision making in support of urban climate policy processes

This section outlines key solutions that can be adopted in developing countries to augment their ability to use diagnostic tools to support climate-informed urban policy processes (Figure 5.1). These solutions are focused on (i) improving cities' capacities to use urban tools and models; (ii) enhancing alignment between tools used for country- and city-level diagnostics, and (iii) continual tailoring of urban models and tools to respond to policy needs in cities in rapidly urbanizing countries. Broader integrative solutions pertaining to strengthening intergovernmental coordination and promoting collaboration and sharing of knowledge, tools, and resources (discussed under Pillar 1) can equally contribute to strengthening evidence-based decision making. This section also discusses the main diagnostic questions that can be explored at different government levels to inform better integration of low-carbon urbanization priorities into national climate planning processes. It also proposes a simple guide for selecting the most appropriate tools and models to provide urban climate policy-relevant insights.

Figure 5.1: Solutions for strengthening evidence-based urban climate policy processes



Improve cities' capacities to use urban tools and models

As discussed in previous sections, the low-carbon urban development agenda in rapidly urbanizing countries has several key characteristics that need to be considered when pursuing its integration into national climate and development planning processes (e.g., NDCs, LTSs). Table 5.1 summarizes the main urban diagnostic parameters that help evaluate the outcomes and impacts of low-carbon growth and climate mitigation interventions in urban areas and their relevance to low-carbon urbanization policy processes.

Entities engaged in climate policy processes relevant to urban areas at different government levels need support to select appropriate tools and models depending on the intended policy objectives, priorities of the diagnostics being undertaken, and available resources. Choosing the 'right' tool or model is not a trivial task. The Guide for selecting diagnostic tools and models proposed on pages 52 to 57 can inform the choice of appropriate tools and models to generate insights on the main urban diagnostic parameters discussed in Table 5.1.

Table 5.1: Main urban diagnostic parameters to assess implications of low-carbon growth interventions in urban areas

Urban diagnostic parameters	Relevance to low-carbon urbanization policy processes
Impact of land-use patterns and spatial planning on the level of demand/supply of urban services, travel demand, infrastructure, and the built environment	Urban form shapes energy demand in cities by influencing the distribution of infrastructure, services, and economic activity. Urban infrastructure and the built environment are long-lived assets that embody triple carbon lock-in in terms of their construction, operations, and demolition (Creutzig et al. 2016b; Seto et al. 2016; Ürge-Vorsatz et al. 2018) and influence the mitigation potential of urban areas (based on Lwasa et al. 2022).

[35] These are GHG emissions embodied into materials used to construct urban infrastructure, such as concrete, steel, and insulation.

Impact of sectoral technology choice on the level of demand/supply of urban services, travel demand, infrastructure, and the built environment	The choice of technologies, materials, and infrastructure that have different carbon intensities will drive urban GHG emissions trajectories through demand for energy, mobility, and urban services and embedded or material-related[35] GHG emissions.
Impact of cross-sectoral interventions on the demand for urban services and infrastructure	Cross-sectoral interventions treat urban areas as the nexus of energy and urban form that can contribute to reductions in both material-related and energy-related GHG emissions while enabling housing and mobility services to benefit the population. An example of such a strategy is electrifying mobility, while decarbonizing electricity and energy carriers and switching to net-zero materials and supply chains (based on Lwasa et al. 2022).
Impact of climate mitigation interventions on energy demand and/or on GHG emissions	The impact of urban climate mitigation interventions (e.g., changing street lighting) on energy demand and/or GHG emissions (e.g., reduction generated by extending car-free zones).
Impact of economy-wide or sectoral climate mitigation policies on urban development indicators	Economy-wide climate mitigation policies such as emissions trading schemes, eco-labelling regulations, and adoption of low-carbon vehicles may contribute to achieving broader urban sustainability goals. System-wide interventions such as spatial planning for compact urban growth supported by climate policies can help meet both climate mitigation and development goals in urban areas, for example, by improving access to low-carbon transportation modes and reducing travel demand and air pollution.
Economic impacts of climate mitigation interventions	Evaluating economic impacts of climate interventions such as transit-oriented development on changes in housing rents, incomes, and access to jobs can inform whether and how such interventions positively impact employment and the livability and competitiveness of urban areas.
Social and environmental co-benefits and unintended positive impacts of climate policy interventions	Climate policy interventions in urban areas lead to social and environmental co-benefits or unintended positive impacts such as reduced congestion, improved air quality, and improved access to services.
Impact of climate mitigation interventions on poverty, income distribution, equity, and informality	Climate policy interventions may result in negative impacts or trade-offs with other urban development objectives, therefore, designing policies and infrastructure solutions in a way that fosters accessibility, equity, and inclusivity for disadvantaged groups is essential (Viguié and Hallegatte 2012; Sharifi 2020; Pörtner et al. 2021). For example, climate mitigation measures can reduce health risks arising from energy poverty (e.g., burning biomass) especially among vulnerable groups such as the elderly and those living in informal settlements (Monforti-Ferrario et al. 2018; Lwasa et al. 2022).

5.2. Guide for selecting urban diagnostic tools and models

An easy-to-use guide developed for this report can support users in selecting appropriate diagnostic tools and models depending on the intended purpose, priorities, and available resources. This guide is underpinned by the analysis of select urban tools and models undertaken for this report (see Box 5.1).

The guide is structured as follows:

1. It categorizes the various urban diagnostic tools and models into "model families" to direct users and decision makers toward a group of tools relevant for addressing their policy objectives.

2. To arrive at a specific model choice, it then outlines a set of criteria, such as common technical abilities, sector coverage, and usability and robustness of models, to address specific policy-relevant questions. These criteria can assist the user in translating the key diagnostic parameters relevant to low-carbon urbanization (Table 5.1) into relevant model abilities.

3. Finally, a high-level decision tree (Figure 5.2) enables the user to identify specific model families based on the intended purpose and priorities of the diagnostic.

1 Model families

Urban tools and models can be categorized into "model families," which loosely correspond to distinct modelling traditions that usually share several key features. This categorization can guide decision makers and users toward the group of tools best suited for addressing their policy needs (see Box 5.1).

Box 5.1: Urban tools and models: Understanding common features to support tool selection

This Guide comprises four main families of urban tools and models, applied at the city level. These tools and models are not suitable for expanding the assessment beyond city level:

(i) Urban GHG inventory tools support the development of GHG emissions inventories that can be deployed to understand cities' current emissions sources and monitor trends. Most inventories are based on the *Global Protocol for Community Scale Greenhouse Gas Inventories* (GPC) accounting method, which is an adaptation to the city level of IPCC accounting standards. The *City Inventory Reporting and Information System* (CIRIS) developed by the C40 Cities Climate Leadership Group is also a widely used tool for creating emissions inventories, relying on the GPC standard. Other examples include the *Google Environmental Explorer*, which is based on Google proprietary data, *Emission Sources Account* (ESA) model, *Global Emissions Model* for Integrated Systems (GEMIS), *GHG Contribution Analysis*, and the *Long-range Energy Alternatives Planning— Integrated Benefits Calculator* (LEAP-IBC), which is particularly relevant for developing countries. as it can account for practices that are unique to these countries.

(ii) Rapid diagnostic tools explore the mitigation potential and costs of various policies and interventions (e.g., fuel switch), without fully modelling underlying mechanisms and interactions between sectors or spatial representations. These tools offer quick insights, and many have user-friendly interfaces. Examples include *Advanced Practices for Environmental Excellence in Cities* (APEX) and its predecessor *Climate Action for Urban Sustainability* (CURB), which are widely used across regions and include user support. *Adaptation and Mitigation Interaction Assessment* (AMIA) is a tool for identifying shared benefits of adaptation and mitigation actions, and the *Greenhouse Gas Abatement Cost Model* (GACMO) is appropriate for creating country-level GHG abatement cost assessments in developing countries. Other examples include the *Action Selection and Prioritization* (ASAP), *City Infrastructure Footprint and Action Analysis* (CIFAA), *ClearPath*, *Coefficient Correction*, *City Performance Tool* (CyPT), and *Strategy-based Model for Low Carbon Cities* (SMLC).

(iii) Non-micro-founded spatial models represent the behaviors of economic agents,[36] relying on assumed and mostly stable empirical relationships to simulate urban spatial extent, population distribution, economic activity, travel behaviors, and climate vulnerabilities. Examples include *Urban Performance* and *UrbanFootprint*, which are very accessible tools with a track record of application for decision making. *Urban Performance*, which can be used in all parts of the world, tests development scenarios with indicators for environmental, economic, and societal welfare considerations, while *UrbanFootprint* focuses on climate adaptation and urban resilience in the United States and Mexico.

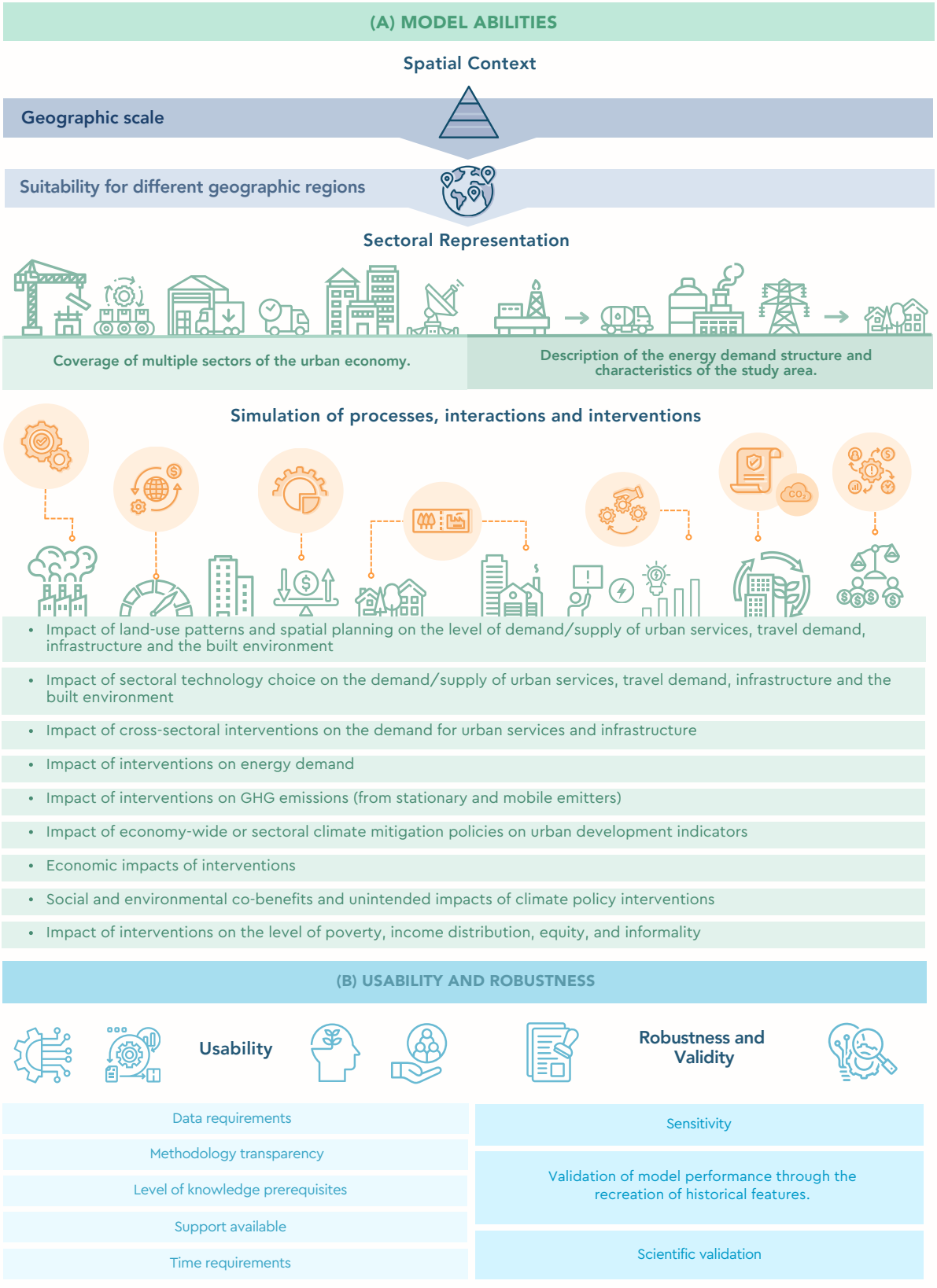
(iv) Micro-founded urban spatial models represent underlying mechanisms explaining the behavior of individual economic agents (e.g., construction or locational decisions) and the resulting outcomes from their interaction—the land-use patterns and spatial distribution of populations, economic activities, and real estate prices. Agents' behaviors are fully described and micro-economically founded and have explicitly represented market mechanisms. *RELU-TRAN* (Regional Economy, Land Use and Transportation Model) and *NEDUM-2D* (Non-Equilibrium Dynamic Urban Model) are models grounded in urban economics. *SLEUTH* (Slope, land cover, excluded regions, urban land cover, transportation, and hill shades) and *SIMPLAN* (SIMplified PLANning Model) both simulate future urban growth, and *TRANUS* and *UrbanSim* model land-use interactions. Other models in this family include *Agent iCity*, *Agent-based market diffusion, SimMobility*, and *UEFM* (Urban Energy Footprint Model). Quantitative urban models (economic geography models) can explain agglomeration economies and welfare effects and simulate the effects of significant interventions, such as the development of a new city district, but need further development for their use in GHG emissions assessments. Examples include the Ahlfeldt model (2015), Bird and Venables Model (2019, 2020), Heblich reduced form model (Heblich et al. 2020), Tsivanidis model (2018), Sturm model (Sturm et al. 2021), and Zárate model (Zárate 2022).

[36] Depending on the models, economic agents can be citizens, families, dwellings, firms, and governments.

2 Selecting diagnostic tools

This Guide identifies common technical abilities and sector coverage of urban models and tools as criteria for model choice (see Figure 5.2). It also provides a set of criteria to determine the usability and robustness of models in addressing specific, policy-relevant questions, including their user friendliness and accessibility (e.g., data requirements, methodological transparency, knowledge prerequisites, and available support), the thoroughness of their scientific review, and the extent to which they have been applied in developing countries. Each of the criteria is discussed in detail below and can inform the use of the high-level decision tree for model selection.

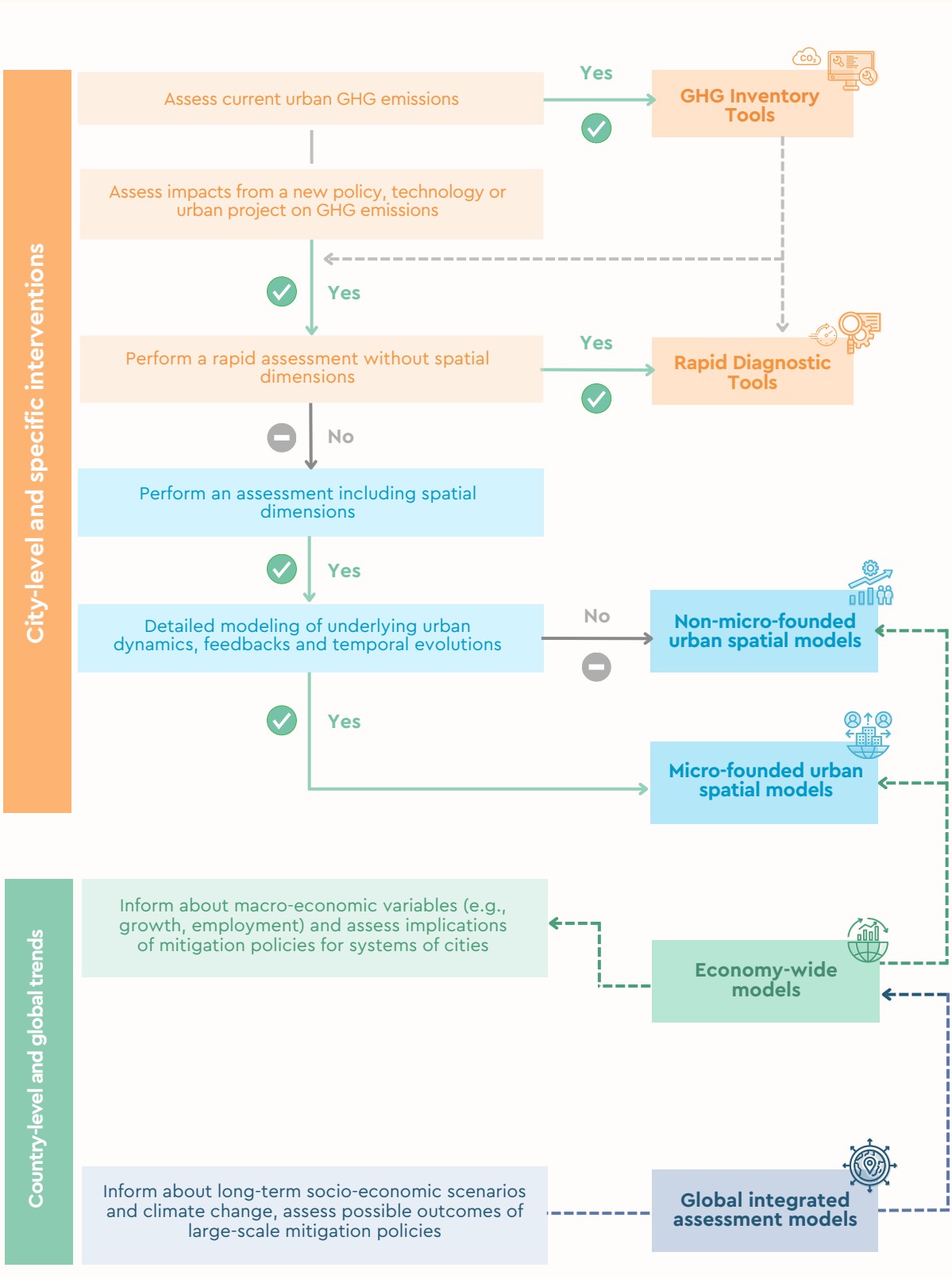
Figure 5.2: Criteria for selecting models: (a) Model abilities and (b) Usability and robustness



3 High-level decision tree for model selection

The key diagnostic parameters relevant to low-carbon urbanization (Table 5.1) can be translated into relevant model abilities. The set of guiding questions in the high-level decision tree illustrated below is intentionally inexhaustive as it aims to provide stylized, easy-to-follow diagnostic parameters that a modelling tool should be able to address. The decision tree summarizes the outcomes of the review of tools and models undertaken for this report and suggests the model families that could be suitable for addressing diagnostic questions based on their common technical model abilities and sector coverage (see Figure 5.3)

Figure 5.3: High-level decision tree for model selection based on intended purpose and priorities of the diagnostic



4 Model selection criteria

(a) Model abilities

Spatial context

Mitigation interventions can occur at multiple urban scales, from households and blocks to districts and city regions, and can be implemented as stand-alone sectoral strategies (e.g., increasing energy efficiency for appliances) or as system-wide actions (e.g., transportation infrastructure investments, housing regulations) (Lwasa et al. 2022). In addition, demographic, social, economic, and political factors vary between cities and may affect the uptake of interventions. These criteria describe the scales at which a model or tool can be applied and its suitability for different geographic regions:

- **Geographic scale:** This sub-criterion pertains to the scale at which the model can be applied (e.g., city, national, regional, or multiple scales). This is useful for determining the type of assessment that the model or tool can be applied to and whether it can be used to support country-level comparisons.
- **Suitability for different geographic regions:** This criterion reflects the context in which models have been applied or to which they can be applied. Most importantly, it helps determine whether the model may be applied to different development statuses and levels of informality in the economy.

Sectoral representation

Urban mitigation actions can focus on a single sector or include multiple sectors. Some of these actions can have long-lasting and far-reaching impacts beyond direct sectoral effects. Urban energy infrastructure often operates as part of larger energy systems, offering various options for electrification, decarbonization, and energy-efficiency improvement in urban systems (Lwasa et al. 2022). The IPCC Sixth Assessment Report distinguishes between two broad categories of urban mitigation strategies: (i) strategies in key sectors, including clean energy, sustainable transportation, and construction, for which the coupling of sectors[37] can be enabled through electrification and (ii) strategies that focus on emissions reduction through a more systematic or fundamental understanding of urban design, urban form, and urban spatial planning and that propose synergistic scenarios for achieving carbon neutrality (Lwasa et al. 2022).

The following criteria characterize sectoral representation in modelling tools:

- **Coverage of multiple sectors of the urban economy:** This criterion focuses on whether a model provides granularity at the sectoral level and the sectors it covers.
- **Description of the energy demand structure and characteristics of the study area:** This criterion helps show whether the model describes the energy demand and energy production system(s) within the study area.

Simulation of processes, interactions, and interventions

Several criteria can be used to identify whether and how the tools and models can reflect specific urban diagnostic parameters that need to be assessed to evaluate implications of low-carbon interventions, including in terms of GHG emissions, urban socio-economic indicators, and potential synergies and trade-offs with other urban development priorities:

- **The impact of land-use patterns and spatial planning on the level of demand/supply of urban services, travel demand, infrastructure and the built environment:** This criterion can help determine whether the tool or model reflects the spatial configuration of urban infrastructure and the relationship between the intervention and demand for/supply of urban services, built infrastructure, and travel demand.
- **The impact of sectoral technology choice on the level of demand/supply of urban services, travel demand, infrastructure and the built environment:** This sub-criterion describes whether the model can reflect the impact of technologies, materials, and infrastructure with different carbon intensities on the evolution of urban development indicators that will, in turn, drive urban GHG emissions trajectories.
- **The impact of cross-sectoral interventions on the demand for urban services and infrastructure:** This sub-criterion focuses on whether the tool or model can assess the impacts of cross-sectoral interventions such as circular economy approaches or integrated urban and transportation planning.
- **The impact of interventions on energy demand:** This sub-criterion helps identify whether the model or tool can evaluate the impacts that various interventions may have on energy demand. These may include, for example, the change in energy use from switching city streetlights to LED.
- **The impact of interventions on GHG emissions (from stationary and mobile emitters):** This sub-criterion helps determine whether the model or tool can evaluate the impacts that various interventions may have on GHG emissions (e.g., the GHG emissions reduction generated by improving waste disposal practices or installing rooftop solar panels in an urban area).
- **The impact of economy-wide or sectoral climate mitigation policies on urban development indicators:** This sub-criterion helps assess whether the tool or methodology can simulate the impacts of various economy-wide or sectoral climate mitigation policies such as vehicle fuel standards or fiscal incentives for low-carbon vehicles.
- **The economic impacts of interventions:** This sub-criterion focuses on whether the model or tool can indicate the economic impacts of interventions such as investment costs, changes in real estate prices, incomes, and job creation.
- **The social and environmental co-benefits and unintended impacts of climate policy interventions:** This sub-criterion focuses on whether a model can show the social and environmental co-benefits or unintended impacts of climate policy interventions.
- **The ability of the model to simulate the impact of interventions on the level of poverty, income distribution, equity, and informality:** This sub-criterion focuses on whether the model or tool can predict the varying impacts of climate interventions on different social groups or their implications on poverty and income distribution within an urban area.

(b) Usability and robustness of models

In addition to model abilities, other parameters that should be considered to ensure that the diagnostic tool is fit-for-purpose in a specific context include: (i) user friendliness and accessibility of the models and tools, (ii) how thoroughly they have been reviewed, and (iii) the extent to which they have been applied in case studies.

Usability

Usability is assessed based on four sub-criteria that describe how adaptable the tools and models are to different requirements and how much expertise their use may require.

- **Data requirements** comprise the data inputs required from the user to produce an output. Understanding the data requirements for various tools and models is important to determine where they can be applied and whether they can be supported by online databases/proxy data. This may also inform future needs and scope of data collection exercises.
- **Methodological transparency** is the extent to which the algorithms or underlying assumptions employed within the tool or model are documented and accessible to the user. This sub-criterion helps in understanding how easily the user can follow the algorithms within the tool or model, as this can potentially affect the adaptability of the approach used by the model to the users' diagnostic needs/context and the ability to meaningfully interpret the outcomes produced.

[37] There is no universally agreed definition of the concept of 'sector coupling'. It pertains to, for instance, interconnecting or integrating energy-consuming sectors. In its report, "Sector Coupling in Facilitating Integration of Variable Renewable Energy in Cities," IRENA defines sector coupling as the process of interconnecting the power sector, especially to support integration of high shares of variable renewable energy, with the broader energy sector (e.g., heat, gas, mobility) (IRENA 2021).

- **Level of knowledge prerequisites:** This sub-criterion involves the information, skills, and knowledge required to set up and run the model or effectively employ the approach to produce useful and meaningful outputs. This consideration is important to determine how easily an approach can be adopted by non-experts, especially if the available level of support is low.

- **Level of support available:** 'Support' may include the help desks, tutorials, and online communities from which support can be obtained, availability and usefulness of regularly updated documentation, and training. This sub-criterion, in combination with the level of expertise needed to effectively implement a model, helps determine the overall level of external support that may be required for an assessment.

- **Time requirements:** This shows how much time and expert effort are required to run the model. The time requirements depend on (i) the readiness and availability of the required input data, which may take weeks or months to collect, and (ii) the readiness of the tool or model to address the specific question. More complex models tend to require adaptation and fine-tuning, often with involvement of experts.

Robustness and validity

These criteria enable the user to assess the overall 'certainty' of the models or tools and whether the outcomes are robust for a specific set of assumptions and to integrate relevant uncertainties.

- **Sensitivity**. This sub-criterion focuses on whether a sensitivity analysis has been undertaken to determine the impact of different parameters on model or tool outputs and ultimately the robustness of the results. Such sensitivity analyses try to demonstrate whether small changes in calibrated model parameters lead to large changes in model results. Typically, a robust model is one that can afford uncertainties in parameters without large implications for model results.

- **Validation of model performance through the re-creation of historical features.** In addition to sensitivity analysis, more trust can be placed on model outputs that have been validated. This criterion helps assess whether the validation of model performance has been undertaken for a particular tool or model.

- **Scientific validation.** This criterion helps determine whether the identified tool or model has been peer reviewed. This can give an additional indication of the quality of the approach and the level of trust that can be placed in the outputs.

Box 5.2. illustrates how the guide for selecting tools and models can be applied in practice through the example of the city of Semarang (Indonesia), where Urban Performance was used to develop sustainable growth scenarios.

Box 5.2: Forecasting sustainable growth scenarios for Semarang, Indonesia using Urban Performance

Semarang is Indonesia's ninth largest city, with a population of 1.65 million in 2022. Sharp population growth has added pressure on the city's transportation system, which has not been upgraded. The number of private vehicles in the city more than doubled from 2005 to 2014, leading to significant traffic congestion. The city introduced several BRT lines, but they lacked sufficient integration with the rest of the public transit system, did not have segregated lanes, and had old vehicle stock.

As a result, the BRT system failed to attract sufficient demand from private vehicle users. In 2016, the World Bank's City Planning Labs, the Indonesian government, authorities from Semarang, including the city's development planning agency, and other stakeholders developed a concept for the development of Semarang. They developed more than 100 possible development scenarios with a time horizon of 2030, considering a range of interventions such as alternative public transportation modes and spatial planning options. The socio-economic and environmental indicators used to analyze the scenarios included proximity to jobs, schools, public spaces, sports facilities, and places of worship. The two reference scenarios were a BAU situation and the city's Detailed Spatial Plan (RDTR) for 2011-2031.

The *Urban Performance* tool was used to evaluate the selected scenarios and determine how they performed against the selected indicators. The choice of this model was driven by the following diagnostic requirements and model abilities: (i) the modelling effort first focused on parameters related to the spatial configuration of the city, e.g., the spatial distribution of population densities and the layout of the transportation network, and this was followed by (ii) an analysis of diagnostic indicators comprising access to transportation infrastructure and urban amenities, the capacity of the transportation system, and reduction of existing congestion.

As outlined in Figure 5.3, the spatial dimensions of a diagnostic can be addressed by models within the *spatial model families*. Further, as this project did not include a detailed assessment of underlying urban dynamics, feedback, and temporal evolutions, its diagnostic needs were appropriately addressed by the *Urban Performance* tool, which is categorized in Box 5.1 as part of the *non-micro-founded urban spatial model family*. The fact that *Urban Performance* has been previously used in several developing countries increased its suitability for the project, while the user support and assistance in setting up *Urban Performance* provided by its publisher, CAPSUS, enhanced its usability.

The Semarang scenario assessment led to the selection of the Transit Oriented Development (TOD) program, which focused on improving mobility by developing areas and densifying the population near existing public transportation infrastructure. The TOD minimized investment costs and brought significant benefits in terms of access to transportation. In contrast to Semarang's initial RDTR scenario, no additional infrastructure investments were required. The TOD scenario was associated with municipal service cost savings of 13 percent (when compared to the baseline scenario). The densification that was modelled within the TOD scenario was found to contribute to a 20 percent increase in access to public transit when compared to the current spatial plan in the city. In addition, this scenario contributed to a reduction in energy consumption for mobility by 16 percent and associated GHG emissions reduction in the city's transportation sector by 9 percent.

Adapted from: Urban Performance (2018) and https://www.urbanperformance.in/case-studies/semarang

Enhancing alignment between tools used for country- and city-level diagnostics

Urban tools and models usually do not allow for expanding the assessment beyond the city level and have limited ability to directly inform country-level diagnostics on low-carbon urbanization. However, they can be better aligned with national diagnostic efforts by ensuring that they reflect comparable economic trends and climate change impacts. These inputs can be provided by two model families—*economy-wide and global integrated assessment models* (IAMs),[38] which focus on assessing the current state of an economy and worldwide trends in economic development and climate change. *Economy-wide models* are routinely used for economic and financial forecasts. This group includes dynamic stochastic general equilibrium models, computable general equilibrium models, and other types of macroeconomic models. *Integrated assessment models* are large and sophisticated models, primarily intended for developing climate scenarios and understanding GHG emissions sources and consequences of climate change policies. These models form the foundations for climate scenarios published in academic literature and the basis for many climate assessments, including those undertaken by IPCC. Some IAMs have been coupled with sectoral urban models. Specific urban effects are often not resolved in these models. If urban economies are represented, it is usually through the inclusion of urban and rural household classifications that have different economic characteristics, consumption patterns, and responses to policies.

Even if these model families are distinctly different from those of urban models, ensuring alignment between the models chosen for country- and city-level diagnostics is important. This can help overcome the limitations of urban models that only focus on one city at a time when decision makers might be interested in the country's urban system as a whole or intend to apply policy changes to all cities simultaneously. In this context, economy-wide models and global IAMs can be useful for urban climate mitigation diagnostics from two main perspectives:

- They can provide the necessary inputs for urban models to reflect the expected impacts of large-scale economic trends, climate change, and policies for assessing low-carbon urbanization pathways and short-term climate mitigation measures. More specifically, these models generate socio-economic scenarios (e.g., demographic trends, income levels, inequality levels, carbon tax levels, fuel prices) that can feed into urban models as inputs (downscaling). They can also provide insights on the impacts of large-scale mitigation policies on urban economies and people, for example, by high-level modelling of urban systems. This ensures consistency between macro dynamics and urban dynamics.

- Urban model outputs can be used to inform and fine-tune global models by providing better calibrated elasticities or parameters. For example, this can take the form of an elasticity linking compactness or fuel prices to energy use for transportation in urban areas, resulting in a mitigation potential. In turn, economy-wide models such as the World Bank's *Macro Fiscal Model (MFMOD)* may also be used to assess the effects of interventions such as carbon pricing on macroeconomic indicators or GHG emissions in multiple urban areas.

Tailoring urban models and tools to respond to policy needs in cities in rapidly urbanizing countries

The solutions discussed below could help address the general limitations of models and tools in supporting evidence-based decision making and policy processes in rapidly urbanizing countries. Implementing these solutions requires a concerted effort at different levels of government and support from a broader set of stakeholders, such as international urban initiatives, development partners, and academia:

- *Build a knowledge base on impacts of urban climate action across policy agendas.* Given the stakes of getting urbanization right both for development and the climate, governments need to build a knowledge base to consolidate data about wide-ranging impacts of climate actions on urban development indicators. An improved understanding of synergies and trade-offs between these two agendas can help governments make informed decisions on a range of topics pertinent to cities such as land-use planning and regulation, housing policies, transportation pricing, and infrastructure investments. It can also enhance acceptability of, and support for, urban climate action by a large set of stakeholders. For complex systems such as cities, where interventions can have wide-ranging impacts across different policy agendas such as poverty, inequality, labor market outcomes, and climate, such a knowledge base is typically constituted through models that can capture the main mechanisms that define urban areas. While model development and calibration may appear cost-intensive, difficult, and time-consuming, these costs should be weighed against the risks of making policy or investment mistakes that could negatively impact urban dwellers over several decades or lead to carbon lock-in.

- *Enhance understanding of contributions of mitigation interventions in rapidly urbanizing countries.* There is a significant gap in the suitability of reviewed models and tools for urban climate mitigation diagnostics in developing countries, particularly rapidly urbanizing LICs (e.g., only a few models have been calibrated for cities in LICs that have high levels of informality). This is a concerning limitation from a climate mitigation perspective, as most urbanization will occur in SSA and South Asia. Urgent efforts should be made to better tailor existing models to these contexts and more analysis should also be undertaken on recommendations for developing new models for such contexts. For instance, occupations are predominantly informal in Africa (76 percent) and the Middle East (64 percent), significantly higher than at the global level (44 percent) (ILO 2018). Recent research demonstrates that informal labor can be significantlyreduced by the introduction of efficient and affordable transportation (Zárate 2022), and new models can forecast such informality reductions and resulting welfare gains from public transportation (Tsivanidis 2017; Sturm, Takeda, and Venables 2022).

- *Leverage insights from spatial models by including GHG emissions impacts.* The insights from new quantitative spatial models can be leveraged by including assessments of GHG emissions impacts. Promising work has been undertaken recently, particularly with quantitative spatial models adapted to Colombia, Mexico, and Uganda, to understand impacts of new transportation infrastructure and induced behavior change on informality and welfare gains. However, these models do not currently reflect associated changes in energy demand and GHG emissions. They can be expanded with energy and emissions calculation algorithms along with specific applications to inform policy processes dedicated to the development of NDCs and LTSs, especially in rapidly urbanizing countries. Targeted technical assistance from international climate funds, development partners, or academia may be required to support these efforts.

- *Explore opportunities of emerging technologies to reduce data gaps.* Beyond existing models, use of emerging technologies such as artificial intelligence and machine learning can be explored for assessing the mitigation risks and potential in urban areas. These approaches may become increasingly important (Kaatz-Dubberke and Kehl 2020) and can possibly improve urban modelling, including by filling data gaps (Milojevic-Dupont and Creutzig 2021). This could be particularly relevant in the context of rapid urbanization in LICs and LMICs that is often characterized by low availability of survey or official data. However, such approaches are still being researched.

[38] Examples of **Economy-wide models** are: CPAT (Carbon Pricing Assessment Tool), MFMOD (The World Bank Macro-Fiscal Model), ENVISAGE-MANAGE, GIDD (Global Income Distribution Dynamics), FSAP (Financial Sector Assessment Program), SHOCKWAVES/UNBREAKABLE, and LTGM (Long-Term Growth Model). Examples of global **Integrated Assessment models** (IAMs) include: ETP (Energy Technology Perspectives), REMIND (Regional Model of Investment and Development), GCAM (Global Change Analysis Model), IMAGE (Integrated Model to Assess the Global Environment), and MESSAGEix (Model for Energy Supply Strategy Alternatives and their General Environmental Impact).

5.3 Integrating systems for tracking climate action

Consistent and comparable data across the various processes undertaken by different entities to plan, implement, and track the outcomes of urban mitigation actions are important prerequisites for their integration into national climate change strategies such as NDCs and LTSs. Such data provide an enhanced understanding of mitigation opportunities in urban areas at the planning stage. At the implementation stage, consistent and comparable data increase the transparency of monitoring and reporting (e.g., by avoiding double-counting of emissions reduction toward mitigation pledges under UNFCCC (Schneider et al. 2014) and enable a robust assessment of the country's progress toward GHG emissions reduction goals. Importantly, effective tracking systems that allow systematic and timely collection, consolidation, and analysis of data on GHG emissions impacts of low-carbon interventions in urban areas can improve policy design, help identify barriers to their implementation and enhance their uptake. As a result, it is crucial to use consistent methodologies, data, assumptions, and parameters across different levels of government and entities for measuring and reporting on GHG emissions and impacts of mitigation actions.

There are several processes (e.g., data collection, analysis, target setting, policy development) that underpin the core elements of MRV systems (see Box 5.3). Such processes need to be aligned through clear communication and collaboration between different entities across government and implementing agencies to enable timely and transparent data flows and aid in the aggregation of impacts and results at the national level and disaggregation at local levels. There is a vast body of literature on MRV systems to support climate action, including on integrated MRV systems. This section briefly outlines the core challenges faced by LICs and LMICs in developing integrated MRV systems and offers solutions to overcome them.

5.3.1 Importance of integrated MRV systems for integration of urban climate action

Pursuing integration of MRV systems at different government levels can be an important enabler for local governments as key actors to deliver climate action. Data collection (based on a clear set of monitored parameters), tracking, and reporting are the core elements of MRV systems, which are the backbone of climate planning and implementation processes (see Box 5.3).

Consistent and comparable data tracking and reporting processes support the integration of urban mitigation action into NDCs and LTSs by:

- Enabling transparent and effective data-driven decision making.
- Providing quantified evidence of GHG emissions impacts from urban mitigation actions and/or specific gaps in their performance.
- Allowing the assessment of climate finance opportunities.
- Helping build the climate investment pipeline.
- Facilitating consistency in assumptions by various entities that are co-creating low-carbon urbanization pathways for developing strategies such as an LTS.

By using high-quality, transparent, and consistent data to underpin target setting and design of implementation strategies, national and city governments can ensure that climate-related policies and actions address critical GHG emissions drivers, verify the extent of progress, and generate important feedback for ongoing policy processes, particularly to inform their adjustments (e.g., strengthening targets, increasing ambition). For instance, this allows governments to evaluate whether the short- and medium-term actions (typically set out in NDCs) are delivering results consistent with long-term pathways outlined in LTSs and, in case they fall short, strengthen the targets and relevant measures in the subsequent NDC update. Such efforts can also help devolve responsibility for delivering on targets and enable targeted allocation of funding flows to the implementing entities in urban areas. This can also enable governments to access various sources of climate finance (especially international funding) to support specific measures.

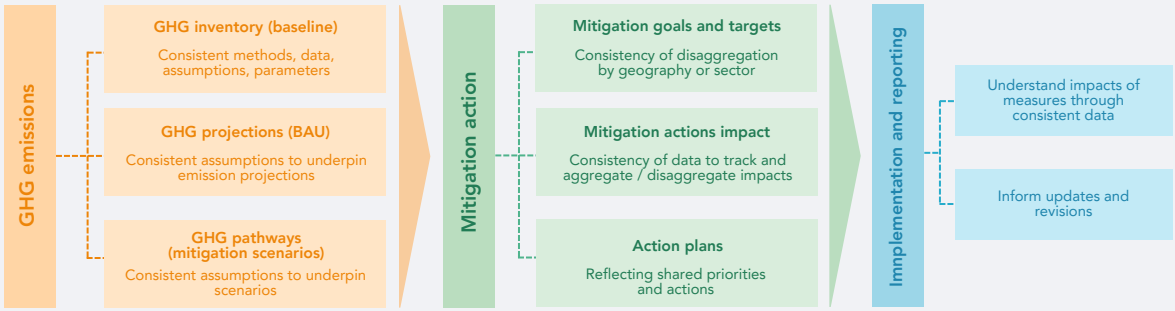
Most countries use several MRV systems for different stages of climate action or at different levels of government. A ***fully integrated MRV system*** consolidates information (e.g., GHG emissions inventories, tracking of climate mitigation action and climate finance flows) into one database led by one central entity. Such integration has several benefits for both national and subnational levels (see Box 5.4.). MRV integration processes can ensure a clear demarcation of roles and responsibilities at each level as part of integrated institutional structures. However, because of various challenges such as insufficient intergovernmental coordination or technical issues (see below), it is not always possible or most efficient to create a fully integrated MRV system (ICLEI 2021; Wartmann et al. 2021).

Box 5.3: MRV process as defined under UNFCCC

MRV and transparency are terms used in reporting under UNFCCC. Both concern providing information related to climate change action and its results at national level, e.g., progress toward climate change targets. Reporting under UNFCCC aims to generate trust among Parties and allows them to understand how they are progressing toward combatting the impacts of climate change.

Collectively, MRV and transparency processes enable answers to questions, in the context of action and progress on climate change, such as "Where are we? Where are we going? How fast are we getting there? Are our responses effective?" The MRV-related elements involved in planning and tracking climate action and the main considerations for each for more effective integration are summarized on Figure 5.4.

Figure 5.4: MRV-related elements for planning and tracking climate action



Source: PSource: Based on Ricardo 2021.

An alternative solution for enabling the integration of urban climate action into NDC or LTS processes is to pursue better alignment of MRV systems. ***Aligned MRV systems*** can still ensure comparability of GHG emissions data and climate action being tracked and realize the benefits outlined above by using the same emissions factors, definitions, and estimation methods at local and national levels. Compared to fully integrated MRV systems, aligned MRV systems are simpler and often quicker to implement as they don't require the creation of a central database with complex governance mechanisms. This may also provide greater flexibility to respond to local and national policy needs (while a fully integrated system may pose the risk of only serving one entity).

Box 5.4: Relevance of integrated MRV systems to support evidence-based climate policy processes

Integrated MRV systems are the most relevant for the following components of climate policy processes:

- *GHG inventories* to understand baselines and the contribution of key sectors and activities at different levels and spatial scales.
- *Projections of future GHG emissions* to understand how emissions will change in the absence of, or with existing, measures in both national and local contexts and the relevant assumptions that underpin such projections (e.g., economic and population growth rates).
- *Setting and allocating targets,* including to local scales or different sectors, over the medium- and long-term.
- *Developing future scenarios and pathways* based on assumptions about global and local action and trends.
- *Tracking impact of climate action*, by quantifying both the expected (ex-ante) GHG emissions reductions and wider benefits.
- *Informing climate planning documents and reports*, including their framing, structure, and presentation; their wider governance and implementation; and monitoring, reviewing, and tracking processes.
- *Quantifying the impact of measures once implemented* (ex-post) and overall progress in reducing emissions over time through GHG inventories.
- *Assessing the needs for climate finance and tracking progress in mobilizing resources* from different sources.

5.3.2 Key barriers to integrating MRV systems

The key barriers to the integration of MRV systems in LICs and LMICs are outlined below.

Data gaps and inconsistent tracking of climate actions

While cities are not bound by the same MRV requirements as national governments, aligning city-level climate planning processes with such requirements is important for pursuing integrated climate action.

MRV literature has identified several common technical challenges associated with developing a well-functioning integrated monitoring system to track climate actions (GIZ NAMA Toolbox 2014; EcoMetrix Africa 2015; ICLEI 2016a; ICLEI 2016b; C40 2019; WRI/C40 2014). Many of these relate primarily to GHG inventories, which is the first step for subnational governments in understanding and managing emissions. Later steps in the MRV process such as mitigation action tracking, projections, pathways modelling, and tracking of climate finance flows are typically in early stages of development for many cities in developing countries.

While a city-level GHG inventory is a prerequisite for creating an evidence base to plan and design mitigation actions,[39] city governments face numerous obstacles to compiling such inventories. There also are significant challenges in complying with MRV requirements for reporting on mitigation action and climate finance flows. Availability of reliable high-quality data on both activities and GHG emissions is often a major barrier in cities in developing countries. For instance, cities might have limited or incomplete data on certain activities or sectors within the city boundary (e.g., unreliable data supply) because of factors such as (i) lack of a formal process for data collection, (ii) lack of incentives for data collection and limited accountability, and (iii) lack of emissions factors specific to the local context or mismatched data on the baseline. City entities in charge of data collection may be unable to aggregate data acquired from multiple sources because of inconsistent formats and categorization or misaligned methodologies or timeframes. Additionally, cities often have limited technical expertise on MRV and may be unable to develop key performance indicators (KPIs) that are aligned or can be aggregated with higher-level indicators. Lack of capacity could also affect accuracy and completeness of data being reported.

IPCC stipulates that data reported by parties should be transparent, accurate, complete, consistent, and comparable. Since city governments are important implementing entities for national climate actions, their limited capacity to track progress through consistent baseline data and indicators can become a barrier to the effective integration of MRV systems and integration of urban climate action in national climate policy processes.

Differing reporting processes at various government levels

While national governments must report the progress on their NDC commitments under the Paris Agreement and the Enhanced Transparency Framework set out by UNFCCC, there is no requirement to include or report on actions being undertaken at the subnational level if these have not been included in the NDC. There are also currently no requirements for countries to report on progress made toward their LTS goals. While some may do so voluntarily (e.g., using the progress reporting/M&E requirements developed by C40), cities are also largely not required to report on progress in implementing their climate action plans, reinforcing the urgency of integrating urban climate action into NDCs and LTSs (Box 3.7). As a result, there could be misaligned tracking and reporting processes at various government levels because of different reporting timeframes, methodologies, tracking and recording approaches, and data (e.g., collected and reported in different formats, compiled using different methodologies, tracked through different indicator sets). This could lead to inconsistencies in target setting, dissimilar KPIs at different government levels (e.g., KPIs of the climate action plans or related strategies), and difficulties in aggregating and updating the GHG emissions inventory at different levels, hindering MRV alignment and integration.

In addition, barriers regarding integrated institutions, particularly lack of clearly defined institutional structures, roles, and responsibilities on climate (discussed in section 3.2.1.); limited funding for setting up and implementing MRV processes; and limited or lack of technical capacity can also hinder the effective integration of MRV and may worsen other barriers.

[39] They are also recommended as part of the 'city journey' under GCoM and are a core part of the Climate Action Planning Framework promoted by C40.

5.3.3 Integrative solutions

The solutions to overcome barriers to developing integrated or better aligned MRV systems should tackle all the main elements of MRV processes, including data, methods, and reporting, and the accompanying institutional and incentive structures to ensure consistency and sustainability of MRV processes. A staged approach—ranging from enhanced communication to fully integrated systems— that factors in the technical and financial constraints faced by LICs and LMICs in developing integrated MRV systems can help progressively enhance integration of MRV between cities and higher levels of government (Figure 5.5). These efforts should be supported by integrative solutions related to the other two pillars of integration, particularly those on policy frameworks, governance and institutional structures, mobilization of sufficient resources, and augmenting technical capacities. The most relevant solutions are (i) strengthening intergovernmental coordination, (ii) enhancing communication between national- and city-level on climate action, (iii) establishing requisite organizational structures and functions, and (iv) promoting collaboration and sharing of knowledge, tools, resources.

Enhanced communication

Enhancing communication is an important first step toward progressive MRV alignment and integration, especially in contexts where cities and national governments face significant barriers across MRV processes, as discussed above. Practical solutions may include promoting transparent and proactive exchange of information on data collection processes; coordinating on data assumptions, calculations, and methodologies; and prioritizing simplified methodologies and completeness of data over granularity and accuracy. For example, the reporting format, time periods, and key assumptions used for data for GHG inventories, mitigation actions, projections, and pathways should be clearly communicated to ensure that reported data can be effectively used across government levels. Ensuring that the sectoral and spatial boundaries of mitigation actions and assumptions included in any modelling of projections and pathways are clearly articulated is also important for promoting a shared understanding of the basis of calculations. Such efforts can help progressively resolve inconsistencies, provide clarity on the approaches used for estimating and reporting the data, and allow for necessary adjustments and subsequent alignment. Communication on MRV between government levels can be enhanced by appointing MRV focal points at each level to systematically identify, gather, and share progress on data. This could facilitate timely data collection, harmonization, and consistency and improve overall data quality across all levels of reporting, such as GHG inventories, city climate action plans, and NDCs/LTSs.

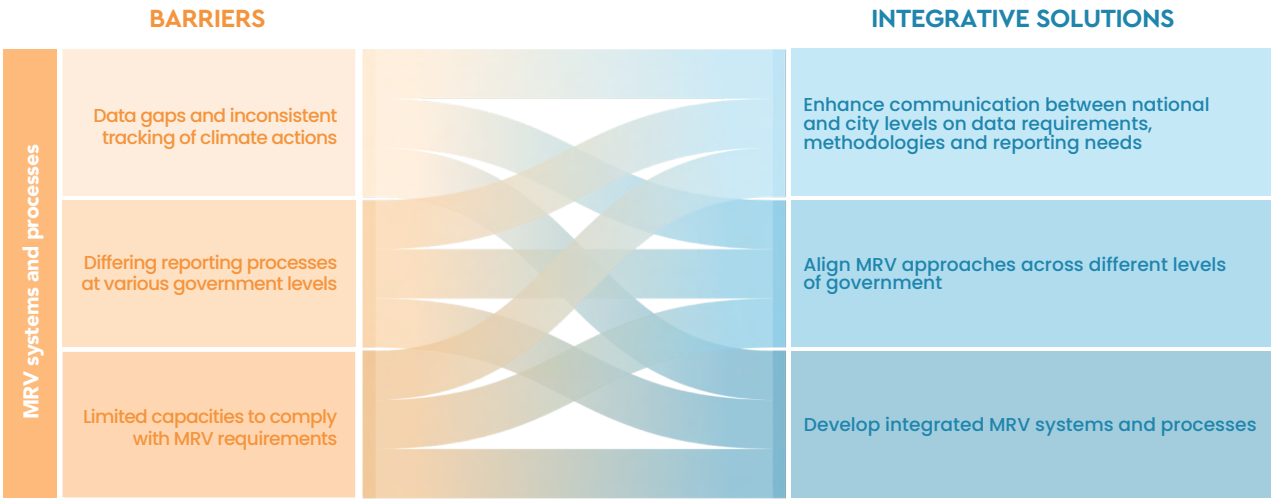
Aligning MRV approaches

Depending on the country and city context, a more 'aligned' MRV approach can often be sufficient, and in some cases preferable, to enable integration of urban climate action into NDCs and LTSs. An aligned approach allows for having independent MRV activities at different government levels[40] that are harmonized for reporting purposes. Ensuring consistent data fields and transparent assumptions as part of alignment efforts can allow for simpler consolidation of data and processes, without the expense and complexity of a fully integrated tracking system (e.g., an IT database/web-based tool). In addition, aligning MRV approaches should encompass coherent processes of data collection, validation, and verification supported by organizational structures with clearly defined roles and responsibilities. This also allows for continually building technical capacity and resources at different levels and keeping ownership of data on GHG emissions and mitigation activities at the local level.

The main steps leading to aligned MRV may include the following efforts, primarily targeted at the highest-priority GHG emissions sources or activities, considering available resources:

- *Improving quality, completeness, and accuracy of data collection* using templates that reflect KPIs aligned with national KPIs to enhance comparability.
- *Aligning methodologies* across GHG inventories, using consistent emissions factors and baseline setting approaches, sharing and aligning assumptions for projections, using consistent calculation approaches for mitigation impacts, and reporting mitigation actions. Other examples include establishing a coordinated cycle for reporting inventories and ensuring better communication on methodological improvements across government levels.
- *Developing common reporting processes and tools*, including by coordinating on scope and timelines of reporting. This could include, for example, agreement between all levels of government on dates for publication, time periods covered, and frequency of reporting data and outputs, so that cycles of reporting (e.g., emissions, actions) can be aligned to make best use of resources. It also is important to synchronize planning and development of strategy documents to ensure that climate action and development plans at each level feed into national reporting (e.g., data collected at the city level that is relevant to NDC/LTS actions and progress tracking feed into the national climate MRV).

Figure 5.5: Integrative solutions for MRV systems and processes



[40] Independence can allow governments at different levels to respond to their specific policy and reporting needs. For example, national governments must report progress in specific formats established by UNFCCC, while cities might report using templates of relevant city networks.

Integrating MRV systems and processes

Developing effective integrated MRV systems relies on setting up and maintaining several key elements:

- *Complete, accurate, and consistent high-quality data.* This can be achieved by creating database systems or fully integrated data collection, analysis, and reporting processes, where the various levels of administration can check which data they are expected to compile using common formats for data collection. For example, an online database could enable aggregation of data upwards (e.g., from municipalities to regional and national level).[41] An online database system can also help ensure that data is collected for all relevant sectors and years (e.g., through automated checks) and that each level of administration understands which dataset to use for tracking climate actions or emissions sources. In addition, an online database can support data transparency between the city and national level by ensuring that all data entries into the system have specified characteristics (e.g., years, units, scope, source).

- *Similar methodologies, inventories, reporting tiers, and emissions factors.* All levels of government would have the same methodologies (e.g., 2006 IPCC Guidelines for National GHG inventories (IPCC 2006)[42] and Greenhouse Gas Protocol's "Policy and Action Standard for Estimating the GHG effects of policies and actions" (WRI 2014), which can later be harmonized and adjusted for internal or external reporting (e.g., GPC reporting for cities[43] (WRI/C40 2012)). Integration also ensures that all levels of government use the same models and assumptions/parameters for aspects such as projecting baselines and future pathways. The database system can clearly define reporting tiers to collect relevant data, which can be easily aggregated for emissions estimation at national level.

  Consistency of emissions factors can be ensured by establishing a dedicated database or communication process for sharing information. A centralized system of inventory compilation can also ensure that methodological updates are automatically applied at all levels and timeseries.

- *Integrated reporting process based on similar reporting formats, boundaries and timelines of reporting.* A fully coordinated reporting process would enable the avoidance of double counting (Schneider at al. 2015) through the centralized nature of calculation and reporting. For example, mitigation actions can be tracked centrally using data reported by local governments to the national level. This can prevent inconsistencies in reporting timelines. However, integration of reporting timelines needs to be part of a wider process of collaboration and engagement to ensure all levels of government are empowered to meet reporting deadlines.

- *Strengthening national MRV systems.* National systems need to be ready and/or able to support cities in aligning and integrating their MRV systems, which is an important pre-condition to integration. National governments therefore have a key role in achieving fully integrated systems, as national MRV focal points often have power and authority to design and regulate MRV systems, allocate funding, and promote a multi-directional flow of knowledge, data, and capacity sharing. As a result, despite the lack of requirements within NDC progress reporting to describe achievements at subnational level or include subnational actions or emissions profiles within Biennial Update Reports[44] (BURs), national governments in rapidly urbanizing developing countries should consider the benefits of integrated MRV approaches as a key enabler of the overall process of integration of low-carbon urbanization considerations into national climate planning processes.

Nairobi, Kenya © mbrand85 / iStock

[41] Where issues with data confidentiality exist, a database system could facilitate data sharing, in that only the levels of administration who need specific data will gain access to it.

[42] Also see "2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories," (IPCC 2019).

[43] GHG Protocol Standard for Cities formally known as Global Protocol for Community-Scale Greenhouse Gas Inventories developed by World Resources Institute (WRI), C40 Cities Climate Leadership Group, and ICLEI–Local Governments for Sustainability (ICLEI) (WRI/C40 2014).

[44] BURs are reports to be submitted by non-Annex I Parties to the UNFCCC (since 2014), containing updates of national Greenhouse Gas (GHG) inventories, including a national report and information on mitigation actions, needs, and support received.

Chapter 6

Readiness for urban climate action integration

Across the globe, experience from cities and other subnational governments on climate-informed policy development, action planning, and implementation suggests that there is no 'one size fits all' approach to pursuing vertical and horizontal integration. As discussed in the preceding chapters, the prevalence, nature, and magnitude of the main barriers to integration—across all three pillars—depends on countries' diverse policy and institutional environments and capacities. These barriers could be predominant either at national or city level or exist across all levels.

Devising a feasible roadmap to pursue integration of urban climate action into national climate change strategies such as NDCs and LTSs calls for a more granular diagnostic approach for assessing how the barriers to integration materialize in specific national and city circumstances. Such an approach can help governments and entities across different levels evaluate their readiness for integration and identify the main gaps and key areas that need to be strengthened by applying integrative solutions appropriate for their country, institutions, and governance context. This chapter proposes a **Readiness Diagnostic Framework** to support these efforts. Subsequent sections outline the Framework and describe how it can be used to assess 'readiness for integration.' The chapter also illustrates the application of the Framework in a country context through a case study on Ghana.

6.1 Readiness Diagnostic Framework

The proposed **'Readiness Diagnostic Framework'** (or Diagnostic Framework) helps identify the level of readiness of countries and cities to pursue the set of integrative solutions outlined in this report. This Diagnostic Framework can help policymakers identify concrete shortcomings that may exist at various government levels within each of the three pillars (or across all of them) and enable them to prioritize and implement the most appropriate integrative solutions.

While each of the 9 integrative solutions covered in the Diagnostic Framework have specific characteristics under each pillar, given the interlinkages among the pillars, some solutions have characteristics that cut across all three pillars (e.g., establishing organizational structures and functions within each government level; promoting stakeholder engagement; promoting collaboration and sharing of knowledge, tools, and resources). Additionally, several standalone integrative solutions outlined in Chapters 3, 4, and 5 are presented in a consolidated manner in the Diagnostic Framework (e.g., enhancing communication between national and city level on climate action, enhancing technical and financial capacities).

For each integrative solution, the Diagnostic Framework offers a set of questions (Table 6.1) to determine whether a specific feature, or 'characteristic,' of this solution is part of existing policy frameworks and institutional structures (Pillar 1), finance mobilization approaches (Pillar 2), and policy processes and MRV systems (Pillar 3). In addition, it includes questions to determine the presence (or lack) of the key prerequisites for deploying the integrative solutions. The questions are tailored to different government levels or cut across all levels, as relevant. Together, the diagnostic outcomes provide a context-specific indication of 'readiness' at national and city levels for pursuing vertical and horizontal integration of low-carbon urbanization considerations.

6.2 Levels of readiness

This section discusses how users of the **Readiness Diagnostic Framework** can evaluate the overall 'level of readiness.' The readiness levels primarily correspond to one of three stages of the integration journey—early, intermediary, and advanced—and are based on the presence of readiness characteristics (and prerequisites) outlined in Table 6.1.

For instance, the lack of one or more characteristics (the response to most of the questions is "No") indicates barriers or gaps that governments should address to improve their readiness. The presence of some readiness characteristics (the response to several questions is "Yes" or "Partially") points to an intermediary stage, or moderate level, of readiness, while having affirmative responses to most questions demonstrates an advanced stage or high level of readiness.

In addition to applying the Diagnostic Framework to determine the level of readiness across the three pillars at national and city levels, policymakers and other users can identify a set of recommendations at both levels for advancing to the next stage of integration. Countries can thus gradually strengthen their enabling environment for integration.

6.2.1 Low readiness

The readiness for integration is '***low***' when there are gaps in national policy frameworks and institutional structures across all three pillars that hinder integration, limited interaction between national- and city-level entities on climate action, and insufficient capacity by cities to undertake climate action. National and city governments show low readiness when they have very few readiness characteristics:

- At national level, requisite policy frameworks and institutional structures do not exist or are weak and not conducive to integration. This can mean lack of or limited climate change mainstreaming in national development planning; climate mitigation considerations in national urban development strategies; and recognition of climate mitigation potential of urban areas and city-level mitigation efforts in NDCs, LTSs, or other national climate change strategies, which usually limit climate finance mobilization for urban climate action.

- At city level, the goals of national climate change strategies are not cascading down, a strong mandate for climate action is lacking, and climate finance mobilized by the national government is not accessible. Cities are not well-equipped for mainstreaming and implementing climate action because of (i) inadequate knowledge and awareness of climate mitigation aspects, including national climate targets; (ii) lack of or nascent city-level climate planning efforts; and (iii) insufficient technical and financial capacities.

- There is a lack of coordination and limited communication between national- and city-level entities on climate action, which also impedes data flows necessary for considering low-carbon urban development issues and priorities in various decision-making processes and MRV systems across government levels.

6.2.2 Moderate readiness

'Moderate readiness' occurs when national policy frameworks and institutional structures are somewhat conducive to integration, national- and city-level entities undertake some coordination on climate action, and cities are partially equipped for planning and implementing climate action. National and city governments show moderate readiness when they have some of the readiness characteristics (although they may be unequally distributed across the three pillars) and need to strengthen others and/or complement them with other measures to pursue integrative solutions:

- National governments are in the early stages of recognizing the climate mitigation potential of urban areas, are making efforts to reflect such considerations in relevant national plans and strategies (including NDCs, LTSs, and sectoral strategies), and are creating legislative and regulatory frameworks on climate action.

Cities are being increasingly empowered by, and receive support from, the national government to undertake climate action by strengthening mandates and inclusion in national climate policy processes.

- Cities are aware of national climate mitigation targets and have a better understanding of specific challenges of urban mitigation action and/or are undertaking measures to build the requisite knowledge base. They are developing climate action plans and establishing implementation mechanisms. Cities are also assessing their financial and technical capacity gaps and working to address them.

- There are efforts to improve coordination between national and subnational entities to facilitate information and knowledge sharing on aspects such as city-level financing needs, data, and diagnostics, and MRV.

6.2.3 High readiness

Countries demonstrate '***high readiness***' when national policy frameworks and institutions show high levels of integration of low-carbon urban development priorities across all three pillars and cities are well equipped and receive support to contribute to national climate goals. National and city governments demonstrate high readiness when they have most of the readiness characteristics:

- Climate change is mainstreamed in national development planning and budgeting processes, the country's national climate change strategies, including NDCs and LTSs, and associated financing roadmaps reflect low-carbon urban development priorities, including the main drivers of the carbon footprint of urban areas and associated GHG emissions reduction potential. Cities' mandates for climate action are well-established and supported by clear policy frameworks that cascade the national climate mitigation targets down to and across government levels. The national government supports cities in accessing domestic and international sources of climate finance through dedicated programs and innovative financing mechanisms.

- Cities are experienced in developing and implementing climate action plans that are aligned with national climate change strategies and urban development priorities. They have robust technical and financial capacities and a well-developed knowledge base on climate mitigation that is regularly updated and communicated to the national level to support coordinated climate policy processes.

- Appropriate institutional structures exist to facilitate effective coordination between national- and city-level entities on aspects such as climate planning and policy development, budgeting, implementation, and tracking of urban climate action and its impacts (through aligned or integrated MRV systems). Such coordination is supported by evidence-based decision-making processes that allow for periodic revisions of climate strategies and for scaling up the ambition of NDCs and LTSs over time.

Dalhousi, India © f9sphotos / iStock

Table 6.1: Readiness Diagnostic Framework Questions

The key to answering the questions under each integrative solution:

- **No** indicates that the readiness characteristic/prerequisite is lacking.
- **Partially** indicates that some elements of the readiness characteristic/prerequisite are present.
- **Yes** indicates that the readiness characteristic/prerequisite is present.
- **N/A** indicates that the readiness characteristics/prerequisite is not applicable in that readiness level.

1 Mainstream climate change in national development planning and budgeting processes

	Readiness		
	Low	Moderate	High
Pillar 1			
National level			
• Do the country's medium and long term (MT and LT) economy wide and sectoral development plans reflect the goals of its NDC and / or LTS and their implementation plans?	No	Partially	Yes
• Do the country's MT and LT economy-wide and sectoral development plans reflect low-carbon urbanization considerations?	No	Partially	Yes
City level			
• Are subnational entities (including cities) consistently developing MT and LT development plans?	No	Partially	Yes
• Are the climate-related goals and actions from national MT and LT economy-wide and sectoral development plans cascading down to these subnational development plans?	No	Partially	Yes
Pillar 2			
Across all levels			
• Are intergovernmental fiscal transfers regular and consistent?	No	Partially	Yes
• Do the budgeting processes associated with national and subnational development plans explicitly consider the financing needs and main sources of financing for climate-related actions?	No	Partially	Yes
• Does the country undertake climate tagging of budgetary spending (to facilitate monitoring of climate finance flows)?	No	Yes	Yes
• Do fiscal transfers targeted at urban spending categories include criteria for undertaking climate action (e.g., conditional transfers to city level)?	No	Partially	Yes
• Does the country's budgeting process earmark funding flows for subnational-level climate action?	No	No	Yes
Pillar 3			
Across all levels			
• Are national development plans informed by development scenarios that reflect low-carbon urbanization trends?	No	Partially	Yes
• Do the systems at national and subnational levels for tracking progress on development goals include climate-related performance indicators?	No	Partially	Yes
• Does the climate MRV system ensure that reporting timelines for tracking climate actions are consistent with budgeting processes and timelines?	No	Yes	Yes

2 Integrate low-carbon growth considerations in the national urban agenda (including through NUPs)

	Readiness		
	Low	Moderate	High
Pillar 1			
National level			
• Does the country have an overarching urban development strategy or plan (e.g., NUP)?	No	Yes	Yes
• Does it include climate mitigation goals and measures (e.g., climate mitigation measures from the NDC and/or LTS targeted to urban areas, city-level climate mitigation efforts)?	No	Partially	Yes
City level			
• Are the climate-related goals and actions from the urban development strategy or plan (e.g., NUP) cascading down to the city level?	No	Partially	Yes
Pillar 2			
National level			
• Does the urban development strategy or plan include a guiding framework for resource allocation to cities to undertake climate mitigation actions (e.g., performance-based grants, dedicated climate program)?	No	No	Yes
Pillar 3			
National level			
• Does the urban development strategy or plan reflect country-specific BAU and low-carbon urbanization scenarios (e.g., assessment of carbon footprint of urban areas, feasible mitigation options)?	No	Partially	Yes
• Does the urban development strategy or plan contain monitorable climate mitigation actions with performance indicators?	No	Partially	Yes

3 Explicitly consider urban climate action in national climate change strategies

	Readiness		
	Low	Moderate	High
Pillar 1			
National level			

• Do the NDC, LTS, or other national or sectoral climate change strategies include low-carbon urbanization considerations?
  ◦ Mitigation-related risks and GHG emissions reduction opportunities in urban areas are considered in NDC target-setting/priority actions or LTS development.
  ◦ NDC/LTS priority actions targeting urban areas are translated into implementable city-level actions.
  ◦ City-level mitigation efforts and targets are recognized in NDC/LTS or other sectoral climate strategies.
	No	Partially	Yes

• Does the country have a strong enabling environment for facilitating city-level mitigation action?
  ◦ Climate change targets are legally binding and cascaded down to subnational level.
  ◦ Robust climate regulations exist with consistent enforcement (e.g., energy efficiency standards).
	No	Partially	Yes

• Is the country on track to implement its climate change strategies?
  ◦ The objectives of NDC are being met (e.g., implementation plans being developed, actions being financed).
  ◦ Considerations relevant for urban areas are included in NDC implementation plans, and associated targets are being met.
  ◦ The country has developed an LTS implementation plan or roadmap that includes specific actions for urban areas.
	No	Partially	Yes

City level

• Has the city developed an MT climate change action plan that includes mitigation aspects? ◦ Climate change action plans assimilate NDC and/or LTS goals and implementation plans or are more ambitious.	No	Yes	Yes
• Has the city developed a long-term low-carbon urbanization vision (e.g., net-zero GHG emissions targets and associated actions)?	No	No	Yes

Pillar 2

National level

• Do the funding strategies for the NDC, LTS, or sectoral climate strategies identify specific financial needs associated with the climate mitigation measures to be implemented in urban areas?	No	Partially	Yes
• Is the country successfully mobilizing finance to fund its national or sectoral climate change measures?	No	Partially	Yes
• Are climate finance flows mobilized by the national government channelled to support urban climate mitigation measures?	No	Partially	Yes

Pillar 3

National level

• Do the NDC or other MT national or sectoral climate change strategies reflect low-carbon urbanization aspects (e.g., GHG emissions drivers in urban areas, risks of carbon lock-in, impacts of city-level climate interventions)?	No	Partially	Yes
• Does the LTS incorporate country-specific low-carbon urbanization scenarios (e.g., urban-centric technological, behavioral, land-use changes)?	No	Partially	Yes
• Do the NDC or other MT national or sectoral climate change strategies include reporting requirements for cities?	No	Yes	Yes

City level

• Is the city-level climate mitigation action plan underpinned by high-quality data and diagnostics (e.g., a GHG inventory, GHG emissions reduction scenarios, impacts of city-level climate interventions)?	No	Partially	Yes
• Does the city-level climate mitigation action plan include monitorable actions (e.g., GHG emissions reduction targets or mitigation actions with KPIs)?	No	Partially	Yes
• Is the progress on climate mitigation actions being reported to national climate planning entities?	No	Partially	Yes

4 Empower city governments and strengthen intergovernmental coordination in policy areas with overlapping mandates

Readiness		
Low	Moderate	High

Pillar 1

Across all levels

• Do city governments have the regulatory authority to undertake climate action in functions that are within their administrative mandates?	No	Partially	Yes

• For urban development functions overlapping or shared with other government levels, do city governments have clearly defined roles and responsibilities for climate action?
  ◦ Cities have clear roles and responsibilities for shared climate functions.
  ◦ The country has mechanisms to seek inputs from city governments on climate-related actions within their jurisdictions (e.g., through coordinated planning and implementation, clear responsibilities for enforcing national policies).
	No	Partially	Yes

Pillar 2

National level

• Does the country facilitate cities' access to domestic and international climate finance to support them in implementing climate functions and mandates (e.g., participation in international climate funds targeting urban climate action, collaboration with entities responsible for participation in carbon markets)?	No	Partially	Yes

City level

• Do city governments have the authority to generate OSR?	No	Yes	Yes
• Do city governments have the mandate to mobilize financing from private sources (e.g., capital markets, debt-based instruments, PPPs)?	No	Yes	Yes

Pillar 3

Across all levels

• Are diagnostics efforts supporting climate policy processes (e.g., development of NDC, LTS, or other climate strategies) aligned across national and city levels? ◦ Climate and development diagnostics reflect comparable economic trends and climate change impacts of urbanization at national and city levels.	No	Partially	Yes

• Are MRV approaches across different levels of government and reporting needs aligned?
  ◦ Entities engaged in climate-related progress reporting at different levels of government coordinate on scope and timelines of reporting.
  ◦ City-level monitorable targets or indicators are aligned with national climate change strategies (to facilitate aggregation).
	No	Partially	Yes

• Does the country have integrated MRV systems, including GHG emissions databases, similar methodologies and reporting processes? ◦ Cities' data collection and reporting processes, timelines, and methodologies are fully consistent with those at national level.	No	Partially	Yes

5 Enhance communication between national and city level on climate action

	Readiness	
Low	Moderate	High

Pillar 1

Across all levels

• Is there a mechanism or framework for coordination between city, state, and national governments on policy and planning processes related to climate?	No	Yes	Yes

• In the absence of a coordination framework, are climate-related efforts consistently communicated between different levels of government?
  ◦ City governments are aware of national climate commitments and their implication for their jurisdictions.
  ◦ Urban climate mitigation efforts undertaken in cities are communicated to the national government.
  ◦ National and subnational entities are engaged in policy processes relevant to climate action in urban areas (e.g., co-creation of NDCs and LTSs).
	No	Partially	Yes

Pillar 2

Across all levels

• Are cities communicating about their financing needs for existing and planned climate actions to the national entities responsible for NDC implementation and resource allocation processes?	No	Partially	Yes

Pillar 3

National level

• Does the country have a mechanism or framework for national-level entities and city governments to communicate on GHG emissions data, diagnostics, and MRV, including tracking of climate actions and finance flows?	No	Partially	Yes

6 Establish organizational structures and functions within each government level

Readiness: Low | Moderate | High

Pillars 1, 2, & 3

Across all levels

• Are there organizational structures with formally defined roles and responsibilities at each level of government to facilitate climate action planning, implementation, and tracking?	No	Partially	Yes

City level

• Are city governments adequately staffed and resourced with personnel who have clear roles and responsibilities on climate change?
  ◦ Cities have a dedicated climate change body.
  ◦ City governments modified existing roles and responsibilities to incorporate climate-related functions.
	No	Partially	Yes

7 Promote stakeholder engagement

Readiness: Low | Moderate | High

Pillars 1, 2, & 3

Across all levels

• Are there mechanisms that facilitate engagement of relevant stakeholders on climate action planning (e.g., across various government levels, private sector, academia, local communities)?
  ◦ Multi-level stakeholder engagement is undertaken as part of NDC and LTS development and implementation processes.
  ◦ City representatives systematically participate in national climate planning processes, including M&E of outcomes.
	No	Partially	Yes

8 Promote collaboration and sharing of knowledge, tools, and resources

Readiness: Low | Moderate | High

Pillars 1, 2, & 3

Across all levels

• Are tools, resources, and technical capacities to support climate change policy processes shared across different levels of government and with other stakeholders (e.g., through technical workshops, consultations processes, knowledge-sharing platforms)?	No	Partially	Yes
• Do national-level entities and city governments effectively collaborate on data, diagnostics, and reporting tools, including through sharing expertise on climate action (e.g., through quality assurance and guidance, co-creation of low-carbon development pathways)?	No	Partially	Yes

9 Enhance technical and financial capacity

	Readiness		
	Low	Moderate	High

Pillar 1

Across all levels

• Do relevant entities have sufficient experience in climate action planning and implementation?	No	Partially	Yes

City level

• Do city governments have sufficient capacities to undertake urban planning and service provision, and do they assimilate climate-related functions into existing roles and responsibilities?	No	Partially	Yes

Pillar 2

Across all levels

• Do city governments have a strong track record of designing, managing, and implementing climate mitigation plans and investments? ◦ Cities have experience in successful design and implementation of climate mitigation projects or low-carbon infrastructure investments.	No	Partially	Yes
• Are city governments funding a sizeable share of their priorities through OSR?	No	No	Yes
• Are city governments successfully attracting capital and mobilizing financing from private sources?	No	No	Yes

Pillar 3

Across all levels

• Are there sufficient technical capacity and resources, including dedicated funding, to support climate-related diagnostics, tracking, and reporting?
  ◦ The country has a knowledge base that consolidates data on wide-ranging impacts of climate action on urban development indicators and vice versa.
  ◦ National and city governments and/or other stakeholders have experience using national- and city-level diagnostic tools that are tailored for the country's specific urbanization context.
  ◦ The country is exploring emerging technologies (e.g., remote sensing) to address data gaps.
	No	Partially	Yes

• Are existing MRV systems ready to support alignment and/or integration of city-level inventories and reporting processes (including to ensure consistency of scope and timelines with NDC/LTS policy processes)?	No	Partially	Yes

City level

• Do city governments have technical capacity to use urban diagnostics tools to support climate policy processes in their jurisdictions and across various levels of government (e.g., NDC and LTS development and implementation)?	No	Partially	Yes
• Do city governments have technical capacity to comply with MRV and climate action tracking requirements (e.g., developing GHG inventories, setting up M&E systems).	No	Partially	Yes

6.3 Case study: Ghana's readiness for urban climate action integration

This section illustrates the application of the **Readiness Diagnostic Framework** to Ghana, a rapidly urbanizing LMIC in West Africa. Current urbanization trends in Ghana present significant potential for achieving the economic dividends of long-term low-carbon urban growth. Ghana first developed its response to the challenges of climate change in 2012 through its National Climate Change Policy (NCCP), which had a strong emphasis on climate resilience, and ratified the Paris Agreement in 2016. It submitted an update to its NDC in 2021 (Government of Ghana 2021c) but currently doesn't have an LTS. The Government of Ghana has been proactive in pursuing climate change mainstreaming, and Accra, Ghana's capital, recently published its CAP (Accra metropolitan Assembly 2020), demonstrating strong initiative on climate. The country is currently updating its NUP. Ghana therefore offers an interesting case study for demonstrating the application of the Diagnostic Framework.

The authors conducted the assessment primarily through a desk review of relevant national- and city-level plans, policies, and documents, complemented by interviews with World Bank staff supporting the institution's engagement with Ghana on climate change and urban development. City-level readiness was assessed by focusing on a sample of three Ghanaian cities—Accra, Kumasi, and Tamale, each with distinct urban characteristics and status of urbanization (see Box 6.1). Accra and Kumasi were selected as representative of *urban centers* (population density over 1,500 inhabitants per km^2) and Tamale as representative of *small urban areas* (population density over 300 inhabitants per km^2), based on urban settlement types defined by the United Nations Department of Economic and Social Affairs (UN DESA 2019). The assessment offers preliminary observations about Ghana's level of readiness both at national and city levels for undertaking vertically and horizontally integrated urban climate action. The case study also provides a set of recommendations that could help the country address key gaps and barriers and advance to the next stage of readiness.

Box 6.1: Urbanization status and key characteristics: Accra, Kumasi, and Tamale

- **Accra**, located on the southern coast, is the country's capital and largest city, with a total population of approximately 2 million (4.9 million in the Greater Accra Region). With an estimated annual population increase of 4 percent, Accra is one of the fastest-growing urban regions in West Africa. It is also Ghana's economic powerhouse, contributing roughly 25 percent of the country's GDP. Currently, 58 percent of the city's population lives in informal housing, however, electrification rates are among the highest in Africa, with 96.5 percent of people having access to electricity.
- **Kumasi**, located in southwestern Ghana, is the second-largest city. The total population of the metropolitan region is estimated at nearly 3.5 million, and the urban population growth rate is similar to that of Accra.
- **Tamale**, located in northern Ghana, is the third-largest city and an emerging investment hub in West Africa. The urban population is estimated at around 700,000, with an annual growth rate of 4.4 percent, making Tamale the fastest-growing city in Ghana.

6.3.1 Urbanization and GHG emissions growth trends in Ghana

Ghana's urban population has more than quadrupled since 1990, from under 4 million to 17.5 million in 2021 (57 percent of the total population) and is expected to reach 37.5 million (73 percent of the projected total population) by 2050 (World Bank, forthcoming); UN DESA 2019). While urban growth has contributed to significant economic gains, it has been characterized by unplanned and low-density urban expansion, along with a proliferation of informal settlements (housing 40 percent of the urban population) (World Bank, forthcoming). If current sprawling expansion trends persist, Ghana could double its built-up area by 2050 (World Bank Group 2022b). Infrastructure development in most Ghanaian cities has not kept pace with urbanization, and climate hazards such as high temperatures, droughts, and floods are increasing the vulnerability of infrastructure assets. Urban areas, including urban centers, suburban and peri-urban areas, and dense and semi-dense settlement clusters, generated 51 percent of Ghana's CO_2 emissions in 2015, compared to 40 percent in 1990 (Crippa et al. 2021). In addition, in 2015, urban areas contributed 43 percent of the country's CH_4 emissions, driven primarily by the waste sector. Under a BAU scenario, GHG emissions from urban areas in Ghana are expected to almost quadruple by 2050 (World Bank Group 2022b).

6.3.2 Climate change mainstreaming in Ghana's national development planning and budgeting

The National Development Planning Commission (NDPC) leads Ghana's development planning, which is set out in Long-Term National Development Plans (NLTDP) and National Medium-Term Development Policy Frameworks (MTDPF), with a 25- and four-year time horizon, respectively. The NLTDP guides the preparation and implementation of MTDPFs, through which Ghana implements its urban development policy agenda. Once an MTDPF is approved, all national entities such as government ministries, departments, and agencies and subnational entities such as metropolitan, municipal and district assemblies (MMDAs) are required to prepare their development plans in accordance with its provisions (World Bank Group 2022b). These plans form the basis for resource allocations from the national budget to subnational governments.

Since 2017, the national government has been pursuing climate change mainstreaming by reflecting national climate change goals in its development plans. NDPC is responsible for ensuring that climate change issues are integrated into the national development planning process and for coordinating the preparation of sectoral and annual national progress reports, which cover climate change-related issues (Climate Action Tracker 2021b).

The Ghana Long-term National Development Plan 2018-2057 (Republic of Ghana 2017) discusses the country's climate change commitments and specifies climate-related strategic interventions including deepening the mainstreaming of climate change in development plans. It also prioritizes managing rapid urbanization under one of its five long-term goals (Goal 3) and identifies urban sprawl and resulting urban land expansion as a key issue, emphasizing the need for strengthened land-use planning. However, this is not linked to its priorities on climate mitigation. Ghana's National MTDPF 2022-2025 (Government of Ghana 2021b) highlights addressing urbanization, urban infrastructure deficits, and climate change among the country's medium-term priorities. It sets out medium-term objectives[45] through a dedicated focus area on climate variability and change and includes strategic interventions such as accelerating the implementation of Ghana's national climate commitments through its NDC and mainstreaming climate change in national development planning and budgeting processes to meet these objectives. This focus area also includes performance indicators on climate change.

[45] These include enhancing institutional capacity and coordination for effective climate action, enhancing climate change resilience, and reducing greenhouse gases.

In addition, MTDPF identifies climate mitigation-related actions as part of strategic interventions in sectors such as energy and natural resources, but these are not linked to national climate goals. While subnational entities such as MMDAs are required to mainstream climate change in MTDPFs for their jurisdictions, only about half currently have climate change-related plans. It is important to note that most of the actions in these plans focus on reducing vulnerability to climate hazards (Climate Action Tracker 2021b) and don't directly reflect climate-related priorities of the national MTDPF. Further, subnational entities face numerous challenges in implementing their medium-term plans and are particularly constrained in carrying out climate-related interventions because of technical capacity constraints (discussed in subsequent sections).

Climate-informed resource allocations to city governments

Fiscal transfers from the national government to subnational entities are anchored in the national development planning process. While intergovernmental fiscal transfers are regular, their volume can depend on changing political priorities (Fumey and Egwaikhide 2018).

Ghana instituted a CBT system in 2016 to track all on-budget climate-related expenditures from key line ministries and generate data to compare projected and actual spending.

The budget guidelines require public institutions at national and subnational levels to identify climate-relevant spending. Ghana's Ministry of Finance (MoF) has developed Standard Operating Procedures for tracking climate change expenditures, and a climate tracking dashboard is expected to disaggregate this information at subnational and sector levels. In addition, Ghana's new Public Financial Management Strategy (2022-2026) (Government of Ghana 2021d) identifies measures to support both adaptation and mitigation, such as the disclosure of information on climate-smart investments by the public sector and the introduction of climate change into performance scorecards of MMDAs' budget committees. To channel financing for climate action to subnational levels, the NDPC has supported incorporation of NDC goals in many national and subnational plans (World Bank Group 2022b). While resources allocated at subnational level are not earmarked for climate action, MMDAs are required to incorporate climate-related actions in their MTDPs to acquire funding. For example, actions identified in Accra's CAP will be implemented by being embedded in the AMA's MTDP, and budgetary allocations for climate activities will be made through the AMA's budget process (Accra Metropolitan Assembly 2020). The annual performance assessment of MMDAs includes a climate change category. However, none of the indicators are minimum conditions for receiving transfers.

Table 6.2: Climate change mainstreaming in Ghana's national development planning and budgeting processes

Pillar 1

National level

	L / M / H
• Do the country's medium- and long-term (MT and LT) economy-wide and sectoral development plans reflect the goals of its NDC and/or LTS and their implementation plans?	Partially
• Do the country's MT and LT economy-wide and sectoral development plans reflect low-carbon urbanization considerations?	No

City level

• Are subnational entities (including cities) consistently developing MT and LT development plans?	Yes
• Are the climate-related goals and actions from national MT and LT economy-wide and sectoral development plans cascading down to subnational development plans?	Partially

Pillar 2

Across all levels

• Are intergovernmental fiscal transfers regular and consistent?	Partially
• Do the budgeting processes associated with national and subnational development plans explicitly consider the financing needs and main sources of financing for climate-related actions?	Partially
• Does the country undertake climate tagging of budgetary spendings (to facilitate monitoring of climate finance flows)?	Yes
• Do fiscal transfers targeted at urban spending categories include criteria for undertaking climate action (e.g., conditional transfers to city level)?	No
• Does the country's budgeting process earmark funding flows for subnational-level climate action?	No

Pillar 3

Across all levels

• Are national development plans informed by development scenarios that reflect low-carbon urbanization trends?	No
• Do the systems at national and subnational levels for tracking progress on development goals include climate-related performance indicators?	Yes
• Does the climate MRV system ensure that reporting timelines for tracking climate actions are consistent with budgeting processes and timelines?	No

6.3.3 Low-carbon growth considerations in Ghana's national urban agenda

The Government of Ghana recognizes the role of urbanization in driving economic growth. The National Urban Policy Framework adopted in 2012 (Government of Ghana 2012) and the National Spatial Development Framework (NSDF) 2015-2035 (Government of Ghana 2015) (see Box 6.2) are the two key policy frameworks guiding urban development planning at national level.

Ghana is in the process of adopting an updated NUP, 'National Urban Policy and Strategies 2023-2032 (Government of Ghana, forthcoming).[46] This draft NUP has an overarching vision of prioritizing inclusive, safe, resilient, and sustainable urban settlements. It commits to aligning and localizing Ghana's commitments under the Paris Agreement (e.g., NDC commitments). While it doesn't outline specific low-carbon urbanization scenarios, one of the 10 proposed policy objectives is dedicated to climate change and aims to promote climate resilience and environmental quality of urban life. Climate change aspects are also reflected in several other policy objectives and considered in a comprehensive manner in those focused on improving urban land-use planning and management and promoting access to urban infrastructure and services. It is unclear if climate-related considerations, particularly those concerning mitigation, are underpinned by dedicated urban diagnostics. Nevertheless, the draft NUP has identified 42 strategies to achieve these policy objectives, including several specific measures that will contribute to actions identified in Ghana's NDC relevant for urban areas such as: (i) improve energy efficiency in construction, operations, and maintenance of public and private facilities in urban communities and (ii) strengthen capacities at all levels to promote enforcement of regulations and private sector participation along the waste management chain. The activities identified to facilitate the implementation of these strategies comprise wide-ranging and specific actions that can contribute to climate mitigation in key urban sectors including public transportation, buildings, waste, and land use.

The draft NUP also specifies the relevant government entities that are expected to collaborate in implementing these activities. The M&E framework for the draft NUP is yet to be developed, so it is unclear if and how the performance indicators for the activities being implemented under these strategies are linked to relevant actions in Ghana's NDC. Lastly, the draft NUP mentions that financing policy implementation will be the responsibility of the national government through national budgetary and other appropriate support.

Box 6.2: The National Spatial Development Framework

The NSDF 2015-2035 was developed by the Land Use and Spatial Planning (LUSP) Authority under the provisions of the LUSP Act in collaboration with NDPC. The NSDF is informed by Ghana's 2010-2013 MTDPF, which emphasized the need to achieve well-planned and spatially integrated cities and highlighted the importance of linking spatial/land-use planning and socio-economic development objectives at all levels of government. NSDF, which is centered on the Accra and Kumasi regions as key growth points, recognizes that rapid urban growth in these city regions is leading to sprawl and recommends the adoption of spatial development frameworks. TOD is noted as an approach that should be adopted to promote compact, mixed-use development and to reduce private vehicle use and transportation congestion. This approach is primarily driven by priorities such as promoting economic development, improving connectivity, and protecting ecological assets.NSDF does not address its contribution to low-carbon urban development.

Source: Government of Ghana 2015.

Table 6.3: Recognition of low-carbon growth priorities in Ghana's national urban agenda

Pillar 1

National level

L / M / H

• Does the country have an overarching urban development strategy or plan (e.g., NUP)?	Yes
• Does it include climate mitigation goals and measures (e.g., climate mitigation measures from the NDC and/or LTS targeted to urban areas, city-level climate mitigation efforts)?	Partially

City level

• Are the climate-related goals and actions from the urban development strategy or plan (e.g., NUP) cascading down to the city level?	Partially

[46] The draft National Urban Policy and Strategies 2023-2032 (2023 NUP) was reviewed for this report.

Pillar 2

National level

• Does the urban development strategy or plan include a guiding framework for resource allocation to cities to undertake climate mitigation actions (e.g., performance-based grants, dedicated climate program)?	No

Pillar 3

Across all levels

• Does the urban development strategy or plan reflect country-specific BAU and low-carbon urbanization scenarios (e.g., assessment of carbon footprint of urban areas, feasible mitigation options)?	No[47]
• Does the urban development strategy or plan contain monitorable climate mitigation actions with performance indicators?	No[48]

6.3.4 Mitigation priorities and targets for urban areas in Ghana's national climate change strategies

National climate change strategies

Adopted in 2012, Ghana's NCCP was designed within the framework of national sustainable development priorities and aimed to mainstream climate change into policies and sectoral activities to achieve sustained growth (Cobbinah et al. 2019). NCCP has a strong emphasis on climate resilience.The role of local governments in its implementation has been minimal, with key responsibilities being limited to disaster risk management and energy conservation in buildings (Tait and Euston-Brown 2017). As mentioned above, Ghana ratified the Paris Agreement in 2016 and submitted an update to its NDC in 2021 but hasn't yet developed an LTS. The country doesn't have a comprehensive legislative framework on climate change but has produced a series of plans grounded in NCCP and numerous separate regulations and policies across several sectors. Ghana's NDC targets are not currently anchored in the law (Climate Action Tracker 2021b; World Bank 2022).

Ghana's updated NDC recognizes the key role that cities/local governments must play in delivering NDC targets and includes mitigation measures related to expanding sustainable inter- and intra-city transportation modes; promoting energy efficiency in homes, industry, and commerce; and improving solid waste management. It also indicates a top-down approach to NDC implementation, in which NDPC is mainstreaming NDC targets into sectoral and district plans and their annual progress reports.

Ghana has developed an NDC financing strategy, which includes budget estimates for most actions that need to be implemented in urban areas but doesn't specify their funding sources (Government of Ghana 2021a). While Ghana has the institutional structures to mobilize and manage climate finance, to date, the government has had difficulty raising sufficient funds for climate action (Climate Action Tracker 2021b).

As such, through its efforts to mainstream national climate change goals in development planning, Ghana's national government has created the enabling environment for city-level climate action. However, there are gaps in its effective implementation, as discussed in the previous section.

Table 6.4: Urban climate action in Ghana's national climate change strategies

Pillar 1

National level

L / M / H

• Do the NDC, LTS, or other national or sectoral climate change strategies include low-carbon urbanization considerations?	Partially
• Does the country have a strong enabling environment for facilitating city-level mitigation action?	Partially
• Is the country on track to implement its climate change strategies?	Partially

Pillar 2

National level

• Do the funding strategies for the NDC, LTS, or sectoral climate strategies identify specific financial needs associated with the climate mitigation measures to be implemented in urban areas?	Yes
• Is the country successfully mobilizing finance to fund its national or sectoral climate change measures?	No
• Are climate finance flows mobilized by the national government channelled to support urban climate mitigation measures?	No

[47] This information could not be verified.

[48] The M&E framework for the updated draft 2023 NUP is expected to be developed.

Pillar 3

National level

• Do the NDC or other MT national or sectoral climate change strategies reflect low-carbon urbanization aspects (e.g., GHG emissions drivers in urban areas, risks of carbon lock-in, impacts of city-level climate interventions)?	No
• Does LTS incorporate country-specific low-carbon urbanization scenarios (e.g., urban-centric technological, behavioral, land-use changes)?	N/A
• Do the NDC or other MT national or sectoral climate change strategies include reporting requirements for cities?	No

City-level climate action planning: Accra

AMA is the only subnational entity in Ghana to have prepared a city-level GHG emissions inventory and climate action plan.[49] Accra's Climate Action Plan (CAP) 2020 - 2025 (Accra Metropolitan Assembly (2020) sets a GHG emissions reduction target of 73 percent below BAU by 2050 (30 percent by 2030). Accra's GHG emissions reduction target for 2030 aligns with the level of ambition set out in Ghana's NDC and goes further by establishing a mid-century target. To achieve these targets, Accra has identified concrete actions to reduce GHG emissions in key sectors where it has a mandate to operate, comprising solid waste management, energy efficiency in buildings, transportation systems, and land-use and physical planning. This is largely in line with city-specific mitigation actions in Ghana's NDC.

While Accra's CAP doesn't include quantitative performance indicators, AMA will monitor and report on progress achieved on climate actions identified in CAP to the national government and report GHG emissions on an annual basis to CDP. Progress reported to the national government is expected to feed into the national MRV of climate actions. Kumasi and Tamale have not yet published their own climate action plans or strategies.

Table 6.5: Climate action planning in Accra

Pillar 1

L / M / H

City level

• Has the city developed an MT climate change action plan that includes mitigation aspects?	Yes
• Has the city developed a long-term low-carbon urbanization vision?	Yes

Pillar 3

City level

• Is the city-level climate mitigation action plan underpinned by high-quality data and diagnostics (e.g., a GHG inventory, GHG emissions reduction scenarios, impacts of city-level climate interventions)?	Yes
• Does the city-level climate mitigation action plan include monitorable actions (e.g., GHG emissions reduction targets or mitigation actions with KPIs)?	Partially
• Is the progress on climate mitigation actions being reported to national climate planning entities?	Yes

6.3.5 Decentralization, intergovernmental coordination, and communication on climate action[50]

Long-standing decentralization reforms in Ghana have given MMDAs a wide range of functions and responsibilities, including generating OSR. However, in practice, national departments retain supervisory powers over several development planning and budgeting processes. Most city governments in Ghana have limited fiscal autonomy. About 80 percent of MMDAs' budgets are financed by transfers from the national government and donors through the budgetary and resource allocation processes set up for MTDPFs, and the remaining 20 percent is financed through OSR (Otoo and Danquah 2021). In this context, the funds for implementing climate action are often insufficient, resulting in a sizeable gap between MMDAs' plans and actual funds received and used (World Bank 2022).

In recent years, the government has promoted PPPs to bridge the financing gap for urban infrastructure and basic services. In 2011, the country adopted its first national PPP policy. A screening system established for PPP preparation includes considerations for climate change and emphasizes that PPPs should consider low-carbon and climate-resilient infrastructure, utilizing climate data analytics (World Bank, forthcoming). The participation of cities in PPPs has been limited. A PPP law adopted in 2020 made provisions for MMDAs to make PPP arrangements, yet no city has used PPPs for financing investment projects.

[49] C40 supported the development of Accra CAP 2020-2025.

[50] This section discusses readiness characteristics across the integrative solutions "Empowering city governments and strengthening intergovernmental coordination in policy areas with overlapping mandates" and "Enhancing communication between national- and city-level on climate action."

Since 1990, only 30 PPP projects have been financed, for a total investment of almost US$ 10 billion, with all PPP transactions managed by a PPP Advisory Unit within the Public Investment and Assets Division of the MoF (MOFEP of Ghana 2020).

When MMDAs have functions that overlap with other levels of government, they have the primary mandate to undertake those functions if they fall within their jurisdiction. Roles and responsibilities for climate change planning and implementation are shared across various government levels, including MMDAs, and the country has clear institutional structures to facilitate vertical and horizontal coordination between entities. However, these climate governance structures are not fully operational because of weak coordination between entities (Climate Action Tracker 2021b). For example, legal and policy frameworks such as the LUSP Act include provisions for inter-jurisdictional coordination or collaboration, yet these are not functioning in practice, affecting implementation of functions with shared mandates such as urban transportation (World Bank, forthcoming). Nevertheless, Accra's CAP seeks to overcome these gaps by including considerations for alignment with national climate planning processes. Specifically, AMA aims to link its CAP revisions and updates with the five-year cycle of Ghana's NDC updates.

At the same time, CAP outlines the need for financial support to enable AMA to develop the second five-year CAP in 2024.

The extent to which Accra's MRV and tracking processes for climate action are currently aligned with corresponding processes at national level is unclear. A recent analysis of climate change laws in Ghana (World Bank 2022) highlights that the institutional arrangements for coordinating climate action monitoring and reporting activities are not embedded in the country's legal and regulatory frameworks. This can make it challenging for entities to coordinate on planning and implementing climate commitments, especially with changing political leadership and priorities. While Ghana seeks to implement its NDC goals at the subnational level through MTDPFs, the current indicators for tracking performance and impacts of climate-related actions in these plans need improvement and don't cascade down. The national climate action monitoring and reporting function in Ghana is assigned to the Environmental Protection Agency (EPA), which mainly focuses on ensuring the country's compliance with UNFCCC's MRV requirements. In the absence of applicable climate-related performance indicators in MTDPFs, the Accra CAP includes its own requirements for tracking climate action and mobilizing external climate finance for its implementation.

Table 6.6: Decentralization and intergovernmental coordination and communication on climate action in Ghana

Pillar 1

Across all levels

L / M / H

• Do city governments have the regulatory authority to undertake climate action in functions that are within their administrative mandates?	Yes
• For urban development functions overlapping or shared with other government levels, do city governments have clearly defined roles and responsibilities for climate action?	Partially
• Is there a mechanism or framework for coordination between city, state, and national governments on policy and planning processes related to climate change?	Yes
• In the absence of a coordination framework, are climate-related efforts consistently communicated between different levels of government?	No

Pillar 2

National level

• Does the country facilitate cities' access to domestic and international climate finance to support them in implementing climate functions and mandates?	Partially
• Are cities communicating about their financing needs for existing and planned climate actions to the national entities responsible for NDC implementation and resource allocation process?	N/A

City level

• Do city governments have the authority to generate OSR?	Yes
• Do city governments have the mandate to mobilize financing from private sources (e.g., capital markets, debt-based instruments, PPPs)?	Yes

Pillar 3

Across all levels

• Are diagnostics efforts supporting climate policy processes (e.g., development of NDC, LTS, or other climate strategies) aligned across national and city levels?	No
• Are MRV approaches across different levels of government and reporting needs aligned?	No

• Does the country have integrated MRV systems, including GHG emissions databases, similar methodologies, and reporting processes?	No
• Does the country have a mechanism or framework for national-level entities and city governments to communicate on GHG emissions data, diagnostics and MRV, including tracking climate actions and finance flows?	Partially

6.3.6 Organizational structures and functions dedicated to climate change

Ghana has clear organizational structures and well-defined roles and responsibilities on climate change at national level. The Ministry of Environment Science, Technology, and Innovation (MESTI) is responsible for climate change issues and coordinates the NDC preparation process. MESTI houses the National Climate Change Committee, which consists of MMDAs, development partners, the private sector, civil society organizations, and other stakeholders. As discussed above, NDPC is responsible for incorporating NDC targets into sectoral and MMDA plans, and EPA is responsible for monitoring and reporting on NDC implementation (World Bank 2022). Several MMDAs have also established climate change units. For instance, AMA's Resilience and Sustainability Unit leads on the climate action agenda and is responsible for supporting various local departments in achieving climate goals.

Table 6.7: Organizational structures and functions on climate change in Ghana

Pillars 1, 2, & 3

L / M / H

Across all levels

• Are there organizational structures with formally defined roles and responsibilities at each level of government to facilitate climate action planning, implementation, and tracking?	Partially

City level

• Are city governments adequately staffed and resourced with personnel who have clear roles and responsibilities on climate change?	Partially

6.3.7 Stakeholder engagement, collaboration, and knowledge sharing[51]

Ghana's national government recognizes the importance of engaging stakeholders in national climate policy planning and regularly conducts stakeholder consultations when developing reports and planning documents. More broadly, NDPC seeks inputs from various actors on MTDPFs but the extent to which such inputs are reflected in policy is not indicated in relevant documents. The government also has numerous initiatives on disseminating knowledge about climate change, largely targeted to the public to enhance awareness. Lastly, the government is taking steps toward developing knowledge infrastructure to support climate policy planning through its Council for Scientific and Industrial Research. However, the work undertaken by this agency is currently limited (Climate Action Tracker 2021b).

Table 6.8: Stakeholder engagement and collaboration in Ghana's climate planning

Pillars 1, 2, & 3

Across all levels

Stakeholder engagement	
• Are there mechanisms that facilitate engagement of relevant stakeholders on climate action planning (e.g., across various government level, private sector, academia, local communities)?	Partially
Collaboration and sharing knowledge, tools, and resources:	
• Are tools, resources, and technical capacities to support climate change policy processes shared across different levels of government and with other stakeholders (e.g., through technical workshops, consultations processes, knowledge-sharing platforms)?	Partially
• Do national-level entities and city governments effectively collaborate on data, diagnostics, and reporting tools, including through sharing expertise on climate action (e.g., through quality assurance and guidance, co-creation of low-carbon development pathways)?	No

[51] This section discusses readiness characteristics across the integrative solutions "Promoting stakeholder engagement" and "Promoting collaboration and sharing knowledge, tools, and resources."

6.3.8 Technical and financial capacity for climate action in Ghana

Ghana's national institutions responsible for coordinating climate action seem to have sufficient capacity, staffing, and budget to perform their statutory tasks. For instance, Ghana is one of the few developing countries that has regularly submitted National Inventory Reports to UNFCCC, which demonstrates adequate capacity for regular GHG inventory reporting (Climate Action Tracker 2021b). However, most city governments face institutional and financial constraints in undertaking core urban development functions such as physical planning and service provision and have limited capacities to undertake climate-related functions (World Bank, forthcoming). For instance, local governments struggle to mainstream climate-related actions into their plans because of limited resources and lack of technical expertise on climate change (Climate Action Tracker 2021b). While AMA has mobilized resources to develop basic structures and establish dedicated capacity to plan and implement climate action, Kumasi and Tamale rely primarily on the national government to identify climate action priorities and implement climate change actions and have achieved substantially less progress in integrating climate change into city functions, policies, and investments.

As discussed in section 6.3.5, the capacity of Ghana's local governments to raise OSR from taxes, levies, and other charges is quite limited, with all three cities highly dependent on the national government for financing climate action implementation. Accra's CAP indicates that its implementation will be financed through a combination of OSR, transfers from the national government, PPPs, and donors (e.g., international climate finance). However, even if Accra demonstrates stronger technical capacity compared to Kumasi and Tamale, it still relies on the national government to unlock finance, including from development partners.

While Ghana has the basic structure for MRV, the 2019 NDC implementation plan identified the need to upgrade the existing domestic MRV system to include the national GHG inventory, climate action accounting, progress on achieving NDC targets, and tracking of financial and technical support received (Republic of Ghana, MESTI 2019a). MESTI had also identified several barriers to the implementation of Ghana's Climate Ambitious Reporting Program, which aims to support the MRV system, including limited funds, low visibility of MRV results for policy-related decision making, and a lack of access to good-quality data (Republic of Ghana, MESTI 2019b). Overcoming these barriers at the level of the national MRV and tracking system and further strengthening cities' diagnostic, monitoring, and reporting capacities are important prerequisites for aligning MRV systems at different levels to support integration of low-carbon urbanization considerations into national climate policies.

Table 6.9: Technical and financial capacity to support urban climate action in Ghana

Pillar 1

L / M / H

Across all levels

• Do relevant entities have sufficient experience in climate action planning and implementation?	Partially

City level

• Do city governments have sufficient capacities to undertake urban planning and service provision, and do they assimilate climate-related functions into existing roles and responsibilities?	No

Pillar 2

City level

• Do city governments have a strong track record of designing, managing, and implementing climate mitigation plans and investments?	No
• Are city governments funding a sizeable share of their priorities through OSR?	No
• Are city governments successfully attracting capital and mobilizing financing from private sources?	No

Pillar 3

Across all levels

• Are there sufficient technical capacity and resources, including dedicated funding, to support climate-related diagnostics, tracking, and reporting?	No
• Are existing MRV systems ready to support alignment and/or integration of city-level inventories and reporting processes (including to ensure consistency of scope and timelines with NDC/LTS policy processes)?	No

City level

• Do city governments have technical capacity to use urban diagnostics tools to support climate policy processes in their jurisdictions and across various levels of government (e.g., including NDC and LTS development and implementation)?	No
• Do city governments have technical capacity to comply with MRV and climate action tracking requirements (e.g., developing GHG inventories, setting up M&E systems).	No

6.3.9 Assessment outcome: Ghana's readiness for urban climate action integration

This section summarizes the preliminary outcomes of the assessment undertaken for this report on Ghana's current level of readiness to develop and implement urban climate action that is integrated in its national climate change strategies. At city level, these outcomes are based on the assessment of three cities that are representative for the purposes of this diagnostic. It also provides a set of recommendations that could help the country address key gaps and barriers and move to higher stages of readiness.

At national level, Ghana demonstrates '***moderate***' readiness. The country has made significant efforts to lay the groundwork for mainstreaming its national climate goals and targets into its national and subnational development plans and sectoral policies and continues to deepen mainstreaming. Ghana's updated draft NUP reflects its climate goals, and the updated NDC explicitly considers the role of urban areas in meeting its targets and includes priority measures that cities should implement. Enacting the country's climate targets and creating institutional structures through dedicated climate change laws is an important long-term priority (World Bank 2022). This can help improve coherence between the climate policy agenda and sectoral policy agendas and support effective functioning of the MRV system (including gathering relevant data for climate reporting), which will strengthen the implementation of NDC, particularly at subnational level. The M&E framework that will be developed to track the implementation of the draft NUP provides an opportunity for harmonizing the indicators for tracking the NUP's climate mitigation actions with those tracking the relevant actions in Ghana's NDC, thereby enabling the country's urban areas to systematically demonstrate their contribution to national climate goals. Ghana has established comprehensive structures to facilitate horizontal and vertical intergovernmental coordination on climate. However, there is a need to strengthen coordination between entities to ensure their effective functioning within these institutional structures. Additionally, since several measures related to low-carbon urban growth need to be undertaken at the metropolitan scale (e.g., curbing urban expansion, improving inter-city connectivity), inter-jurisdictional coordination at this level should also be strengthened (World Bank, forthcoming).

Ghana should strive to incorporate low-carbon urbanization considerations underpinned by dedicated urban diagnostics in its efforts to develop an LTS. This would further elevate the role of rapidly growing urban areas in achieving the country's long-term vision for decarbonized development. It can also provide an enhanced understanding of the specific contributions of urban mitigation actions to national climate goals and the support required to facilitate their implementation.

Based on the assessment of three representative cities, Ghana demonstrates '***low***' readiness for climate action at the city level, with Accra being an outlier. Lack of climate-related technical expertise and resource limitations at local level hinders city governments' ability to undertake climate mitigation planning. In this context, cities may also struggle with integrating local data on GHG emissions and priority climate actions into national climate policy processes and the MRV system. Despite Accra's greater implementation readiness, there is a need for the national government to augment the city's efforts to access finance and build capacity to deliver climate-related projects and programs. For smaller cities with more acute capacity gaps, a starting point could be to follow Accra's example and develop their own climate action plans that are aligned with national climate change targets and policy objectives and include robust climate action tracking systems. Further, given their low levels of fiscal autonomy, Ghanaian cities need to work collaboratively with the national government to identify financing priorities for climate action and mobilize climate finance from domestic and international sources. To further empower local governments to implement their climate-related functions, the national government should strive to mobilize technical and financial support, including by strengthening collaboration and sharing of climate-related knowledge and technical resources across government levels and between cities. It is also important to improve local government representation in sectoral planning and implementation strategies and strengthen existing engagement systems to facilitate coordination between national and subnational entities on shared roles and mandates. As indicated in Accra's CAP, in areas with overlapping mandates such as energy and transportation sectors, coordination between entities is key to achieving the city's mitigation targets. By enabling intergovernmental coordination, the national government can strengthen the ability of local governments to undertake ambitious climate action and contribute to Ghana's national climate objectives.

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