



Cities and Carbon Market Finance:

Taking Stock of Cities' Experience with Clean Development Mechanism (CDM) and Joint Implementation (JI)

Executive Summary

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EXECUTIVE SUMMARY

In the search for solutions to address climate change, carbon markets and cities are increasingly part of international and national policy frameworks. Yet the rise of carbon markets as a policy instrument to put a price on and limit greenhouse gas (GHG) emissions and the increased role of urban governance in climate policy frameworks are two quite separate trends. To date the actual or potential interaction between carbon markets and city or urban scale mitigation has received little attention from analysts and policymakers. This paper offers an in-depth analysis of experience with urban projects in compliance carbon markets. It addresses two key questions of relevance to international and national policymakers: *How have cities accessed carbon markets to date? What lessons might we draw from this experience for the reform of future market mechanisms?*

Cities and climate change mitigation

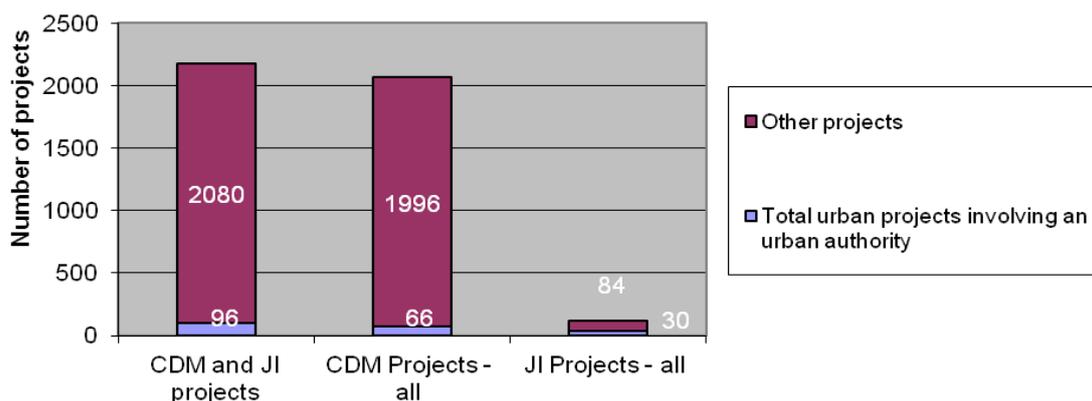
The importance of cities in climate policy stems from the simple reality that they house the majority of the world's population, two-thirds of world energy use and over 70% of global energy use emissions. Approximately 50% of the global population is urban dwelling and this share is expected to increase significantly in the coming decades, with much of this growth due to rapid urbanisation in developing countries. Cities are expected to house 76% of world energy use emissions by 2030.

Urban development policymakers - either at the municipal, regional or national level - have the potential to alter urban emission pathways. For example, buildings and land-use zoning, transport, local distribution networks, waste management, and urban forestry and land use are urban activities that typically have large and cost-effective abatement potential in principle. For various reasons, urban authorities are increasingly active in setting local mitigation policy goals and developing local plans. Local policymakers have good access to relevant stakeholders and are well-placed to develop a context-specific vision of a low-emission future. Importantly, they have the ability to identify urban mitigation projects with high local co-benefits (e.g. in areas other than reduced GHGs such as clean air and streets, or increased safety and health). However, the extent to which cities can actively engage in changing emission pathways depends, in part, on how cities fit within national and other layers of governance.

At the international level, global carbon markets have become an important new source of financing for mitigation projects and programmes. In particular, the two offset mechanism, currently operating under the Kyoto Protocol -- Joint Implementation (JI) and the Clean Development Mechanism (CDM) -- play a key role in financing mitigation projects. The value of primary transactions in the carbon offset market (i.e. CDM, JI or voluntary project-based transactions) was approximately 5.2 billion € in 2008, while the mitigation projects behind them represented approximately 463 million tonnes worth of emissions reductions respectively. Although the carbon market has suffered from uncertainties about the post-2012 period, and from the global economic downturn, it has become an important mechanism for financing low-carbon technology choices and offers the potential to fill some of the gaps in technological, financial or institutional capacity for projects in both developing and developed countries. Carbon markets could offer potentially significant support to viable urban mitigation projects, working alongside other financial and policy instruments (e.g. taxes, bonds, subsidies, norms, etc). Yet, limited market activity in urban areas to date suggests that this potential is not being realised.

To date, the participation of urban authorities and of urban mitigation projects in the global carbon market remains extremely limited. Almost all of the experience has occurred through the compliance offset market, which accounts for around 90% of the primary transactions. However, urban mitigation projects represent less than 10% of all projects in the compliance market today and are concentrated in few sectors (waste management, energy efficiency, and energy distribution networks) (see Figure ES-1).

Figure ES-1. Overview of CDM and JI registered projects initiated by city or involving city authorities



Source: CDC Climat Research – from JI pipeline overview (UNEP Risoe) as at 1/3/2010 & project design documents

The under-representation of urban carbon projects can be linked both to the difficulties to implement urban mitigation projects and to the difficulties for cities to access the carbon market. Among factors that explain implementation difficulties are the limited autonomy that urban authorities often have to directly regulate GHG emissions, as it is often seen as a national priority and not a sub-national one, the limited budgets and access to start-up capital, as well as limited institutional capacity (e.g. human resources and technical expertise) of many urban authorities. Further, some of the likely types of mitigation projects that can be city-led do not easily lend themselves to accurate measurement, at least using existing current methodologies (e.g. transportation, energy efficiency in buildings).

The analysis presented in this paper thus centres around the question of how urban-scale actors might be better able to exploit the potential of carbon markets to contribute to urban mitigation than what is currently suggested by the relatively low levels of urban project activity.

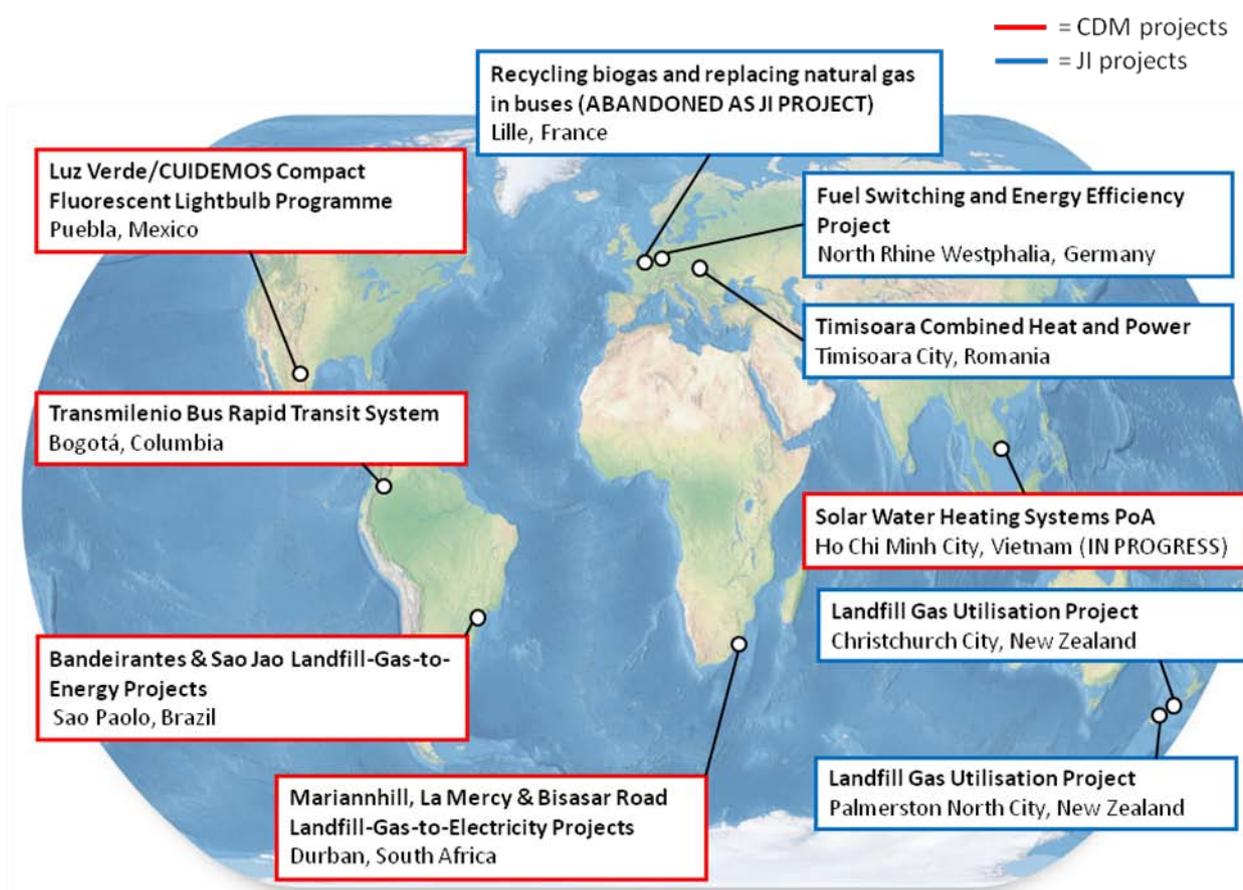
Aim of the paper

The aim of the paper is to develop a better understanding of the factors that currently drive success in the access of urban mitigation projects to carbon offset markets. The paper explores why there are limited volumes of urban-led project offsets and also takes a brief look at how lessons from the past may inform decisions in future about how to reform offset mechanisms in the compliance carbon market. It identifies and reviews a number of urban projects proposed and operating within the realm of Joint Implementation (JI) and the Clean Development Mechanism (CDM) of the Kyoto Protocol to the UN Framework Convention on Climate Change (UNFCCC). It examines the drivers of success for projects, examining in particular: types of projects that have been successful and their profitability; leadership and other roles of various actors in project initiation development and operation (i.e. local, regional and national governments as well as international, private sector or other non-governmental organisations); the role of local co-benefits; and project financial structure and risk management approaches. Drawing lessons for the future

from this experience, the paper seeks to identify institutional models and actions that can help cities to successfully access carbon markets.

The analysis is based on an in-depth review of empirical evidence, examining 10 offset projects (5 CDM and 5 JI) as case studies from around the world where local authorities are benefiting from carbon market financing to support investment in urban greenhouse gas abatement projects (see Figure ES-2). The case studies were selected to represent the geographic and project type diversity that exists across urban projects, and to provide interesting examples of the role of urban authorities in project development and implementation. The selected projects directly involved local authorities (city or regional) as project instigators or hosts. The analysis draws on qualitative research methods and information gathered through semi-structured interviews carried out with approximately 30 people (from project developers and operators including city governments, national governments, firms, and consultants), from primary source documents and from other literature on cities and markets.

Figure ES-2. Project case studies by region



Source: Image Natural Earth II from Tom Patterson, US National Park Service, derived from Natural Earth (www.shadedrelief.com)

Lessons from case studies

Comparative analysis of the case studies suggests there are a number of common barriers and features of project risk that tend to limit the access to carbon markets by urban projects. Since the rules and legislative frameworks that create and regulate carbon markets have not been designed with urban mitigation projects in mind, various legal, technical and financial barriers to offset markets often appear to

be insurmountable for urban projects. Challenges include potential overlapping jurisdiction of GHG-emitting sources, the lack of knowledge about carbon market possibilities among urban governments or local stakeholders to identify viable project options (and assess the costs and benefits); the lack of specific capacity to develop, monitor and bring projects to approval (i.e. particularly given quantification difficulties of typical urban projects such as transportation); high transaction costs due to long time frames, administratively complex procedures, and the typically smaller scale of urban projects; financial barriers in the context of city budget constraints due in part to high start up costs and risk of project failure; the risk of projects underperforming in terms of carbon reductions verified and credits ultimately delivered; and a political context that can discourage carbon market projects. While many of these same challenges are faced by non-urban projects, they are often exacerbated for cities, particularly given the limited financial resources and working knowledge of carbon markets within city authorities.

Table ES-1 highlights key features of the cases examined, demonstrating that there is no dominant institutional model. While political leadership is common from a key actor to champion an urban project throughout the development and approval phases, the source of that leadership varies. Although local authorities were typically instrumental in the initial decision to exploit carbon market financing, the ongoing leadership for these projects has only occasionally come from individuals or organisations within the urban government itself. Rather, this often comes from other governmental partners, international institutions or the private sector, which in turn have been instrumental to overcome financial or technical barriers in early phases of the project development.

The case studies examined highlighted that while carbon credits can be a genuinely important source of finance for urban projects, they are not necessarily a magic bullet solution to project finance. In other words, the existence of carbon credits may not change the principle design of a pre-existing urban project, but can provide a supplementary revenue stream. Contrary to what is sometimes understood, the Kyoto carbon markets are not designed to pay for the entire cost of a new investment project that reduces emissions. Rather, they operate on the principle that carbon credits can be used by project developers to cover the surplus cost of opting for a more carbon-friendly technology as part of an existing installation or a planned investment. Over the 10 case studies, this expected carbon revenue stream varied widely from 50% to less than 15% of overall project costs. Given the supplementary nature of carbon credit revenue, additional funding is typically needed in the form of revenues from new services, or additional public or private investment.

The case studies also revealed large differences between the amount of expected carbon credits and the amount of issued credits: some projects received less than half of expected credits. Although this may be quite technology specific, this trend highlights the ongoing risks involved in relying on carbon financing. Such risks are particularly important for local authorities who may struggle to manage them through a diversification of revenue streams. Moreover, since carbon revenues arrive after the project is operational and has begun reducing emissions, other means must be found to meet the start up costs of a project. However, even if relatively small within a project finance package, carbon finance can leverage additional private financing. Finally, our case studies highlight that there is no unique financing model for projects: the levels of private financing vary significantly, and the carbon finance aspect can be managed in a variety of ways, from easier to more complex approaches involving credit prepayments, auctions, or other options.

Table ES-1. Project overview

Project type, name, & location	Role of urban authority	Role of national or regional government	Private sector role or credit purchasing role	Other international partner role	Co-benefits	Carbon Finance ^a
Waste – Methane Capture to Energy						
Landfill Gas to Energy, Bandeirantes and São Joao; CDM; São Paulo, Brazil	Pro-active in project development; have rights to ½ of credits generated and sold them by auctioning	Limited role, acted as DNA	Joint venture -- “Biogas” -- created between 3 private companies with concession contract with city government for the methane.	KFW, Germany is purchaser of ½ of credits sold by Biogas	Job creation, odour reduction, improved safety, revenue raising for local amenities (e.g. green space)	High actual carbon revenues = ~ 100% of capital costs ^b
Landfill Gas to Electricity Projects, Mariannhill, La Mercy and Bisasar Road; CDM; Durban, South Africa	Municipality signed MoU with WB PCF; Provided technical oversight and operation of projects	Provided funding for upfront costs	Credits from Bisasar Road bought by Trading Emissions Plc	WB PCF – initiated PDD in return for credit purchase, developed methodology; AFD French development bank provided loan for upfront costs	Landfill odour management, displaces coal-fired electricity thereby improving air quality, job creation	Medium - high projected carbon revenues = ~50% of total costs ^c
Landfill Gas Utilisation Project; JI; Christchurch City, New Zealand	Proactive in project identification and development.	Sponsored national programme to identify and develop projects (Track I)	A variety of private consultancies, provided important expertise, local broker helped with transactions. Buyer was hands-off investor for EU ETS obligations. No upfront purchase of credits by buyer.	<i>(no significant role)</i>	Energy savings, odour reduction, additional revenues used to achieve additional reductions	High projected carbon revenues = ~70% of capital costs ^d
Landfill Gas Utilisation Project; JI; Palmerston North City, New Zealand	Proactive in project identification and development.	Sponsored national programme to identify and develop projects (Track I)	A variety of private consultancies, provided important expertise, local broker helped find buyer, an institutional investor on behalf of Austrian Gov't. Some upfront purchase of credits by buyer.	Buyer was Austrian national government for Kyoto compliance.	Energy savings, additional revenues used to achieve additional reductions	Medium - high projected carbon revenues = >50% of capital costs ^e
Building Energy Production & Use, Including Energy Efficiency						
Solar Water Heating Systems Programme of Activities; CDM; Ho Chi Minh City, Vietnam	Established Energy Conservation Centre and provided funding	Vietnam Ministry of Industry and Trade provided funding for Energy Conservation Centre	MUMSS (Japanese investment bank) conducted feasibility study and collected data	Japan Ministry of Environment provided grant to MUMSS to collect data for PDD	Energy security	Medium projected carbon revenues = ~18-30% of capital costs ^c
Luz Verde/CUIDEMOS Mexico Programme of Activities for compact fluorescent lightbulbs; CDM; Puebla, Mexico	Project host	Co-sponsored project development through a grant	Private sector partner initiated project – partnered with national gov't; Local distribution facilities and awareness campaign sponsored by private sector	Eneco in Netherlands is credit purchaser; ING provided debt financing; Philips provided a grant for the light bulb supply	Poverty alleviation, reduced electricity subsidy payments by national government	High projected carbon revenues = ~100% of operating costs ^f

Project type, name, & location	Role of urban authority	Role of national or regional government	Private sector role or credit purchasing role	Other international partner role	Co-benefits	Carbon Finance ^a
NRW Programme of Activities for fuel switching and energy efficiency of boilers and heat productions; JI ; North Rhine Westphalia, Germany	Project host	Regional agency managed the entire project, including carbon aspect. Regional Gov't supported and financed project development phase. National Gov't verified methodology, as JI track 1	Private consultant developed methodology, Private and public sectors purchase credits	Rhonalpernergie-environnement as foreign partner, helps to obtain the LoA	Energy savings, reduced regional subsidy	Low - medium projected carbon revenues = ~5-20% of total costs
Combined Heat and Power Project; JI ; Timisoara, Romania	Guaranteed debt issuance of subsidiary to finance upfront project costs.	National government verified methodology, as JI track 1. Formed part of a Gov't scheme to launch domestic JI projects.	Some private expertise provided by domestic carbon market consultancy. But limited private sector involvement aside from some indirect debt financing	Swedish Energy Agency was the credit buyer. Found project through a call for tender process in the Baltic and Eastern European region as part of an existing Government policy to invest in region's energy sector.		Medium projected carbon revenues = ~15-20% of total costs ^d
Transport						
Transmilenio, Bus Rapid Transit; CDM; Bogota, Colombia	Mayors championed project, , provided funding for infrastructure	Financed project construction; promoted BRT systems elsewhere	Public private partnership -- Transmilenio S.A. -- formed between City Hall and private actors; also CAF – regional bank and credit buyer intermediary - financed project development	Netherlands VROM, ultimate credit purchaser	Public transport reliability and access; reduced air pollution; improved traffic congestion	Low projected carbon revenues = ~1-2% of operating costs ^c
Bus network fuel switching project from waste management; JI ; Lille metropolitan area, France	Local government championed the entire project, defined methodology	Help in methodology, and definition of additionality, as JI Track 1	Caisse des Depôts (French bank) forsees to purchase carbon credits, and acts as administrative and financial intermediary	Foreign partner for LoA	Reduced air pollution, fuel savings	Low projected carbon revenues = ~13% of capital costs

^a Depending on data availability, carbon revenues are indicated as part of the total cost or the capital cost (and rarely the operating cost). This refers to projected carbon revenue (with the exception of São Paulo); however, issued credits are often less than projected (See Annex 2).

^b Received CER auction proceeds for two years (2007-2008) for both landfills.

^c Projected 7 year CER stream valued at 10€/tonne.

^d Projected 5 year ERU stream valued at 5€/tonne.

^e Own estimates, calculated based on the conservative assumption that ERUs were sold for at least 10 NZDs each. We also use the reported figures of 5-15% simple return on capital, and assuming that this return is shared between energy sold to grid (190 000 €) and energy savings (370 000 €) and carbon credits sales (680 000 €). The latter two figures are reported on the council's website: <http://www.palmerstonnorth.com/YourCouncil/NewsAndViews/MediaReleases/Detail.aspx?id=13254>

^f Projected 1 year CER stream valued at 10€/tonne.

In most cases, project “co-benefits” played a pivotal role in the motivation to pursue and in the design of projects. This is a key difference between projects involving an urban authority and purely private sector projects, where often the co-benefits get no more than lip service. Cases showed that the motivations for engagement by city authorities are not purely related to climate policy but stem from the multiple co-benefits in other non-climate areas of policymaking. For instance, in New Zealand, Christchurch’s Landfill Gas Utilisation project began with local resident complaints about escaping odours and the desire to reduce energy costs. In one case (São Paulo) the financial benefits of the project are high, covering 100% of capital costs, and the city is also using a share of project revenues to invest in local amenities, notably green spaces in the area to improve local living conditions. Co-benefits can make carbon market projects more attractive at the city level. The way carbon market projects and finance are integrated with, and assist to achieve, existing policy priorities (e.g. energy poverty reduction, energy security) is key to the success of the project.

The analysis shows that successful projects demonstrate a pattern of institutional features or drivers that go beyond project profitability. These include: the demonstration of political will and strong multilevel governance; private sector engagement to bear risk and provide financial and technical support; and presence of tangible local co-benefits (waste management, odour reduction, energy reduction consumption, etc.) (see Table ES-2). These inter-related drivers have combined in unique ways for every project, however in all cases each of these clusters of drivers were present and contributed to the success of the project, and they sometimes highlight key differences between the way public and private actors weigh investment decisions.

Table ES-2. Motivating Factors - Drivers of Urban Project Success

Project Element	Conditions for Carbon Market Access & for Project Success
Project profitability and type/suitability	<ul style="list-style-type: none"> ✓ Suitable project types for city authorities ✓ Use of existing or simple methodologies/technologies ✓ Projected profitability
Co-benefits	<ul style="list-style-type: none"> ✓ Existence of high local co-benefits
Private sector engagement	<ul style="list-style-type: none"> ✓ Risk management through private sector engagement e.g. for technical expertise and financial risk management
Political will and strong multi-level governance	<ul style="list-style-type: none"> ✓ Local political support ✓ Alignment with national climate strategy ✓ Support from national or regional government for methodology and project development ✓ Engagement of international partners

Looking forward: supporting low carbon urban development through carbon markets

The review shows that the carbon market in its present form is cumbersome and infrequently used as a means to support low-carbon urban development. Carbon markets are not currently an important source of finance for urban projects when looking across the pool of offset projects to date. In almost all cases, urban projects have overcome numerous barriers to market access through recourse to higher levels of government, international institutions and private sector partners who can offer both the technical know-how and the financial support that they lack themselves.

Looking forward the challenge is how to best tap the potential for carbon markets to offer increased levels of financial support for urban mitigation projects or programmes. What kind of targeted market reforms could address the two-fold problem of low volume (and size) of urban projects and the slow pace of project development and approval? Suggestions for possible solutions include: developing methodologies for urban programmatic or sectoral projects to boost the volume of urban emissions, and simplifying the project development phase to accelerate the pace of project development and approval and reduce transaction costs. A decision by the representatives of the Parties to the Kyoto Protocol could help to guide the Executive Board of the CDM to develop methodologies and guidelines applicable for urban level projects, and the Joint Implementation Supervisory Committee to develop criteria of eligibility for “Track 2” urban projects. For “Track 1” countries (which have the right to oversee the monitoring, verification and issuance of credits for projects in their country), possibilities are theoretically greater as each national government is responsible for its own JI rules although it is not used in practise – mainly because of a lack of knowledge – and typically Track 1 projects tend to follow Track 2 like procedures. However, as pointed out in earlier analysis, the CDM market tends to support larger, low-cost, low-risk projects, which is not in favour of urban projects.

Beyond existing market mechanisms, other avenues that could be explored for urban mitigation projects are domestic offset mechanisms and possibly participation in national cap and trade systems. These are already viable options in the case where national governments have taken on a national cap as they do not require changes in international market rules. Examples of existing or proposed systems include: in New Zealand, Germany, France and most new EU Member States, where the domestic offset option is technically already in place using the JI architecture; and in the US, where the idea of regional or federal domestic offset projects has been proposed. Domestic offset projects are interesting mechanisms as they offer the possibility of scale on a national level, whereas city-wide trading schemes, such as the Tokyo cap-and-trade programme, are more limited in scale by definition and context specific.

Over the longer term, it will be important to consider how to mainstream urban low carbon development and move towards large scale private investment in these options. Experience from CDM and JI urban offset projects provides valuable information and opportunities for learning about the costs, technical and financial aspects of mitigation and should help to limit future project risk associated with mitigation technologies and practices. Carbon market rules should be designed to encourage such projects to be taken up in the market on their own.

National governments and international organisations will need to act to create urban-friendly carbon markets. First steps could include: subsidising the development of relevant urban methodologies for key sectors at urban scale; working through national governments to simplify and reduce costs of the project approval and verification procedures for urban projects; and advancing internationally harmonised accounting methods and reporting guidelines for urban emissions to help cities identify potential target areas for mitigation projects and provide a consistent accounting framework to integrate with national policy frameworks. National governments are also well placed to support capacity building of urban actors and institutions and to align policies and incentives to support action at the urban scale.