

The little book of City Climate Finance

A simple guide to financing climate mitigation and
adaptation for Chinese stakeholders at the
city/regional level

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Prelude: Role of Cities and City Climate Finance¹

Cities have a crucial role to play in achieving the goals of the Paris Agreement. 75% of global GHG emissions occur in urban areas, mostly in the buildings and transport sector (UN environment programme, 2022). Urban emissions are increasing. According to the latest available numbers, global urban GHG emissions per capita rose by around 12%, reaching 6.2 tCO₂ per person in 2015 (up from 5.5 tCO₂ in 2000) (IPCC, 2022).

Demographic pressure means that urban emissions are likely to further rise. The world population is expected to increase to just below 10 billion by mid-century (UN DESA, 2022). 58% of which are projected to live in cities (UN-Habitat, 2022). Cities face significant expenditures to meet the basic needs and services for their growing populations, including infrastructure, transport, buildings and waste management.

In 2021, 80% of cities experienced some form of climate hazard, with excessive heat, rainfall, drought and flooding being most often mentioned (World Economic Forum, 2022). It is therefore important that cities become more resilient to better manage the effects of climate change and avoid (future) human and monetary losses. At the same time, it is also important to reduce urban emissions to ensure liveable and sustainable cities and not offset any development gains made, including by climate-proofing all new investments.

Debt levels have reached unsustainable levels in many cities, not least due to COVID-19 recovery efforts and an on-going cost-of-living crisis. This situation risks delaying much needed climate efforts and locking-in continued GHG emissions and other pollutants, ultimately increasing climate vulnerability and further increasing costs.

Many cities in developing countries have limited fiscal autonomy power. In developing countries, most local governments do not collect or collect only very limited taxes and revenue from service charges which are the major source of funding for cities in developed countries. Most cities in developing countries depend on national government transfers as well as limited revenue from property and service charges (UN-HABITAT, 2015).

Intergovernmental transfers, grants and concessional finance provided by public funders are nowhere near enough to meet the investment gap. It is therefore critical to mobilise more private finance. In theory, potential funding is abundant. However, the risk-return profile of many projects is often not attractive enough for private investors. Not all cities are allowed to borrow on international markets and not all cities are equipped to do so. For example, only 21% of the 500 largest cities (4% of which are in low-income countries) worldwide access investment grade credit rating and therefore only a minority has access to global capital markets (World Bank, 2022a).

This guidance provides an overview of what climate change means for municipal governments, what sources of funding are available, and how they can best be leveraged and for which purposes. The guidance provides

¹ This report is one of the knowledge products under the project Sino-German Cooperation on Climate Change – NDC Implementation (NDCI), which is a bilateral project of the International Climate Initiative (IKI) commissioned by the German Federal Ministry for Economic Affairs and Climate Action (BMWK) in coordination with the Ministry of Ecology and Environment of the People's Republic of China (MEE). The project is based on the continuous cooperation of the German and Chinese governments in the field of climate change. As part of the Sino-German cooperation, this project contributes to the implementation of ambitious Chinese climate policies within the 14th Five-Year Plan. In particular, the project supports the development of knowledge, resources and capacities within the national government as well as within the administrations of selected provinces. Key issues include the national coordination of climate policies and climate legislation. In addition, the project cooperates with provinces and cities on mitigating greenhouse gases, adapting to climate change and developing climate finance capacities for selected local climate finance pilots in China. The cooperation also includes mitigation in industrial sectors.

good practice examples from cities all around the world, but with a focus on Europe, and which might be relevant for Chinese policymakers.

It is important to bear in mind that each city is unique and that any strategy for leveraging funding for climate action has to carefully take into account these unique characteristics and wider policy framework in which the city operates.

Chapter 1: Context and Fundamentals of Climate Finance for Cities

1.1 Challenges facing cities, making municipal investments climate proof

In 2020, 56% of the world's inhabitants lived in an urban setting. This figure rises to over 80% in Latin America, the Caribbean and North America, and has seen a significantly increase in all regions in the world over the last decades (World Economic Forum, 2020). Urbanisation trends are likely to continue at a rapid pace, although not at the speed we have seen in the past. As a result, significant investments in urban infrastructure and basic services such as health care and education will be needed.

This comes at a time of high debt levels in many cities, not at least due to post-COVID 19 recovery efforts and soaring energy prices (Xie *et al.*, 2023). Climate change is further compounding this challenge. Most cities are highly exposed to climate hazards. In 2021, 80% of cities surveyed by the disclosure body CDP experienced some form of climate hazard, with excessive heat, rainfall, drought and flooding being most often mentioned (World Economic Forum, 2022).

Trillions will be required annually by 2050 to address climate risks for urban infrastructure. Urban infrastructure investment needs have been estimated at USD 4.5 – 5.4 trillion per annum from 2015-2030 with a portion of this (10-25%) related to additional investment costs or incremental costs to ensure infrastructure is low emission and climate resilient (Cities Climate Finance Leadership Alliance, 2015; World Bank, 2022a). Specifically on adaptation, cities need significant capital, with the World Bank estimating that between USD 11-20 billion will be required annually by 2050 to address climate risks for urban infrastructure (Cities Climate Finance Leadership Alliance, Atlantic Council, *et al.*, 2021).

Cities are also significant contributors to climate change, with 75% of global GHG emissions emanating from cities. To meet the Paris Agreement goals and mitigate the socioeconomic impacts from climate change hazards, significant investments in mitigation and adaptation efforts, on top of what is required based on current urbanisation trends, will be needed (UN environment programme, 2022).

Strategies to achieve this will depend on a city's size, urbanisation level, location and development level, among others. For example, cities with lots of existing capital stock can reduce GHG emissions in their buildings sector by retrofitting their building stock. Transport emissions can be reduced by promoting non-motorised, public transport, and electric vehicle charging. Cities that are now expanding face significant infrastructure expansion challenges and thus can avoid future GHG emissions through energy efficient and climate proof infrastructure (IPCC, 2022).

More generally, the latest IPCC research (2022) points to the following three mitigation strategies as the most effective to reduce GHG emissions, especially when implemented in parallel: i) reducing or changing energy and material use towards more sustainable production and consumption; ii) electrification in combination with switching to renewable energy sources; and iii) enhancing carbon uptake and storage in the urban environment, for example through bio-based building materials, permeable surfaces, green roofs, trees, green spaces, rivers, ponds and lakes.

For cities to implement such strategies, finance is key. A city's ability to finance is heavily influenced by a number of factors, including institutional set up, budgetary and fiscal power, access to finance and technological resources (IPCC, 2022). For example, the governance and budgetary powers determine what a city can do with regard to planning, regulation and finance. The institutional set up and closely related (human/monetary) resources and skills influence a city's ability to invest in planning and financing

expenditures and mobilising climate finance. These variables also strongly influence city climate finance outcomes (Cities Climate Finance Leadership Alliance and The World Bank, 2021a). In addition, more general enabling conditions, such as a conducive policy environment, also play a crucial role in determining whether and where climate investment can be mobilised in urban areas, irrespective of the source of financing.

It is therefore critical to understand the unique characteristics of each city as well as their finance needs to identify and tailor the best fitting climate finance approach at the scale and speed required (Cities Climate Finance Leadership Alliance and The World Bank, 2021a).

Many cities, in particular in developing countries, have limited to no taxation powers and very limited own resources. Studies suggest that only 16% of countries allow their cities any taxation power (World Bank, 2012; NCE, 2019). Their success in mitigating and adapting to climate change will thus depend on their capacity to raise other public or private climate finance. However, 56% of countries also forbid any kind of borrowing by local governments (World Bank, 2012; NCE, 2019). Accountability and creditworthiness are another challenge, even if borrowing is permitted. Only 21% of the 500 largest cities (4% of which are in low-income countries) worldwide access investment grade credit rating and therefore only a minority has access to capital markets (World Bank, 2022a)². Bonds and other financial instruments are therefore very challenging (World Bank Group, 2019).

At the same time, there is no lack of potential funding per se. Well over USD 100 trillion from public and private sources is potentially available. A major impediment to meeting the investment gap for low-carbon projects within cities is the unattractive risk-return profile of the many investment opportunities and therefore lack of bankable projects. For example, many low-carbon opportunities in cities do not offer clear payback models, while also not offering attractive returns (World Bank Group, 2019). To close the investment gap, it will therefore be key to identify suitable and innovative financing instruments and sources which can help de-risk low-carbon investment opportunities and work on the wider enabling policy framework in which cities are placed.

1.2 Landscape of climate finance

Climate finance can be loosely defined as local, national or transnational financing provided to support mitigation and adaptation efforts in line with global climate objectives. It can be publicly or privately sourced (UNFCCC, 2022). Climate finance support is needed because climate investment needs far outweigh investment capacities, especially in the developing world.

In cities, climate finance flows primarily to the transport, buildings and energy sectors. Overall, cities receive and spend less than 10% of what is needed to meet the international climate objectives. According to the Climate Policy Initiative (CPI), climate finance flows in the transport and buildings sectors reached an estimated USD 384 billion annually on average in 2017/2018 (Figure 1) (Climate Policy Initiative, 2021). This compares to an estimated investment need of at least USD 4.5 trillion (Cities Climate Finance Leadership Alliance, 2015).

Tracked investments are primarily drawn from private sources and mostly come as capital expenditure, with project-level investments playing a much smaller role (Figure 1) (Climate Policy Initiative, 2021).

² Creditworthiness which is used by international capital providers to assess and price in risks, is determined largely by a city's own revenue as well as stability, predictability and unconditionality of intergovernmental grants (UN-HABITAT, 2015).

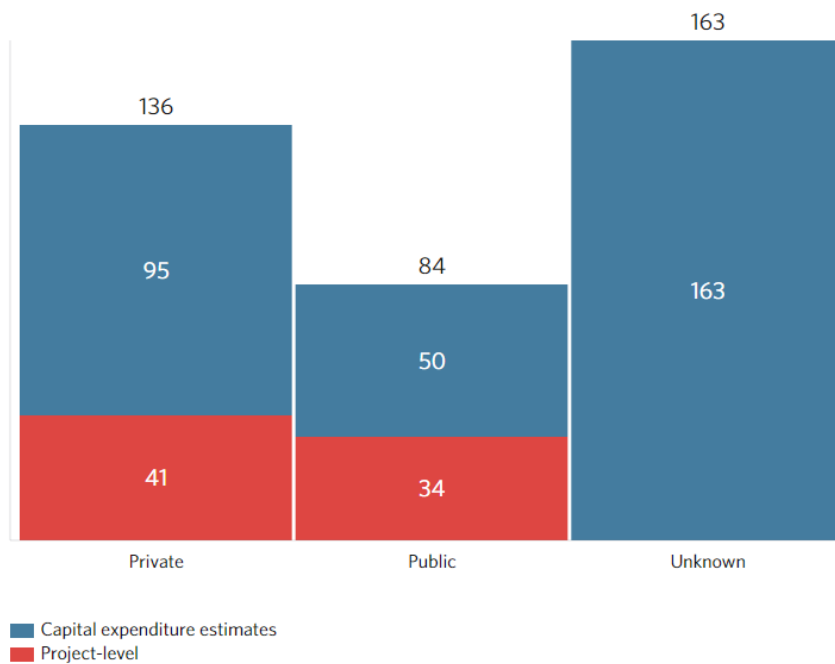


Figure 1 Urban climate flows by financing institution statuses, annual average 2017-18 (USD billion) (Climate Policy Initiative, 2021)

Almost the entirety of tracked investment flows is for mitigation and mixed mitigation-adaptation purposes (Figure 2). The majority of tracked climate finance in cities is currently provided by private households. The largest single provider is national governments. More generally, public sources play a bigger role in developing countries cities than in developed one. Nevertheless, as cities face difficulties financing mitigation and adaptation objectives by themselves and public funds are generally scarce, it is important that cities also have improved access to private sources of climate finance to meet their investment needs.

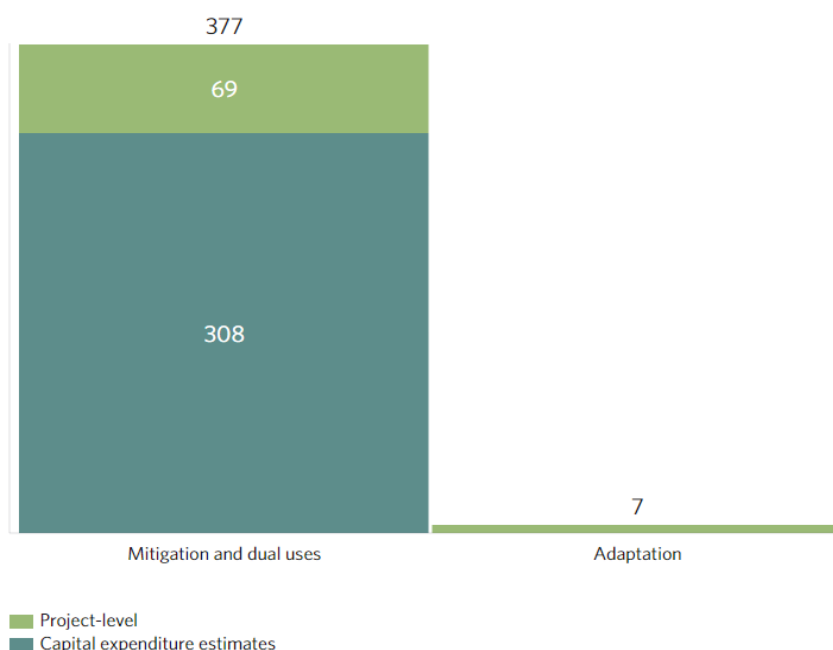


Figure 2 Urban climate finance by uses, 2017-18 (USD billion) (Climate Policy Initiative, 2021).

A number of financial instruments can be used to finance mitigation and adaptation efforts in cities (see Table 1 for an overview of commonly used instruments). Their availability and potential usage will depend on the unique characteristics of cities and their financing needs and priorities. Instruments may also be used in different combinations. For example, a city may use a combination of grants and its own balance sheet to fund the installation of solar panels on municipal buildings, while also leveraging tax incentives and external/ market-rate loans to lower the overall costs of the project.

Table 1: Types of climate finance (instruments)

| Type of instrument | Explanation |
|---|--|
| Grants | Financing provided without repayment by the recipient. Provided mainly by governments and (multilateral/ national) development banks. Cities often use grants for planning and feasibility studies, or capacity building, but grants can also be used to finance specific climate projects. |
| Concessional loans | Below market-rate loans, with longer repayment periods and more flexible terms than market-rate loans. Provided mainly by governments and (national/ multilateral) development banks. Can be used to fund climate projects directly, but also for de-risking of projects or capacity building for example. |
| Market-rate loans | Loans issued at the prevailing interest rates determined by the market. Typically offered by banks and other financial institutions to counterparties that meet the lender’s creditworthiness standards. |
| Balance sheet financing (equity/ debt) | Use of own balance sheet (rather than external funding sources) to fund investments/ projects. While balance sheet financing is mostly used by corporates, cities may use their own balance sheet to fund climate action and/ or cooperate with private sector corporates to fund investment projects. |
| (Municipal) Green bonds | Debt instrument where the use of proceeds is earmarked for green purposes. |
| Sustainability linked bond | Debt instrument whose coupon is linked to the issuer’s sustainability performance. |
| Pooled municipal bonds | Debt instrument to allow a group of cities access the international debt market where otherwise they might not have been able to due to costs (bond issuance, legal) and lack of credit rating. |
| Land value capture | Instrument to recover a portion of the increase in land and property values that result from public investments. Can take various forms, such as land value taxes, impact fees and charges on building rights, among others. |
| Revolving fund | Fund set up for specified purposes with the concept that repayments to the fund may be used again for these purposes. Revolving funds may provide cities with a flexible and self-sustaining financing mechanism to support their climate action |

plans and projects, while also generating economic and environmental benefits for their communities.

Sources: (IFC, 2018; Climate Policy Initiative, 2021)

Chapter 2: A City-Centered Approach

2.1: Lens of risks

Climate change can impact cities in multiply ways. Physical risk is the risk caused by the immediate and direct impacts of climate change, such as increased flooding and increased frequency of storms which can wreak havoc in cities and result in damage to critical infrastructure, for example. Heatwaves can increase the risk of heat-related illnesses and mortality, particularly among vulnerable populations such as the elderly and low-income communities (Figure 3). It is important that cities identify physical climate risks early on and act upon them. To do so, cities can use urban risk assessments which can help them identify the nature and extent of the risk, including assets most exposed, likelihood of hazard and potential damage. These should be supplemented by vulnerability assessments that also identify specific vulnerabilities, for example specific populations and assets as well as adaptive capacities. Many assessment tools also combine both a risk and vulnerability assessment (Climate ADAPT, 2023).

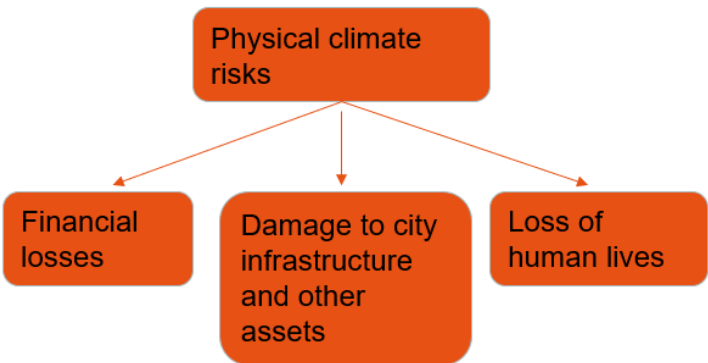


Figure 3 Physical climate risks and implications for cities

Transition risks describe risks stemming from the socio-economic transition to a low-carbon economy, i.e., changes in policy, technology and market demand. In cities, these risks can lead to changes in the city’s revenue, for example through changes or a decrease in municipal taxes, re-evaluation of assets such as fossil fuel plants or land valuations, and increased costs to adapt to technological changes (Figure 4) (CDP, 2022). An example of transition risk for cities is the shift away from fossil fuels towards clean energy sources, which can have economic and financial implications for cities that rely on the fossil fuel industry. As countries and companies around the world begin to transition to a low-carbon economy, demand for fossil fuels may decline, and cities that are heavily dependent on fossil fuel extraction and production could experience a significant reduction in revenue and job losses. This can lead to economic instability and social disruption in these cities.

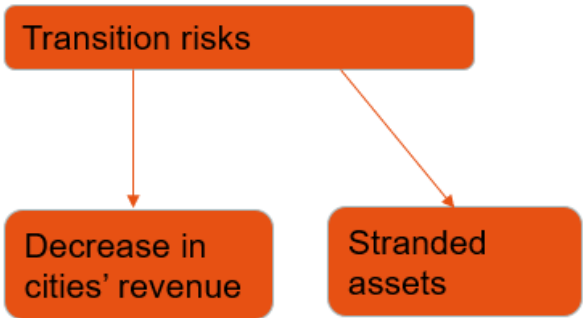


Figure 4 Climate transition risks and implications for cities

Three major resources for cities to consult are the World Bank's Understanding Disaster and Climate Risk in Cities³, the Climate ADAPT's Urban Adaptation Support Tool⁴ and C40's Climate Change Risk Assessment Guidance and Screening Template⁵.

The risk assessments should cover information on the type of risk, the sectors most exposed, the (expected) (socio)economic impact, the magnitude of impact, timescale and level of confidence (Climate ADAPT, 2023).

Both risk assessments provide the basis for the identification of investment needs and should be integrated into a city's strategic and budgetary planning.

2.2: Lens of opportunities

A multitude of studies demonstrate that there are attractive climate-related investment opportunities in cities. For example, for cities in emerging markets, the International Finance Corporation (IFC) estimates an investment opportunity of USD 2.5 trillion annually through 2030, with investment opportunities mainly concentrated in the waste, water, energy, transport and buildings sectors (IFC, 2018). Using technically feasible, widely available measures, GHG emissions in cities could be reduced by 90% by mid-century, thereby creating close to 90 million jobs in 2030 (Coalition for Urban Transitions, 2019). Wider opportunities and benefits of climate action in cities include cleaner air, green job creation, public health benefits, and biodiversity improvement through expansion of green space.

Cities have multiple avenues to take advantage of those opportunities. In their role as providers of services, many cities can influence procurement and consumption decisions. For example, cities can adopt green procurement standards. This also has a market signalling effect beyond the administrative boundaries of a city, showing there is demand for electric vehicles, green building, low-carbon equipment etc. Increased demand and public incentives in turn increase investor interest and confidence. Cities can also green their service provision, for example for district heating, public transport or electricity generation (Cities Climate Finance Leadership Alliance and The World Bank, 2021b). Helsinki, for example, which is aspiring to become climate-neutral by 2030, is planning to use cold seawater to help decarbonise its district heating and is partnering with the city's utility and two infrastructure companies to realise the project (Bloomberg, 2022).

In their role as stewards, many cities can develop and enforce standards and regulations. They can thereby ensure that private development and investment align with the city's climate objectives. For example, the city of London requires all new homes to be zero-carbon, thereby going beyond the national government requirements. If project developers do not meet the policy objective, they have to provide a compensation into a locally managed fund which finances low-carbon projects in the city (Realdania *et al.*, 2019). In addition, through their convening and systems-level planning, cities can come together to share knowledge, raise awareness and advocate for more ambitious climate actions across sectors and at higher level of government (Cities Climate Finance Leadership Alliance and The World Bank, 2021b).

³ Urban Risk Assessments: Understanding Disaster and Climate Risk in Cities (worldbank.org)

⁴ Urban AST step 0-0 — English (europa.eu)

⁵ Climate Change Risk Assessment Guidance and Screening Template (c40knowledgehub.org)

Chapter 3: City climate finance roadmap

3.1 Drafting a city climate finance roadmap

To develop a climate finance roadmap, cities need to first come up with a city climate action plan. A robust city climate action plan in turn requires cities to conduct an inventory of urban emission and carry out an urban risk and vulnerability assessment (see Figure 5). Robust climate action plans ideally also include sectoral assessments and can serve to identify climate investment themes, needs and opportunities, both in the short/ medium and long term. There is ample guidance available to develop such an action plan.⁶



Figure 5 Development process of a city climate finance roadmap

A number of key elements should be included or taken into account when drafting a climate finance roadmap (Figure 6). First, cities need to identify their long-term climate goals (and intermediate goals), ideally based on their climate action plan, and a long-term investment plan to reach those goals. To ease access to (international) climate finance later on, it may be helpful for cities to take into account their national government's investment needs and priorities in the context of the Nationally Determined Contribution (NDC) and/ or National Adaptation Plan (NAP). (International) climate finance may be available to support implementation of NDCs and/ or NAPs. Therefore, the early alignment of climate action plans with national climate goals can help cities attract climate finance later on (UNFCCC SCF, 2019).

Second, the city needs to develop, and include a pipeline of bankable projects in their climate finance roadmap. This means that cities should include a description and evaluation of each project, including expected climate and development impacts. It is also important to include expected capital expenditure (CAPEX) and operational expenditure (OPEX) wherever that information is available, and include associated financial benefits for investment priorities, for example return on investment (IRR), net present value (NPV) as well as monetised climate co-benefits, for example avoided health costs and loss of income to increase transparency and investor trust (C40 Cities Climate Leadership Group and C40 Knowledge Hub, 2023). It may also be helpful if municipal governments identified if and how projects align with leading taxonomies, such as the EU or the EU-China Common Ground Taxonomy (see section 3.2 on investment themes) which can help mobilise (private) finance.

Included projects should be aligned with the city's investment priorities and long-term climate goals. There is a wide range of international support available to identify investment priorities, help develop a project pipeline and project preparation (see box 1). Involving stakeholders early on in the project development and prioritisation is equally important to ensure projects meet the needs of local communities.

Third, the finance roadmap should clearly identify (additional) finance needs and for which projects, and potential sources of funding, including the city's own (and projected) resources. For a successful implementation of the roadmap, it may be helpful to align the roadmap with the city's budget cycle. One way to do this, while also incentivising mainstreaming of climate change planning is to introduce a climate/ green budget approach. A participatory green budget such as in the case of Lisbon, can help earmark a city's own

⁶ For example, [JRC Publications Repository - Guidebook 'How to develop a Sustainable Energy and Climate Action Plan \(SECAP\)'](#) ([europa.eu](#)), [Guided Learning \(c40knowledgehub.org\)](#)

annual funds for climate related purposes while additionally achieving buy-in for climate related projects (see box 2). In addition, it can help track climate related expenditures and revenue (see box 3, chapter 3.2).

Regular exchange with a wide range of stakeholders, including the private sector, can help create trust and reduce (perceived) project risks later on. For example, the EBRD's Green Cities Programme supports cities understand investment needs and priorities and involves a range of key stakeholders in this process, which in turn helps the Bank finance cities' climate projects later on and also secure co-financing by the GCF (also see Chapter 4) (UNFCCC SCF, 2019).

It is important to monitor and evaluate the implementation of the roadmap regularly. To do so, it may be helpful to identify KPIs or other metrics early on. These KPIs should be specific, measurable, and linked to the city's goals and objectives. This could include GHG emissions reductions, number of adaptation projects implemented, amount of climate finance mobilised or achievement of climate co-benefits. The roadmap should be regularly adjusted, depending on the assessment.

Figure 6 Key elements of a city climate finance roadmap

There are a number of common challenges when drafting (and implementing) a city climate finance roadmap and attract additional finance include (Cities Climate Finance Leadership Alliance and The World Bank, 2021b). These include:

- Lack of capacity and resources
- No pipeline of investor-ready bankable project
- Project proposals, when available, often lack evidence of financial viability and sustainability
- Private funders are not (sufficiently) aware of opportunities and/or their products are not tailored to the needs of cities

To address these challenges, it may be helpful to create or designate a climate finance team in charge of developing and implementing the roadmap. Representatives from different sectors, including from the municipal government, private sector, civil society and scientific experts should ideally be part of this team. It is also important that this team has the buy-in from the highest level of government within the city. Available

international technical assistance and/or advisory services (see box 1) should be approached early on to help with pipeline development and project preparation.

Box 1: International technical assistance/ advisory resources

Cities Climate Finance Gap Fund – World Bank / EIB / GIZ

The Gap Funds supports early-stage climate planning and project preparation for cities in developing countries. In particular, the Fund supports city climate strategy developing, provides capacity building, helps with the prioritisation of investments, defines project concepts and their financing, and matchmaking with additional support for later stages of the project. Interested cities can apply for Gap Fund support by submitting an Expression of Interest online.

The Fund is implemented by the World Bank and the European Investment Bank in partnership with the GIZ and works directly with big city networks such as GCOM, ICLEI, C40 and CCFLA.

Financing Energy for Low-carbon Investment – Cities Advisory Facility (FELICITY)

FELICITY provides technical assistance to support the design and structuring of low-carbon infrastructure projects in cities. In particular, the facility provides advisory services to help with pipelining and preparation of low-carbon investment projects, develop individual and organisational capacities, provide recommendation on specific national framework conditions (barriers/ opportunity analysis), and supports knowledge management and strengthening of networks. FELICITY was established by the GIZ in cooperation with the European Investment Bank.

City Resilience Program

The City Resilience Program's objective is to increase financing for urban resilience. In particular, the CRP supports cities have access to tools and technical support to plan for resilience, have access to different sources of resilience specific financing, and can leverage global partnerships to support their resilience objective.

A core CRP product is the City Scan which helps cities visualize the interaction between their built form, climate, and natural hazards. It identifies challenges and obstacles and can serve as a basis to resolve them. CRP is also working to develop a COVID-19 related City Scan.

The City Resilience Program is managed by the Global Facility for Disaster Reduction and Recovery and implemented by the World Bank.

Transformative Actions Program

The Transformative Action Program (TAP) supports cities with their project pipeline and preparation. The incubator is geared towards infrastructure projects and designed to bring together climate actors, technical experts and financial institutions to improve capital flows to cities, towns and regions and improve cities' capacities to attract investments for low-risk, high-impact and high-feasibility sustainable infrastructure projects.

TAP was developed by ICLEI and partners.

C40 Cities Finance Facility

The C40 Cities Finance Facility helps cities in developing and emerging economies to develop finance-ready climate projects while also contributing to addressing the wider socio-economic impacts faced by cities. The Facility only supports projects prioritised by cities.

Sources: (World Bank, 2020, 2022b; GIZ, 2021; C40, 2022; ICLEI, 2022)

Box 2: Lisbon’s participatory green budgeting

Lisbon was the first European city to introduce participatory budgeting in 2008. Participatory budgeting allows residents to decide on the use of public investments via a democratic process. Citizens of Lisbon as well as non-residents who visit or work in the city, can decide for how part of the city’s budget is spent each year, by submitting and voting on citizen-based or private-sector proposals.

In 2018, Lisbon decided to focus part (15%) of its participatory budgeting on projects with a demonstrable positive mitigation or adaptation impact by giving it as “Green Seal”.

After the city was awarded the title of European Green Capital in 2020, Lisbon decided to dedicate its entire participatory budget to projects with a green objective.

The purpose of this participatory green budget is to help the city transition to a more sustainable future, raise awareness about the positive impacts of the city’s mitigation and adaptation projects, and attract additional private-sector capital for green objectives.

Source: (Mayors of Europe, 2020; Centre for Public Impact, 2021)

3.2 I Investment themes, evaluation, and selection of investment projects

As pointed out in section 3.1, it is important to identify investment themes and priorities to build a pipeline of bankable projects. These are ideally based on a city climate action plan and are part of the city climate finance roadmap.

Using taxonomies, classification systems for economic activities, may help policymakers identify and prioritise attractive projects for investment of their climate action plan. By using a sustainable finance taxonomy, municipalities can classify activities and projects based on their contribution to climate goals and use this information to guide financial decisions, promote disclosure and monitor and evaluate climate finance flows (expenditures and revenue). In order to make informed decisions that contribute to a sustainable future, it is crucial for policymakers to have a clear understanding of the impact of economic activities on the environment and society. Publicly disclosing which of the identified projects aligns with the (chosen) taxonomy, increases not only transparency but also investor trust and may therefore help attract external funding. Disclosure can also help financial (international) institutions better understand which of the proposed projects and activities are aligned with a low-carbon future.

There is a wide range of available taxonomies that cities can choose from. Using a domestic taxonomy (if available) can help policymakers develop low-carbon and resilient investment projects in accordance with national climate and development priorities. As discussed earlier, this will help secure national funding later on. It may also help set up or improve systems for tracking and measuring finance flows. (The World Bank, 2020)

Moreover, using a taxonomy to identify and build a pipeline of projects helps financial institutions to identify attractive investment opportunities and therefore lower transactions costs, originate and structure financial products more easily⁷, reduce reputational risk and help with their own disclosure and meeting regulatory requirements with regards sustainable investment (The World Bank, 2020).

⁷ For example, this may be attractive for bond issuers wanting to set up a thematic bond.

In the absence of a domestic taxonomy or to attract international funders, cities can opt for regional or globally leading/ most used taxonomies. These include for example the EU Taxonomy or the EU-China Common Ground Taxonomy.

The EU Taxonomy was developed by the EU Technical Expert Group on sustainable finance, an interdisciplinary expert group, and builds on extensive stakeholder consultations (Technical Expert Group, 2020). The Taxonomy offers a detailed classification system for economic activities based on their contribution to one of the six EU sustainability objectives without significantly harming one of the other five objectives. For the climate change mitigation objective, activities are considered sustainable if:

- They are low carbon;
- They enable emission reductions in other activities, e.g. manufacturing of components needed for the energy transition;
- They are not yet low carbon but can transition to become green in the future, e.g. by employing best available technologies.

For climate adaptation, economic activities are considered sustainable if:

- They reduce climate related risks to the extent possible and on a best effort basis;
- They enable risk reduction in other activities.

The Taxonomy further proposes an approach to aggregate economic activity alignment evaluation scores to a project, company or investment portfolio level, by using a weighted average of alignment rates based on the capital expenditure (CAPEX) and operating expense (OPEX) investment volume or based on an asset's, company's or portfolio's yearly turnover.

The Green Bond Endorsed Projects Catalogue governs China's green bonds market. It aims to support financial institutions with a transparent reference of approved green projects, thereby helping to increase the credibility and reputation of green bond issuers. To be included in the catalogue, submitted projects are screened against eligibility criteria, after which they have to pass an independent verification process, demonstrating for example that they have a clear environmental impact. It has last been updated in July 2021 with a view to further harmonise the catalogue with other major taxonomies (Moody's analytics, 2021).

The EU-China Common Ground Taxonomy, developed by the People's Bank of China and the EU Commissions and published in late 2021, is an effort to create a harmonised framework by drawing on both the EU Taxonomy and the Green Bond Endorsed Project Catalogue.

The Common Ground Taxonomy analyses 80 mitigation-focused economic activities across six sectors:

- Agriculture, Forestry, Fishing
- Manufacturing
- Electricity, gas, steam, air conditioning
- Water supply, sewage, waste management and remediation activities
- Construction
- Transportation and storage

Eligibility is determined by either being consistent with both the Chinese or EU Taxonomy, or, in case they deviate from each other, by being consistent with the more ambitious taxonomy. Therefore, by using the Common Ground Taxonomy, investors (and cities) can ensure that their projects are aligned with both the Chinese and EU Taxonomy. However, at this point, the Common Ground Taxonomy only covers mitigation. The doing no significant harm principle is not covered by the Common Ground Taxonomy, either (ISS, 2022).

More generally, all investments that are made by the city should be clearly checked for potential adverse impacts. Cross checking investments against the recently developed EU Taxonomy, the EU-China Common Ground Taxonomy or the Green Bond Endorsed Project Catalogue can help with this task.

Box 3: Monitoring of city climate finance – green/ climate budgeting

Region of Brittany

In 2020, the region of Brittany (France) decided to include green budgeting in its climate and development policies. It builds on the methodology for green budgeting developed by I4CE, a French think tank focusing on climate economics.

Green budgeting is useful to identify expenditures that contribute or that may undermine a city's (or region's) climate action plan and can also be used to facilitate decision-making, identifying cost-effective expenditure items that help the region achieve its climate goals. It can therefore support cities monitor progress towards achieving its climate goals and mainstream climate within budgetary decisions. To enable the monitoring of climate investments, cities need to first decide which items can be classified as green. Taxonomies might be used to that effect. To conduct green budgeting, Brittany made use of the EU Taxonomy to classify its expenditures.

Through the identification of the share of expenditures that contribute to meeting its climate action plan, Brittany aims to improve the assessment of the climate impact of its policies and create a direct link between its climate policies and its expenditures and thus use it as additional decision-making tool. Green budgeting might also be useful as communication tool with citizens and financial counterparties that provide (co-)funding for municipal or regional climate projects. It can also help answer a growing demand for transparency and accountability.

Brittany conducted the exercise in 2020 for the first time, and focused on climate mitigation and adaptation exclusively, thereby leaving out other domains covered by the EU Taxonomy (e.g. pollution, circular economy). It identified several methodological, operational, resource and political challenges that it hopes to overcome in the next green budgeting phase in 2023.

City of Oslo

The city of Oslo is thought to be the first city that has developed a climate budget, integrating carbon emissions tracking with financial budgeting. The city aims for a 95% reduction in emissions by 2030, and the Climate Budget ensures actions align with this goal. Oslo's finance department oversees the climate budget process, which is fully integrated into regular financial budgeting and can thereby monitor its climate finance expenditures and revenue.

Source: (C40, 2021; OECD, 2022)

Chapter 4: Sources of Funding

4.1 Public sources

A number of national and international public sources are potentially available for cities to finance their climate action plans. Table 2 provides an overview of these sources.

Securing public funding for climate efforts from the national government or international donors is critical for cities with limited own resources and limited fiscal space. Climate action requires often significant upfront investments that may not have immediate financial returns, such as infrastructure investments, making it less attractive for private investors who prioritise projects with shorter payback periods and higher rates of return. Public funding can help bridge this investment gap and provide the necessary resources to undertake climate action projects.

Table 2: Overview of public sources to finance climate action in cities

| Source/ funder | Main instruments | Relevance for cities | Access | Example |
|--|---|---|--|--|
| A city's own resources | City-level taxes, service fees, betterment fees, land value capture | Highly relevant, but many cities do not have necessary financial autonomy | Direct (if the city has the political powers); Cities without credit ranking could look into pooled muni bonds | Miami levies impact fees on real estate development to help fund coastline improvements that will reduce the damage of sea-level rise. |
| National government transfer | Fiscal transfers, can also take the form of conditional (performance) transfers/ grants | Highly relevant, but oftentimes limited availability of resources | Dependent on country context | Kenya Devolution Support Programme (not climate specific) ⁸ |
| Funding mechanisms established under the UNFCCC ⁹ | Grants, (cessionnel) loans, TA | Strict fiscal standards applied, making it difficult for cities to access funding from funds like GCF | Difficult to access directly, usually has to present request through | GCF's Green Cities Facility. EBRD serves as accredited agency. GCF |

⁸ <https://www.devolution.go.ke/kenya-devolution-support-programme-kdsp/>

⁹ Funding mechanisms under the UNFCCC include:

- The Green Climate Fund (GCF): Established in 2010, GCF is the world's largest dedicated fund helping developing countries meet its mitigation and adaptation goals, and the main financing mechanism under the UNFCCC. It aims to particularly fund transformative projects.
- The Global Environment Facility (GEF): Established in 1992, the GEF provides grants and mobilizes co-financing which can support a financial institution's client countries invest in new technologies, overcome investment barriers, and meet renewable energy goals. The GEF recently adopted a new strategic direction, which includes, inter alia, a focus to catalyse transformational change in key systems that are driving major environmental loss, in particular energy, cities and food.
- The Adaptation Fund (AF): The Adaptation Fund was established under the Kyoto Protocol of the UN Framework Convention on Climate Change, and since 2010 has committed USD 720 million to climate adaptation and resilience activities. The Adaptati on Fund

| | | | | |
|--|---|--|---|--|
| | | | national government | provides loans and grants and secured co-financing |
| Multilateral Development Banks (MDBs) | Grants, (concessional) loans, mezzanine finance, guarantees, TA | Highly relevant, but many cities do lack resources and skills to access funding and/or identify relevant MDB programme/ fund. Eligibility criteria might also be strict. | Direct. (Eligibility) criteria and application process are programme/ fund/ MDB specific. | ADB's Urban Climate Change Resilience Trust Fund supports cities in Asia to develop and implement climate-resilient infrastructure and services (ADB, 2023) |
| Bilateral/ national development banks (NDBs) | Grants, (concessional) loans, mezzanine finance, guarantees, TA | Highly relevant, but many cities do lack resources and skills to access funding and/or identify relevant NDB programme/ fund. Eligibility criteria might also be strict. | Direct. (Eligibility) criteria and application process are programme/ fund/ NDB specific. | Sustainable and Competitive Cities programme (developed jointly by the IADB and FINDETER), supporting cities develop strategic projects for ambitious climate action ¹⁰ |

While the collection of (additional)/ usage of taxes can be an interesting avenue for cities to consider when looking for options to finance climate action, in reality cities' power to collect taxes are often highly limited. Even for cities with some tax raising power it may be questionable if the funds collected will be sufficient to cover the entire cost of projects and the administrative costs/ social acceptance required for the introduction of new/ additional taxes needs to be carefully weight against the achievement of climate goals.

Public sources often limited and/ or difficult to access for most cities. For example, one major difficulty in tapping the financing mechanisms under the UNFCCC is that they predominantly channel their funding through accredited entities at the national and international level. At the moment, there is no subnational financing vehicle that directly channels funds to climate action in cities. Therefore, cities often need to address their financing needs and requests to the GCF national designated authority which in turn needs to address the GCF and request support (UNFCCC SCF, 2019). In other cases, there is a lack of a clear mandate to encourage cities' climate projects and therefore also a lack of capacity to identify, analyse and finance such projects.

One source that could be of particular interest for municipalities are National Development Banks (NDBs). They bring the country-level expertise and therefore are well aware of the barriers and opportunities for cities climate investment opportunities. In addition, they are well connected and can tap into other sources

finances projects and programs that help vulnerable communities in developing countries adapt to climate change. Initiatives are based on country needs, views and priorities

¹⁰ The programme provides support throughout the project process, from conception to funding to implementation, thereby increasing the bankability of projects.

of funding such as institutional investors, international markets and other international public sources which are often difficult to access for cities on their own. Moreover they may be able to pool private sector sources thereby increasing the potential that cities can access climate finance (Cities Climate Finance Leadership Alliance and The World Bank, 2021a). For example, a local public government funding agency in Southern Sweden (Kommuninvest), which was initially set up by nine municipalities and the local government, was able to borrow on international markets at favourable terms by pooling the needs of their participating municipalities (Andersson, 2023).

Finally, highly indebted cities could also consider municipal climate debt swaps. Municipal debt swaps are financial agreements between an indebted municipality and a creditor to cancel debt in exchange for low-carbon investments. These swaps could be beneficial for creditors and debtors alike. For example, creditors could recover at least part of an outstanding debt which would otherwise be lost, and thereby also increase their ODA without spending additional funds (depending on the creditor). Debtors, on the other hand, have the possibility to reduce their (often unsustainable) debt, giving them more fiscal space and allowing them to invest in climate action (World Bank Group, 2019).

More generally, there is not one source that can meet all finance needs for cities. Likewise, there is not one approach to finance climate action. Instead, the specific sources and approaches will depend on specific investment barriers and the city’s unique characteristics. It is therefore important that these characteristics and investment barriers are carefully considered before identifying possible funding sources and financial instruments (UNFCCC, 2019).

4.2 Private Sources

As the scale of required climate investments is enormous, and public funding alone is not sufficient to meet the investment needs, cities need to mobilise private finance for their climate efforts. The involvement of private investors is largely driven by the risk-return profile and expected pay-back periods of investment opportunities. Table 3 provides an overview of the most common private sources.

Some private investors may be more willing to take on riskier investments and provide innovative financing structures, such as green bonds or climate risk insurance, that can support climate action efforts. In addition, private financing can help ensure that climate action efforts are financially sustainable over the long term. By leveraging private financing, cities can reduce their reliance on public funding and ensure that climate action efforts are financially self-sustaining. This can help create a virtuous cycle of investment, where successful climate action projects attract additional private financing and support for future projects.

Table 3: Overview of private sources to finance climate action in cities

| Source/ funder | Main instruments | Relevance for cities | Risk appetite | Example |
|-------------------|---|---|---------------|---|
| Private companies | Project finance/ SPVs; balance sheet financing (equity/ debt) | Highly relevant, but many cities do not have necessary powers and/ or do not have a credit rating | Low-medium | In 2015, Google announced that it would provide USD 1 million to fund the installation of bike lanes in Mountain View, California, where the company is headquartered. The funding went towards the installation of more |

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|----------------------------------|---|---|---|---|
| | | | | than six miles of bike lanes, as well as the addition of new bike racks and bike-friendly traffic signals (The Guardian, 2015). |
| Households/ citizens | Direct investments, (consumer) loans; crowd-based financing | Highly relevant | Low-medium-high (depending on context) | Crowd-based financing been successfully used in the US to finance (mostly smaller) low-carbon projects |
| Investors/ large asset owners | Various equity and debt instruments | Relevant both as direct investor in projects (if investment risks can be mitigated), as financier of private companies; Impact investors might be particularly relevant | Low-medium (depending on mandate/ fiduciary duty) | Whitehelm Capital and APG have started a fund called the Smart City Infrastructure Fund which aims to pool investments from pension funds to fund smart city infrastructure projects in major cities around the world. The fund has raised EUR 250m in its first closing, and aims to provide solutions to challenges faced by the sector and complement existing public initiatives (European Commission, 2018). |
| Commercial banks | Various equity and debt instruments | Relevant both as direct investor in projects (if investment risks can be mitigated), as financier of private companies | Low (depending on jurisdictions/ regulatory requirements) | Goldman Sachs has set up an Urban Investment Group that focuses on investing in urban development projects. The Bank provided financing for the redevelopment of the Hudson Yards area in New York City, which includes a number of sustainable features such as green roofs, rainwater harvesting systems, and a cogeneration plant that provides electricity and heating to the area (Goldman Sachs, 2023). |
| Insurance companies | Various equity and debt instruments | Highly relevant both from an insurance perspective (insure against climate risks) and as an investor | Low-medium (depending on type of insurance company) | Swiss Re (Foundation) has launched the Natural Hazard and Climate Risk Management Programme, which provides technical |

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|------------------------------------|---|---|---|--|
| | | | | assistance and insurance solutions to cities in developing countries to enhance their resilience to natural disasters and climate change. The Programme has already supported several cities, such as Chennai in India and Dakar in Senegal, to develop disaster risk reduction strategies and insurance solutions to protect their citizens and infrastructure. (Swiss RE Foundation, 2023) |
| Private equity/ Venture capital | Direct equity or debt investments. Sometimes project finance. | Mostly invested in corporate debt/equity, sometimes project finance | Medium-high (but mostly operative in more mature markets) | Obvious Ventures, a venture capital firm based in San Francisco, invests in companies that use technology and innovation to foster sustainable urbanisation, among others. CarbonCure, one of its portfolio companies, develops technology to reduce the carbon footprint of concrete, a major contributor to GHG emissions in cities. (CarbonCure, 2023) |

Sources: (UNFCC Race to Zero, 2021; The German Institute for Economic Research - DIW Berlin, 2022)

Many cities, in particular in emerging markets, face difficulties in tapping private sources due to their generally low-risk appetite or expectations for higher returns. Other cities are not legally permitted to receive funding from international and/ or commercial funding sources. In many cases, it will therefore be important to de-risk their investments through public-private partnerships or blended finance instruments (see Chapter 4.3).

Some cities could consider the usage of financial instruments that aim to leverage private funding. These include the issuance of green bonds and sustainability linked bonds, for example (see boxes 4 & 5). Cities that do not have the powers or necessary credit rating to issue these bonds, could evaluate whether they could partner with affiliated municipal organisations, for example utilities or development banks (see Chapter 4.3). There is ample guidance available for cities to identify eligible green projects which might be financed by green bonds.¹¹

¹¹ Example: Green Bonds for Cities - Climate-KIC

Cities play many roles. They are both a provider, for example of infrastructure and services, and a steward, for example through their regulatory and convening powers. Both roles can be harnessed for ambitious climate action. For example, the procurement decisions of cities, the convening and regulatory powers can have systemic impact. These actions and targeted incentives may help cities leverage private sector and household investments in climate action which can go beyond their capacity to mobilize local public funds. (Cities Climate Finance Leadership Alliance and The World Bank, 2021)

Box 4: Green municipal bond

A green municipal bond is a fixed-income financial instrument where the issuer commits to using the proceeds to finance or re-finance green projects.

Several cities have issued green muni bonds, among them:

- **Gothenburg** was the first city in the world to issue a green muni bond in 2013. An amount equal to the net proceeds of the green muni bonds finance or refinance, in whole or in part, investments undertaken that promote the transition towards a low carbon, climate change-resilient and ecologically sustainable society. To that end, the city has also developed its own Green Bonds Framework. Since then, the city has issued four green muni bonds and raised SEK 4.36 billion (around USD 420 million).
- **Stockholm Region** is one of the largest regional and municipal issuers of green bonds in the Swedish bond market. Region Stockholm issued its first green bond already in 2014 and has 14 outstanding green bonds with a total outstanding volume of SEK 12.7 billion. Almost 60 percent of Region Stockholm's debt portfolio is green financing; green bonds and loans tied to environmentally friendly projects from the European Investment Bank and the Nordic Investment Bank, with the ambition to grow the green financing part of the debt portfolio even further. Projects funded include: Metro and railway extension, construction of hospitals.
- **Mexico City** issued its first green bond – also a first for Latin America – in early 2017. The USD 50 million bond will fund energy-efficient lighting in the city as well as upgrades to its transportation and water infrastructure.

To issue a muni green bond, cities must meet some important prerequisites and face some important challenges, including:

- Have the right (and capacity) to borrow on financial markets. This is not necessarily a given. Most countries do not grant such right to their cities.
- In the absence of an internationally agreed standard, cities must rely on national guidelines, which may not always be available.
- Capacity, technical knowledge and funding, e.g. determining eligibility of a project to be funded by a muni green bond requires third-party certification by a third-party, which in turn can increase costs

Sources: (City of Gothenburg, 2019; UNFCCC SCF, 2019; Oxford Business Group, 2023; Region Stockholm, 2023)

Box 5: Climate Policy Performance Bonds (CPPB)/ Sustainability Linked Loans (SLL)

Climate Policy Performance Bonds and Sustainability Linked Loans (SLL) are a fixed-income financial instrument which are linked to a sustainability outcome. They incentivise the borrower to achieve a predefined policy (or sustainability) outcome by offering a margin reduction if those outcomes are achieved. The achievement is measured against pre-defined key performance indicators.

Compared to a green bond, an SLL is generally less expensive to set up and administer, however can be become costly for the issuer if the predefined outcome is not met.

In 2020, the International Capital Market Association (ICMA) published the voluntary Sustainability Linked Loan Principles (SLLPs), which provide guidance to market participants.

In 2022, Helsingborg in Sweden was the first city to issue an SLL to help support meeting the city's net zero GHG target by 2035 and choosing the emissions trajectory as its performance indicator.

Source: (ICMA, 2022; The Mayor.eu, 2022)

4.3 Public Private Partnership & Blended Finance

The upscaling of blended finance will be important to meet the investment needs of cities around the globe (UNFCC Race to Zero, 2021). Increasing usage of blended finance instruments that combine public and private sources of funding is key to complement the often-scarce resources of city governments and can ensure a more efficient allocation of funds whereby cities provide credit guarantees or similar thereby increasing the investment appetite for projects that would otherwise not be interesting to commercial financial institutions.

Results-based blended financing for example can be an attractive approach for cities to help raise climate finance, in particular for their climate-smart infrastructure investments (see box 6). Results-based blended finance helps to address major investment barriers, i.e. construction risks (outputs are clearly set, payments are tied to achievement of results), operational risks (payments only made once milestones are reached, thereby creating operational incentives), counterparty risk (if a counterparty does not obey its contractual obligations, concessional finance is not paid) and therefore increase investor appetite (World Bank Group, 2019).

Cities can collaborate with financial institutions to help finance climate related projects by the private sector. The Paris Fonds Vert (see box 7) is an example of how a city can initiate and help deliver private climate solutions through a capital development fund. Cities can also help raise awareness for private funding opportunities available to private companies that provide climate solutions (see box 8).

Cities may also collaborate with city networks to attract funding. For example, the Norwegian Government Pension Fund Global, one of the largest sovereign wealth funds globally, and C40 are partnering to deliver municipal renewable energy projects. The Norwegian Government Pension Fund Global, has pledged to invest up to USD 1 billion to bolster the creation of renewable energy infrastructure, including wind and solar power, in urban areas worldwide.

In addition, cities can directly partner with private sector companies to finance climate action projects, such as through PPPs for energy-efficient buildings or renewable energy projects. Many cities have made good experience setting up a PPA with an energy services company (ESCO) which guarantees energy savings that in turn finance the project over time – see box 9. Taipei set up the Taipei Green Building Partnership, a PPP between the Taipei city government and private companies, to promote energy efficiency and sustainability in the city's buildings. The partnership encourages the use of green building technologies and practices, such as green roofs and walls, rainwater harvesting systems, and energy-efficient lighting. Beyond buildings, PPP opportunities are to be seized in numerous other sectors. International climate finance is available to help seize these opportunities (see box 10, the Green for Growth fund as one example). PPPs can be used for example to promote sustainable transportation, such as bike-sharing programs and the creation of dedicated bike lanes. More generally, to be effective, PPPs for climate resilience need to be transparent, accountable, and designed with the needs of communities and businesses in mind.

Box 6: Results-based blended finance

Results-based blended finance ties financing (of climate relevant projects) to the achievement of measurable, pre-agreed results. It can thereby increase transparency and accountability which boosts investment interest and can thus help mobilise climate finance.

Results-based blended financing mechanisms are most often used to finance infrastructure projects (which require high up-front costs) in the energy, waste management, transport and water sectors. Environmental impact bonds are one example of results-based blended finance. These bonds are a pay-for-success instrument, municipalities can limit their financial losses if the project is not successful. In practice, they allow municipalities to partner with financial institutions who provide upfront capital and payback is linked to project performance. This promotes investment in novel climate-smart infrastructure solutions. Environmental Impact Bonds have been frequently used, in particular in the US and UK and a number of developing countries are testing the approach to finance social outcomes.

Source: (World Bank Group, 2019)

Box 7: Paris Fonds Vert

The Paris Fonds Vert/ Green Fund is an example of how cities can make use of limited public funding from their national government to catalyse private investment at the municipal level.

The Paris Green Fund, a development capital fund, which was initially mobilized with EUR 15 million from the French Government in 2018, has catalysed more than EUR 200 million of investment in urban sustainability projects. It thereby funds mostly small and medium-sized unlisted enterprises, which are required to showcase positive impacts on urban sustainability, such as creating new jobs, promoting renewable energy, and producing social impacts. The idea is that through the funding the selected SMEs can deliver climate solutions more rapidly for the city. The fund has been initiated by the city of Paris which is also partly funding it.

Source: (The Mayor.eu, 2019)

Box 8: AXA Impact Fund - Climate and Biodiversity

The AXA Impact Fund Climate and Biodiversity is a private equity fund that invests in companies that have a positive impact on society and the environment. The fund focuses on companies operating in sectors such as renewable energy, energy efficiency, sustainable agriculture, and water management.

The AXA Impact Fund aims to generate financial returns while also contributing to the United Nations Sustainable Development Goals (SDGs). The fund's investments are evaluated based on their potential to have a positive impact on the environment and society, as well as their financial viability.

The AXA Impact Fund uses a blended finance approach, combining investment from traditional private equity investors with investment from development finance institutions and impact investors. This allows the fund to provide financing for companies that may otherwise struggle to access traditional sources of capital.

Although not directly aimed at cities, it also supports companies that deliver essential services in cities and can thus indirectly support cities' climate efforts.

Source: (UNPRI, 2020)

Box 9: Energy performance contracting

- **Ljubljana:** EPCs were used for the renovation of 50 public buildings, including schools, libraries, healthcare centers, sports facilities and administration buildings. It resulted in energy cost savings of above EUR 1 million. Annual emissions savings have been close to 3000 tonnes of CO₂e. Because of the success of a first phase, the city has expanded the programme to cover around 100 buildings across the city.
- **Paris:** The city has used EPCs to refurbish around 250 schools. Renovations were tailored to each school, including window renovations and installation of LED lighting, sensors, insulation and new boiler systems. The city achieved good results from a first phase (renovation of 100 schools), reducing energy consumption by 33-38% compared to 2004 levels and is therefore being expanded to other public buildings.

Source: (Jožef Stefan Institute, 2022; C40, 2023b)

Box 10: Green for Growth fund

The Green for Growth Fund (GGF), an impact investment fund, aims to mitigate climate change and foster sustainable economic growth through targeted investments that mitigate climate change and promotes sustainable economic growth, in particular through measures that reduce energy consumption, resource use and CO₂ emissions.

The public-private partnership, through its blended finance structure, leverages risk-capital provided by public institutions with additional private capital to increase climate finance volumes to recipients that otherwise do not attract such funding, including cities. The funding is channelled through local financial institutions, as well as direct investment in eligible projects. The fund also comes with a dedicated Technical Assistance Facility to ensure the successful and high-quality implementation of projects. The GGF is currently active in Southeast Europe, including Turkey, the European Eastern Neighbourhood Region, the Middle East and North Africa.

Projects of interest to municipalities and which are eligible for funding include:

- Improvements to the built environment
- Heat supply & cooling systems
- Modern lighting

Source: (Green For Growth Fund, 2023)

4.4 Monitoring, reporting and verification

Depending on the financial instruments deployed and the funding source, there may be different implications with regards monitoring, reporting and verification (MRV). Generally, MRV is often required to ensure and demonstrate that funding is delivering tangible benefits to the city and its inhabitants. In this section, we discuss MRV of support which is not to be confused with MRV of GHG emissions or MRV of mitigation actions (Singh *et al.*, 2016).

MRV is not only often a pre-condition for the disbursement of funding but has a range of additional benefits. It can help ensure that the funding is effective, increase transparency and credibility which in turn can help attract more climate finance. MRV can also help identify good practice and be used to explore replication in other sectors or for other projects. Finally, it can help signal a need to change course and make changes if funding is not delivering the expected results.

Cities first need to understand the specific MRV implications for each specific project and therefore for each specific financial instrument used and the specific funder (Figure 7). These can vary widely.

To make MRV work cities should ask themselves the following questions and ensure:

- Is there sufficient backing from the city council/ in the municipality?
- Is there (enough) staff dedicated to leading the MRV process?
- Is there an understanding of what needs to be communicated, to whom and when?
- Is there sufficient capacity and knowledge to carry out the work?
- Is the information flowing to whom needs them? Are information channels set up and working?
- Have relevant external stakeholders be identified and are engaged?

(ICLEI, 2016)

Some guidance is available and provided by major city networks, such as ICLEI¹², to help initiate the process and/ or further improve it.

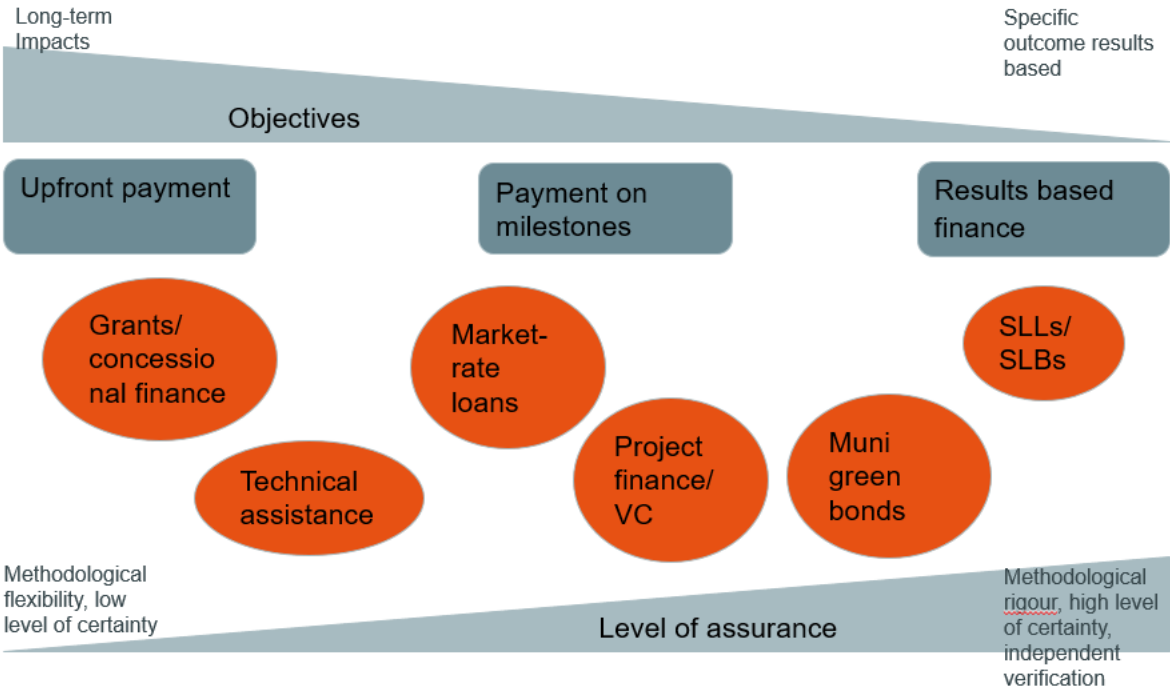


Figure 7 Overview of MRV requirements per type of climate finance instrument and funder. Based on (Sinclair, 2016)

¹² See for example GCC_Handbook_final.indd (iclei.org)

Chapter 5: Climate innovation in insurance

Innovative insurance products in the face of climate change are available for an increasing number of cities and are one important tool for risk management. They can help insure cities, their inhabitants and companies operating within the city boundaries against financial losses linked to either physical climate related hazards or linked to the transition of becoming a low-carbon city or both (see Figure 8).

Innovative climate insurance schemes include:

- Climate Risk Insurance - covers physical damage caused by extreme weather events such as floods, hurricanes, and heat waves.
- Green Insurance - covers the cost of transitioning to a more sustainable and environmentally friendly business model.
- Climate Adaptation Insurance - covers the cost of adapting to the impacts of climate change, such as rising sea levels and increased frequency of natural disasters.

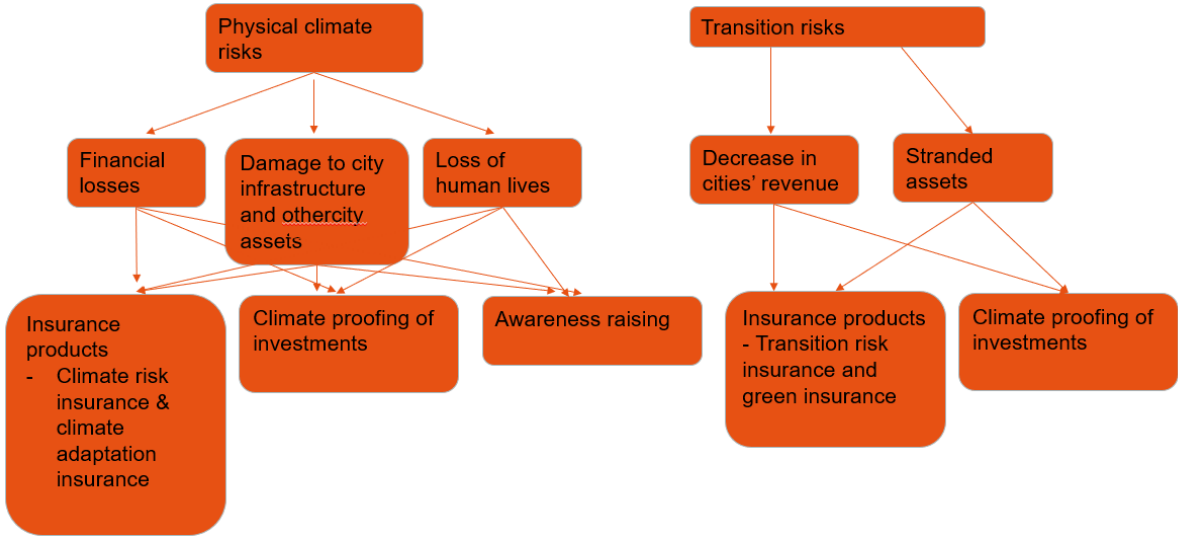


Figure 8 How insurance can help address climate risks (Authors' own illustration)

Climate Insurance-Linked Resilient Infrastructure Financing, as one type of climate risk insurance, is a new financing mechanism that aims to address the challenge of climate risks for critical infrastructure projects. Climate change poses a major risk to cities' infrastructure through their potential impact on the stability and functionality (Cities Climate Finance Leadership Alliance and The World Bank, 2021b). So far, the availability and affordability of insurance options for such infrastructure projects, especially for cities in developing countries, have been very limited. Climate Insurance Linked Resilient Infrastructure Finance aims to change this. It typically works by linking insurance coverage to the investment in infrastructure, allowing investors to transfer the risks associated with climate events to insurance providers. The Urban Infrastructure Insurance Facility (see box 11) is an example of Climate Insurance Resilient Infrastructure Finance. The approach is still being tested but has the potential to play a significant role in helping to ensure that critical infrastructure projects can continue to operate effectively in an increasingly challenging climate. Benefits of climate risk insurance go beyond financial compensation in case of adverse climate hazards and include increased risk awareness, incentivising risk mitigation and fostering economic growth and capital mobilisation (Cities Climate Finance Leadership Alliance, Climate Policy Initiative (CPI), *et al.*, 2021).

Box 11: The Urban Infrastructure Insurance Facility

The Urban Infrastructure Insurance Facility, a PPP, aims at improving the resilience of urban infrastructure systems in the face of increasing climate risks. It provides insurance and financial support to help cities and other urban entities better manage the financial risks associated with climate change.

The Insurance Facility operates by providing insurance coverage to infrastructure projects, such as water treatment plants, transportation systems, and energy infrastructure. In the event of a climate-related loss, the Insurance Facility provides financial support to help cover the costs of repairs, reconstruction, or replacement of damaged assets. It thereby helps to attract private investment in urban infrastructure projects by reducing the perceived risks associated with investing in climate-sensitive assets. The Insurance Facility currently focuses only on cities in Latin America.

The project is funded by the German development Bank KfW and implemented by the ICLEI World Secretariat.

Source: (ICLEI, 2023a)

In addition, cities might consider risk pooling. Pooling is especially interesting for smaller, vulnerable cities which otherwise could not afford climate risk insurance. It can be used for early recovery financing after a hazard strikes. An example is the Philippine's City Disaster Insurance Pool, an instrument whose design was done by the Philippines Department of Finance with support from the Asian Development Bank. The Pool compensates immediate losses incurred due to climate hazards and includes pay-outs which are determined by specific characteristics of the hazard (such as wind speed).

Cities can also take out parametric insurance to cover financial losses due to climate catastrophic events that strike property, assets or operations. Parametric insurance, which can be provided by all types of insurance providers, provides pre-specified rapid pay-outs according to a specific trigger event. International donors or development banks might also come in to help fund insurance premiums for cities located in developing countries.

Moreover, cities can also buy catastrophe bonds. These are high-yield bonds, financed by municipal governments and issued by reinsurance companies. These bonds pay out in the event of a catastrophe and are triggered when specific parametric triggers are met by a disaster. Catastrophe bonds can be an attractive option for cities because they fill the temporal gap left by traditional insurance companies' focus on assessing risk on an annual basis. For municipal governments seeking to establish long term resilience strategies, catastrophe bonds can provide long term protection against risks by filling this gap. However, catastrophe bonds can introduce a moral hazard into the ecosystem and disincentivize investment in resilience. To mitigate this risk, firms like Swiss Re have begun to tie "cat bonds" with rebate programmes that reward cities for investing in building resilience. Swiss Re and Re:partners' instrument, Re:focus, assesses the degree of risk reduction for a given protection measure and then reduces the rates that a municipality must pay its bondholders, reflecting the reduced likelihood that pay out from these bonds will be triggered (Re:focus, 2017).

Specific innovative insurance options are also available for businesses that operate in cities. These include: Green insurance which can cover costs linked to transitioning a business to a more environmentally friendly model. This can include costs related to upgrading equipment, implementing renewable energy sources, and improving waste management practices. The coverage may also extend to expenses incurred as a result of environmental regulations and the risk of environmental liability. The exact coverage provided by green insurance will depend on the policy and the specific needs of the business.

Green insurance for cities refers to insurance policies that are designed to help municipalities and local governments manage and mitigate the risks associated with climate change. Green insurance can cover a range of climate-related risks, such as flooding, extreme weather events, and damage to infrastructure. These policies often include provisions that encourage the adoption of green or sustainable practices, such as the use of renewable energy or low-carbon transportation options. Green insurance can also help to incentivize investment in climate-resilient infrastructure and other adaptation measures. By providing financial protection against climate-related risks, green insurance can help cities to become more resilient and sustainable in the face of a changing climate (Stockholm Resilience Centre, 2016).

Climate adaptation insurance refers to insurance products that provide financial protection against the impacts of climate change, such as natural disasters and weather-related events. One example is agricultural insurance which covers that covers losses due to weather-related events such as drought, floods, and storms, which can impact crops and livestock (Jarzabkowski *et al.*, 2019).

Insurance can be a vital tool in promoting climate adaptation as it provides capital to support communities and infrastructure to recover from disasters, reducing the burden of paying for losses on individual citizens, governments, or aid organizations. Moreover, insurance contributes to the wider understanding of climate-change risks and helps to promote measures that individuals and communities can use to improve their protection from climate-change-driven disasters. However, insurance is only one of the available disaster-risk financing mechanisms, and it needs to be considered within a broader fiscal framework that also includes international assistance, catastrophe debt drawdowns, and other financial securities, disaster reserves, and budgets. Furthermore, insurance and other disaster risk financing mechanisms need to be integrated into other resilience and adaptation measures as part of a comprehensive climate adaptation strategy (Jarzabkowski *et al.*, 2019).

Conclusion

The rapid urbanisation of the world's population has placed a significant strain on urban infrastructure, which is further compounded by climate change. This has resulted in the need for significant investments in mitigation and adaptation efforts, which will require substantial financing. However, the financing of climate change initiatives in urban areas faces several challenges, including limited taxation and borrowing powers for local governments and a lack of bankable projects. To overcome these challenges, it will be necessary to tailor climate finance approaches to the specific needs and characteristics of each city, while also addressing broader issues such as governance, institutional set-up, and policy environment.

A city climate finance roadmap constitutes a centrepiece of a city's efforts to finance their climate goals. The development of a climate finance roadmap for cities requires a robust city climate action plan, which should include an inventory of urban emissions and an urban risk and vulnerability assessment. The climate action plan should also identify short, medium, and long-term climate investment themes, needs, and opportunities. The city climate finance roadmap should lay out how the city plans to implement and meet its climate investment goals and should contain a pipeline of bankable projects that align with the city's investment priorities and long-term climate goals. Identified projects need to be clearly described, including in terms of expected costs and financial/ development/ climate benefits. The roadmap should also contain an identification of potential funding sources and strategies on how to leverage those. To ease access to funding, early involvement of potential funders in the project preparation phase and early alignment with national climate goals can increase chances that projects will be fully funded. Involvement of a wide range of potential funders, from public and private sectors, and tailored financing instruments and arrangements, depending on the local context and policy environment, will be needed to make sure that climate projects will get financed. Regular exchange with stakeholders, including the private sector, can help create trust and reduce perceived project risks. If needed, international technical assistance and advisory services should be approached early on to help with pipeline development and project preparation.

Appendix: Setting Best Practice

International alliances of city climate finance/ transformation alliances

International alliances/ large city networks can support cities finance climate action in several ways. First, many city networks provide technical assistance to member cities on how to develop and finance climate action projects. This can include guidance on project development, project financing, risk management, and stakeholder engagement. Second, they facilitate knowledge sharing and peer-to-peer learning. This can help cities identify financing opportunities, but also help them overcome common barriers to better access finance.

Third, city networks can help member cities build partnerships with other cities, private sector actors, and international organizations to finance climate action projects. This can include facilitating matchmaking events, networking opportunities, and investment forums. In addition, city alliances can advocate for policy changes at the national and international level that support climate action in cities. This can include lobbying for stronger climate targets, carbon pricing mechanisms, and regulations that promote renewable energy and energy efficiency.

By providing these types of support, large city networks can help member cities access finance and accelerate the transition to a low-carbon and climate-resilient future.

C40

C40 is a network of the world's leading cities committed to addressing climate change. Founded in 2005, C40 connects nearly 100 of the world's greatest cities, representing over 700 million people and one-quarter of the global economy. The network helps address municipal climate finance challenges across various stages of project development in major urban infrastructure groups such as clean energy, zero-carbon buildings, public transportation, waste, and resilience. By increasing investment in these areas and divesting from fossil fuels, mayors can create safer, healthier, and more economically sustainable communities for current and future residents. C40's work is aligned with each city's Climate Action Plan and inclusive climate action principles to ensure that future investments support the priority actions of the city and improve the lives of vulnerable communities. C40 also works to improve the supply of finance to cities by building relationships with key finance institutions, calling for public banks to support cities, and advocating for policies that can improve cities' fiscal capacity.

The network provides support, among others, for the following activities:

- Finance academies – workshops to help city officials overcome financing challenges preventing the implementation of specific climate solutions;
- Research – identifies gaps in city practitioners' knowledge and engages experts to provide climate finance resources tailored to their needs;
- Capacity development and knowledge sharing – workshops, webinars, and training sessions to continuously develop skills in various areas such as project development, financing, business planning, and sustainable investing;
- Project preparation support – C40 also provides project preparation support through the C40 Cities Finance Facility to selected cities to help them develop technical studies needed to bring projects to a bankability stage;
- Investor engagement – The organization engages with investors through the creation of investor pitch decks and the organization of investor roundtables for specific areas and geographies;
- Technical assistance - provides ad-hoc and tailored technical assistance to help cities address challenges as they arise.

(C40, 2023a)

Climate Alliance

The Climate Alliance is a European network of local governments committed to reducing greenhouse gas emissions and promoting sustainable development. It was founded in 1990 by a group of Austrian, German, and Swiss mayors in response to the need for more effective action on climate change at the local level.

Today, the Climate Alliance has grown to include nearly 2000 member municipalities in 25 European countries, representing a population of more than 80 million people. The network focuses on implementing sustainable energy policies, promoting public transport, reducing waste and promoting recycling, protecting forests and biodiversity, and working with indigenous peoples in the Amazon rainforest.

The Climate Alliance also advocates for climate justice, acknowledging the disproportionate impact of climate change on vulnerable communities, and calls for policies that address the root causes of climate change while promoting social and economic justice (The Climate Alliance, 2023a).

The Climate Alliance provides a platform for local governments to exchange knowledge, share best practices, and learn from one another's experiences. It offers a range of services and support to its members, including networking and collaboration as well as training and capacity building.

In 2023, the Climate Alliance founded *Klima-Bündnis Services*, a Climate Alliance venture. The venture supports Climate Alliance members in implementing local climate protection measures through consultancy, campaigns, and data collection services. It also serves as a link between data and political concepts and strategies, and makes climate action measures quantifiable. Klima-Bündnis Services offers services also to interested actors outside of Climate Alliance's membership base. Its tools include the Climate Protection Planner, which facilitates the preparation of greenhouse gas inventories and enables users to record municipal energy flows, and the ESG Cockpit, a web-based tool for sustainability reporting and certification. (The Climate Alliance, 2023b)

ICLEI

Local Governments for Sustainability (ICLEI) is an international association of local governments and organisations committed to sustainable development. Its mission is to promote sustainable urban development and address global environmental challenges at the local level.

ICLEI was founded in 1990 and has since grown to include over 2500 members in more than 125 countries, representing more than 25% of the global urban population. Its members include cities, towns, and regions, as well as national and regional local government associations, non-governmental organizations, and academic institutions.

The organisation provides its members with a range of services and support, including technical assistance, policy guidance, training and capacity building, and access to networks and partnerships. Its main areas of work include climate change mitigation and adaptation, sustainable urban development, resilience, and biodiversity conservation.

ICLEI collaborates with international organizations, national governments, academic and financial institutions, civil society, and the private sector to establish strategic alliances. Its goal is to create more sustainable, resilient, and liveable communities, while also contributing to global efforts to achieve a more sustainable future for all. (ICLEI, 2023b)

ICLEI provides support to cities and local governments to overcome the financial barriers to implementing climate action plans and projects, including:

- Access to funding opportunities: ICLEI provides its members with information on funding opportunities for climate-related projects and programs, including grants, loans, and other sources of financing. ICLEI also helps developing funding proposals and accessing finance.
- Capacity building: ICLEI offers training and capacity building programmes to help local governments develop the skills and knowledge they need to effectively finance and implement climate action plans and projects.
- Technical assistance: ICLEI provides technical assistance to help local governments identify and evaluate financing options for climate-related projects, including innovative financing mechanisms such as green bonds, climate funds, and public-private partnerships.
- Peer learning and knowledge sharing: ICLEI facilitates peer learning and knowledge sharing among its members, providing a platform for local governments to share experiences and best practices on financing climate action.
- Advocacy: ICLEI advocates for policies and initiatives at the national and international levels that support local governments in financing and implementing climate action. This includes advocating for greater access to climate finance and supporting the development of innovative financing mechanisms.

In 2020, ICLEI developed the *climate finance decision-making tree* which provides guidance to local and regional governments by asking a series of questions that assist them in evaluating various financing options. The decision-making tree also includes detailed descriptions of each financing tool, outlining their advantages, disadvantages, and case study examples¹³ (ICLEI, 2020).

Global Covenant of Mayors for Climate & Energy

The Global Covenant of Mayors (GCoM) is a global alliance of over 11,500 cities and local governments from 142 countries and 6 continents, representing more than 1 billion people. GCoM cities have committed to reducing global emissions by 1.9 GtCO₂e annually in 2030 and 3.8 GtCO₂e annually in 2050, equivalent to half of all GHG emissions in the United States in 2019 or four years of CO₂ emissions from global commercial aviation. GCoM aims to support voluntary action to combat climate change and build a resilient and low-emission society. (GCOM, 2023b)

GCoM helps cities finance climate action in several ways through its Invest4Cities initiative. The initiative aims to provide better access to finance for cities by advocating for regulatory changes that support financing of cities' climate action commitments, accelerating city capacity, and unlocking large-scale financing instruments. Invest4Cities is also mobilising technical resources to help cities develop their climate projects and make them more attractive to investors.

The Invest4Cities initiative also supports the City Climate Finance Gap Fund, a collaboration of GCoM, the Governments of Germany and Luxembourg, World Bank Group, and European Investment Bank, which provides technical assistance, capacity building, and pipeline-building for later-stage project preparation and for investors.

GCOM partners with the European Commission, European Investment Bank (EIB), and European Bank for Reconstruction and Development (EBRD) under the umbrella of 'Global Urbis' to provide financial advisory services and financing to foster low carbon and resilient investments.

The initiative also provides support to enable national governments to reduce the risk for investors in city projects, calling for tools such as credit enhancement instruments, or even legislative changes which make it easier for cities to attract public and private investment into climate action and enhance cities' capacity to strengthen public financial management and municipal revenue generation.

¹³ The tool can be accessed here: <https://www.solutions-gateway.org/show?page=financetool>

Additionally, the initiative works to find ways for national governments to reduce the risk for investors in city projects and enhance cities' capacity to strengthen public financial management and municipal revenue generation. Finally, Invest4Cities is leading the funding and financing action track of the International Coalition for Sustainable Infrastructure to support sustainable and resilient infrastructure financing. (GCOM, 2023a)

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