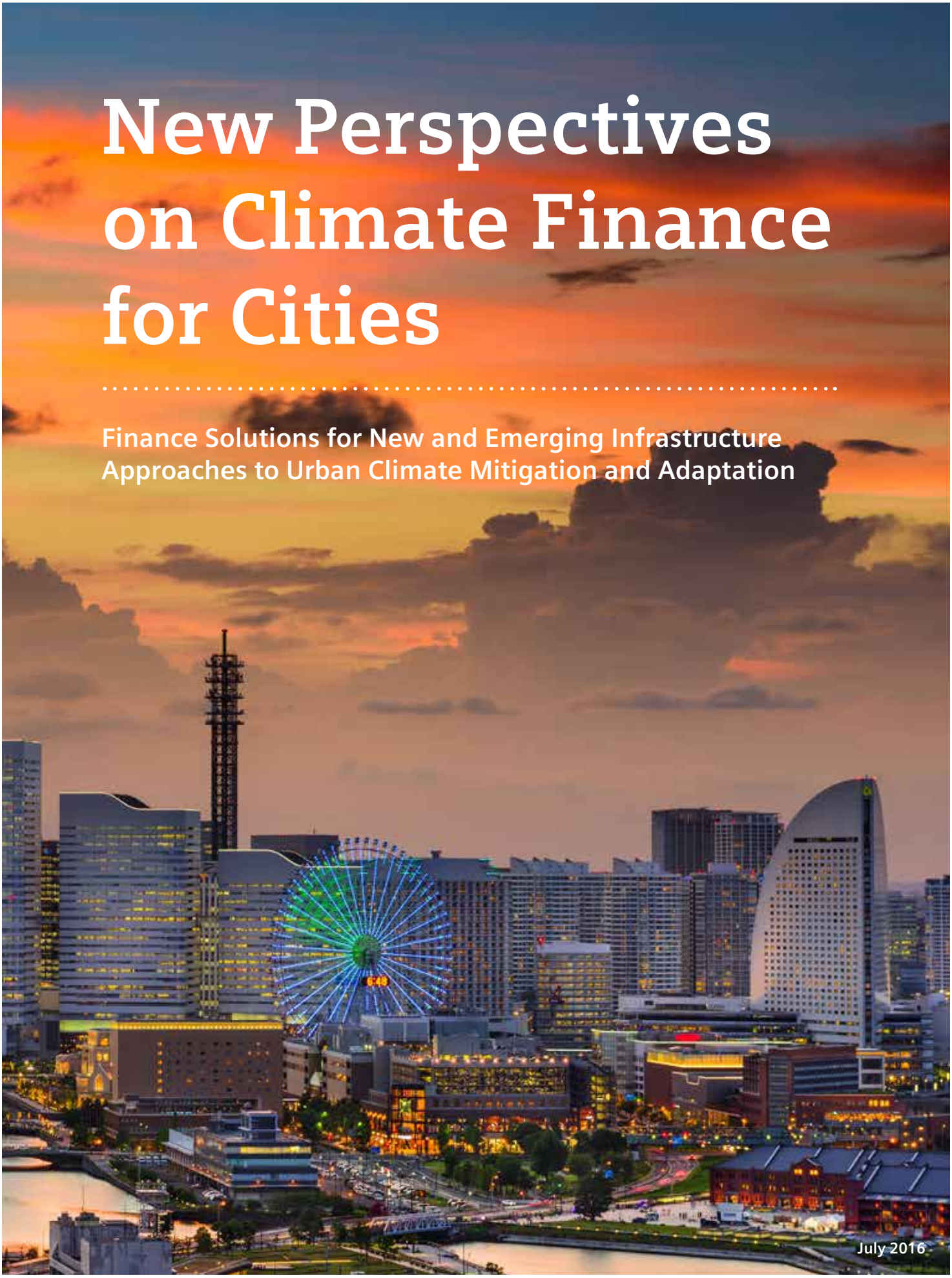
New Perspectives on Climate Finance for Cities

Finance Solutions for New and Emerging Infrastructure Approaches to Urban Climate Mitigation and Adaptation



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About this report

New Perspectives on Climate Finance for Cities has been prepared by C40 Cities Climate Leadership Group, Siemens and Citi. The focus is specifically on routes to financing climate change projects and programs. A multitude of guides already exist exploring more conventional routes of project finance, but few are focused purely on the topic of climate finance.

Climate finance presents new opportunities for city administrations and other constituents to deliver on climate action plans and targets. But it also presents new challenges for the finance sector. Tackling these challenges is integral to unlocking and mainstreaming climate finance. This report provides an introduction for city officials seeking to understand climate finance options and identify possible routes for supporting projects and programs. It sets out the benefits and drawbacks from different finance options, the lead in times and next steps required to access different types of climate finance. Importantly, it draws on case studies from around the globe, where these alternative routes have been implemented.

C40 Cities Climate Leadership Group

The C40 Cities Climate Leadership Group, now in its 11th year, connects more than 80 of the world's greatest cities, representing 600+ million people and one quarter of the global economy. Created and led by cities, C40 is focused on tackling climate change and driving urban action that reduces greenhouse gas emissions and climate risks, while increasing the health, wellbeing and economic opportunities of urban citizens. The current chair of the C40 is Rio de Janeiro Mayor Eduardo Paes; three term Mayor of New York City Michael R. Bloomberg serves as President of the Board. C40's work is made possible by our three strategic funders: Bloomberg Philanthropies, Children's Investment Fund Foundation (CIFF), and Realdania. To learn more about the work of C40 and our cities, please visit www.c40.org or follow us on twitter @c40cities

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Introduction

The importance of urban infrastructure

Outline of report

This report explores potential financing options for climate change programs and projects in cities. It sets out the basic principles for different financing routes. It also outlines next steps that cities should take in order to advance different financing opportunities.

The application of new approaches and technologies to city challenges means that not just city governments and technology companies need to think differently, but also the financial sector. Whilst new approaches bring new hurdles and challenges that must be overcome, they also provide new and exciting opportunities for cities to advance their agendas. Through history cities have often been the engines for economic, social, cultural and scientific change. It is clear that they will once again play a pivotal role, this time in mitigating and adapting to the impacts of man-made climate change.

Why cities matter

Our cities face unprecedented change. More and more people are choosing to live in cities. Over half of the 7.1 billion people on the planet live in our cities today. By 2050 global urban population will exceed 6.7 billion. Whilst nearly 80 percent of this growth will take place in low and middle income countries, where populations are already rising by over one million people per week, cities in high income countries are also growing and will pass 1.2 billion by 2050.

Cities are drivers of our global economy. 75 percent of global economic output comes from cities. Despite their geographic size (cities occupy around two percent of the surface of the World) they are huge consumers of resources. Cities consume three quarters of global primary energy and vast quantities of water. They also generate huge quantities of waste and wastewater. Cities are responsible for 80 percent of greenhouse gas (GHG) emissions.

Cities are also incredibly vulnerable to the impacts of climate change. For example, 75 percent of cities are located in coastal areas at risk from sea-level rise.

Consequently, more and more cities are taking a leading role in combating climate change. They are recognizing that tackling their greenhouse gas emissions also brings other benefits, using resources more efficiently can make them more competitive and attractive places to live and work. By taking measures to adapt to climate change and make themselves more resilient, cities are reducing the exposure of their populations and economies to climate change. According to the Intergovernmental Panel on Climate Change (IPCC), an increase in global temperatures of 2° Celsius could result in aggregated global economic losses of 0.2 – 2.0 percent of income every year.

"Through history cities have often been the engines for economic, social, cultural and scientific change"

The scale of the infrastructure challenge

Cities in both high income and low to middle income countries are growing rapidly. Low and middle income countries primarily need to invest in new infrastructure to accommodate their new populations and to sustain their economic growth. Equally, much of the existing infrastructure in high income countries is ageing and needs to be replaced.

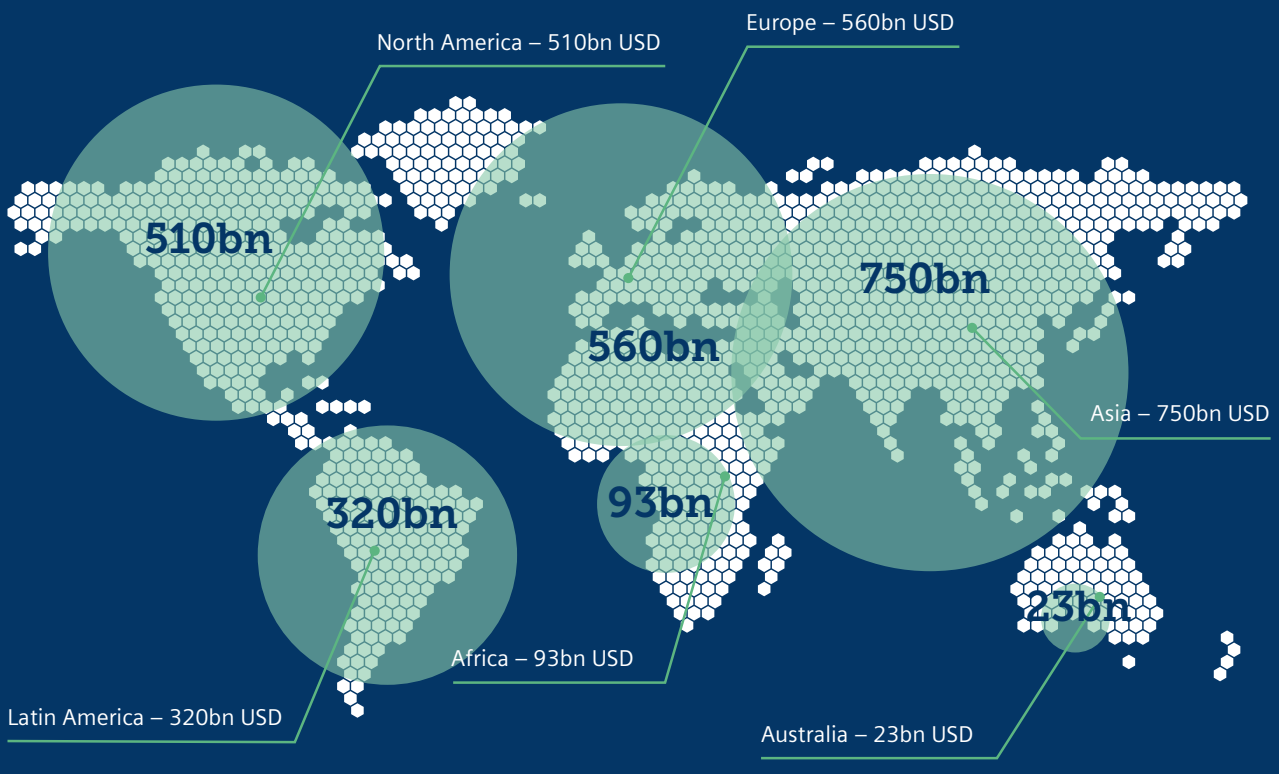
McKinsey estimate that the total investment needed in our cities (in transport, energy, water and telecommunications infrastructure) between now and 2030 is $57 trillion or $2.7 trillion a year. That is almost two thirds more than was spent on infrastructure during the last two decades.

The illustration below indicates the scale of investment required by region. Whilst the figures are taken from several sources, they do give an indication of the scale of investment needed.

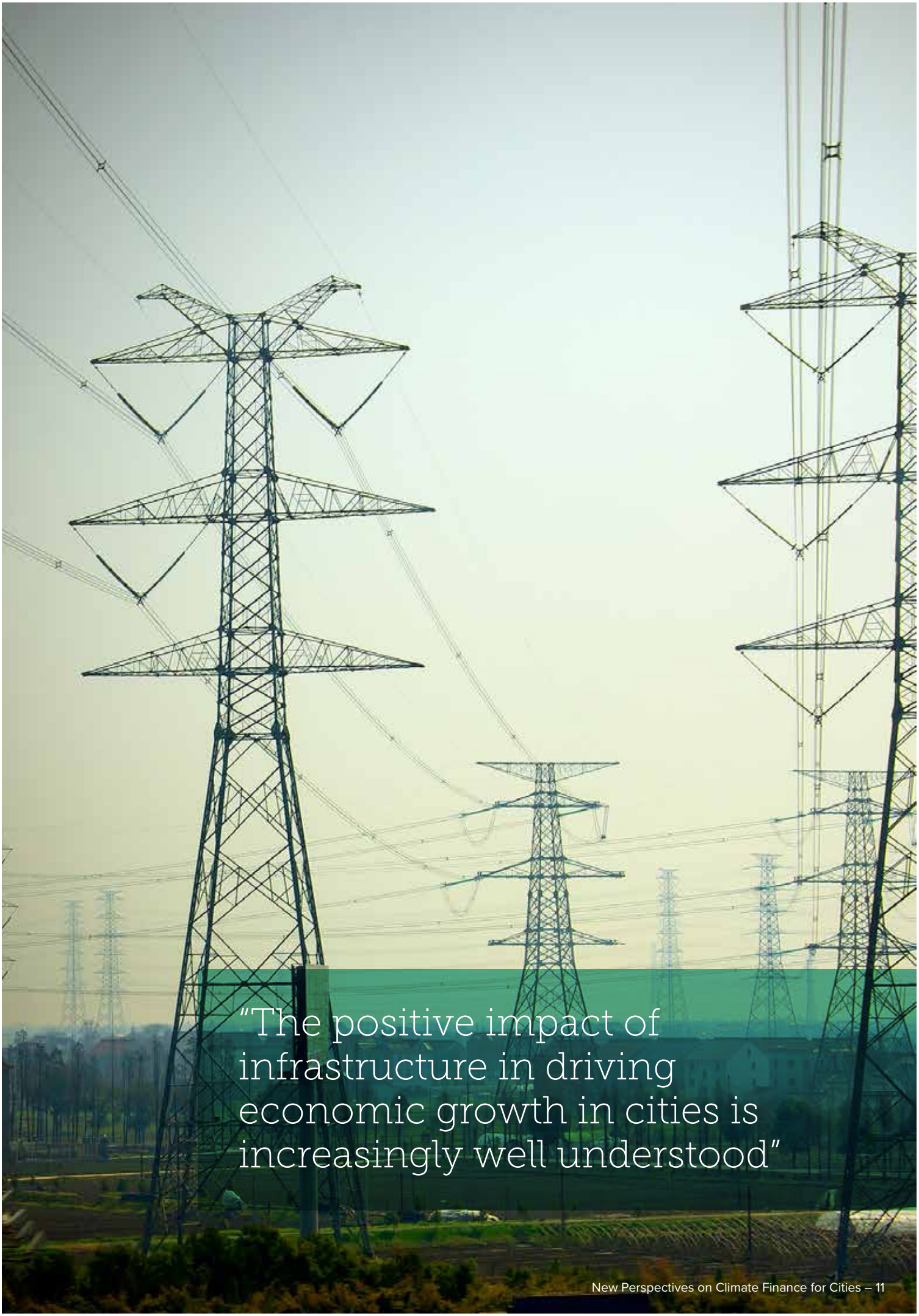
$57 trillion The investment needed in city infrastructure between now and 2030

The positive impact of infrastructure in driving economic growth in cities is increasingly well understood. It has been estimated amongst G20 countries that a one percent GDP increase in infrastructure spending can lead to a multiplier effect of between 1.0 to 2.5 over a three year period in high income countries. The impact is greatest in emerging economies. For example the investment benefit is doubled or more in Brazil, India and China.

Estimates of infrastructure investment required by continent



Source: Adapted from Long Finance & WWF, 2015


"The positive impact of infrastructure in driving economic growth in cities is increasingly well understood"

The cost of inaction

Much concern has been raised about the cost of transitioning to a low-carbon economy. The cost of inaction, however, is far higher. In 2013, Citi explored the respective costs and benefits to the global economy of moving towards a low-carbon future in “Energy Darwinism”, a groundbreaking research paper on the topic. Citi released “Energy Darwinism II” in August 2015 with updates to reflect recent developments in the energy sector and to underscore the importance of the COP21 summit in Paris.

We reference this research work here because the monetary impact of climate change on cities will be in the trillions of dollars, and that amount will drastically increase without addressing our energy mix. However, impacts of climate change to the billions of global city-dwellers will be immeasurable from their perspective without action on both energy generation and climate change mitigation at local levels. The good news is that cities are not hesitating to meet this challenge.

Cities are taking action

Across the world, cities are setting targets and putting in place strategies to tackle their GHG emissions. Importantly, this is also being backed up by action. Since 2011, C40 cities have taken close to 10,000 climate related actions across a range of sectors from buildings to renewable energy supply, from transport to water management.

The pace of activity is also quickening. Of those actions, half are now at the city scale, an increase of 340 percent since 2011.

Climate finance in cities

This report is focused on the climate financing options for sustainable infrastructure in cities. Annex 1 provides the definition of sustainable infrastructure used in this report.

We take a broad definition of climate financing which means that we are exploring all financial flows from international, national and regional entities specifically to support projects and programs related to climate change mitigation or climate change adaptation from the public and the private sector. Narrower definitions focus on 'additional' sources of financing such as aid money and grants, whereas this report also looks at private finance and capital investment. Private sector finance will be essential to helping cities deliver the climate related infrastructure projects they need, whether that be city-financed, or city-motivated interventions pursued by owners of private property.

Structure of this report

This report focuses on the financing of sustainable infrastructure in cities and is split into three sections:

1. Consideration of city infrastructure financing challenges
2. Creating the conditions for infrastructure delivery in cities
3. Detailed analysis of several financing mechanisms offering great potential for cities

Section 2

Infrastructure financing challenges

Infrastructure financing challenges

From a financing perspective delivering infrastructure can be challenging. These challenges include the following:

- Infrastructure projects typically require large injections of capital.
- Transaction costs tend to be higher as they are more complicated and occur over a longer timeframe.
- They face liquidity risks as they often do not generate cash flows until after a number of years and the initial phase of an infrastructure project is subject to high risks. For example, a district heating network needs to be constructed and in place before customers connect and provide a source of revenue.
- They can involve a large number of parties including construction companies, operators, governments and their agencies, private investors, insurers and the public, which can make them complex.

Climate infrastructure can bring additional issues to financiers. Some of these are set out below:

- Perceived risks of the technology or solution – often climate infrastructure is new with fewer operational hours 'clocked' than conventional approaches. Financiers may struggle to identify suitable experts or sufficient historical performance data, to assess the technology's robustness.
- The economic, social and environmental benefits and cost savings of sustainable infrastructure can be difficult to monetize – for example, how do you monetize the benefits of a green roof on a building?
- The small size of projects and the lack of scalability often present a challenge and a perceived risk to financiers. This is especially relevant when considering energy efficiency programs or microgeneration/ small scale renewable energy projects across a city, which are of course integral to driving down GHG emissions.

Cities are increasingly looking for ways to deliver services to their citizens without funding services in a traditional way. This is driven by three trends:

- Movement towards decentralized infrastructure. Cities will need some degree of centralized infrastructure for years to come, but some, like stormwater and wastewater treatment, often prove more economical to handle in a distributed manner, while others related to IT infrastructure for certain applications, may not need to be centralized at all.
- Cities increasingly want to trade capital expenditure money for operating expenditure money. Even when traditional centralized infrastructure is required, cities may not want to finance, build and own it in the traditional manner.
- Cities with constrained municipal budgets are looking for new sources of funding and finance to support their large pipeline of projects planned or under consideration. Common areas of interest include exploring off-balance-sheet finance options for cities who are close to their debt limits and diversifying or increasing existing city funding sources.

"Cities are increasingly looking for ways to deliver services to their citizens without funding services in a traditional way"

Traditional infrastructure presents challenges to investors that are better understood.

However, new approaches to infrastructure also offer a range of potential benefits and incentives. The key is to understand and embrace the opportunities and devise corresponding, supportive financing structures.

The most important of these benefits and incentives are:

- Lower cost infrastructure
- Reduced exposure to future costs or price fluctuations (e.g. avoided regulatory fees, or disaster prevention)
- Ancillary benefits such as public health, security, jobs and enterprise development
- Optimizing existing infrastructure through automation and digitalization
- Greater flexibility and future proofing of infrastructure
- Improved resilience of vital city infrastructure
- Greater integration and connectedness of city systems

Another key to this puzzle is how to unlock this value, and for financial institutions, to serve as an effective intermediary between those needing the capital (and value/benefit), and those wanting to provide the capital (and realize the value/returns).

Clearly, a set of alternative, more cost-effective approaches have to be pursued, and financed in ways that capture the cost-effectiveness (or capture cost savings and other benefits).

The challenge of new approaches

Like most things that are new, there are associated disruptions, and a lack of familiarity on the part of market players. Investors, lenders and rating agencies look for historical performance information to support transactions, and this is mostly absent with new approaches. So there is a need to demonstrate performance, and devise ways to mitigate that risk.

New approaches are often driven by opportunities to capture additional economic and societal value. New approaches also present their own set of challenges with respect to the basic information that underpins financing and investment decisions.

Has this been done before? Is there data to demonstrate historical performance? Will an independent engineer have precedents for evaluating the particular technology, its application, and the likelihood of it being able to deliver required results? Typically, the answer to these questions for anything new is some degree of “no”. In some cases the technology isn’t new. What is often new is how it is being applied and the scale. Cities can think strategically about how to address the “new” factor by considering degrees of difficulty, sequencing of pilots, and building on precedents.

This challenge can be further compounded by the fact that investors are working with a broad range of cities with different degrees of capability across multiple dimensions such as technical expertise and credit quality.

But along with the challenges of new approaches to infrastructure a range of potential mitigants and incentives emerge. Cities and investors need to embrace this infrastructure shift and develop supportive structures that capture the value of mitigants and incentives.

A number of financing routes are open to cities. Their appropriateness, applicability and deliverability will be informed by a number of factors including technology, scale, ownership, governance powers, market familiarity and geographic location among others.

"New approaches are often driven by opportunities to capture additional economic and societal value"

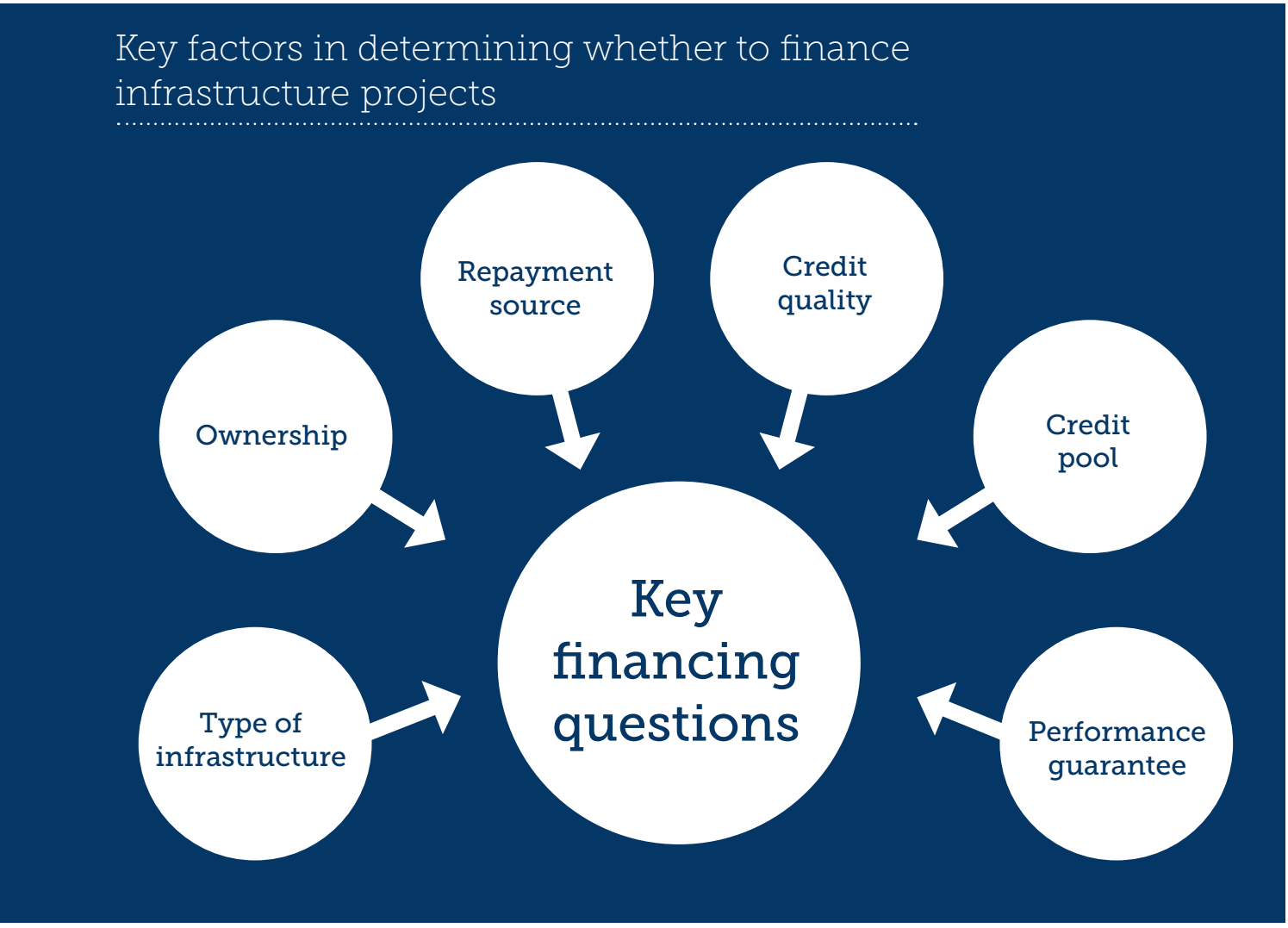
Making infrastructure choices and optimizing finance options

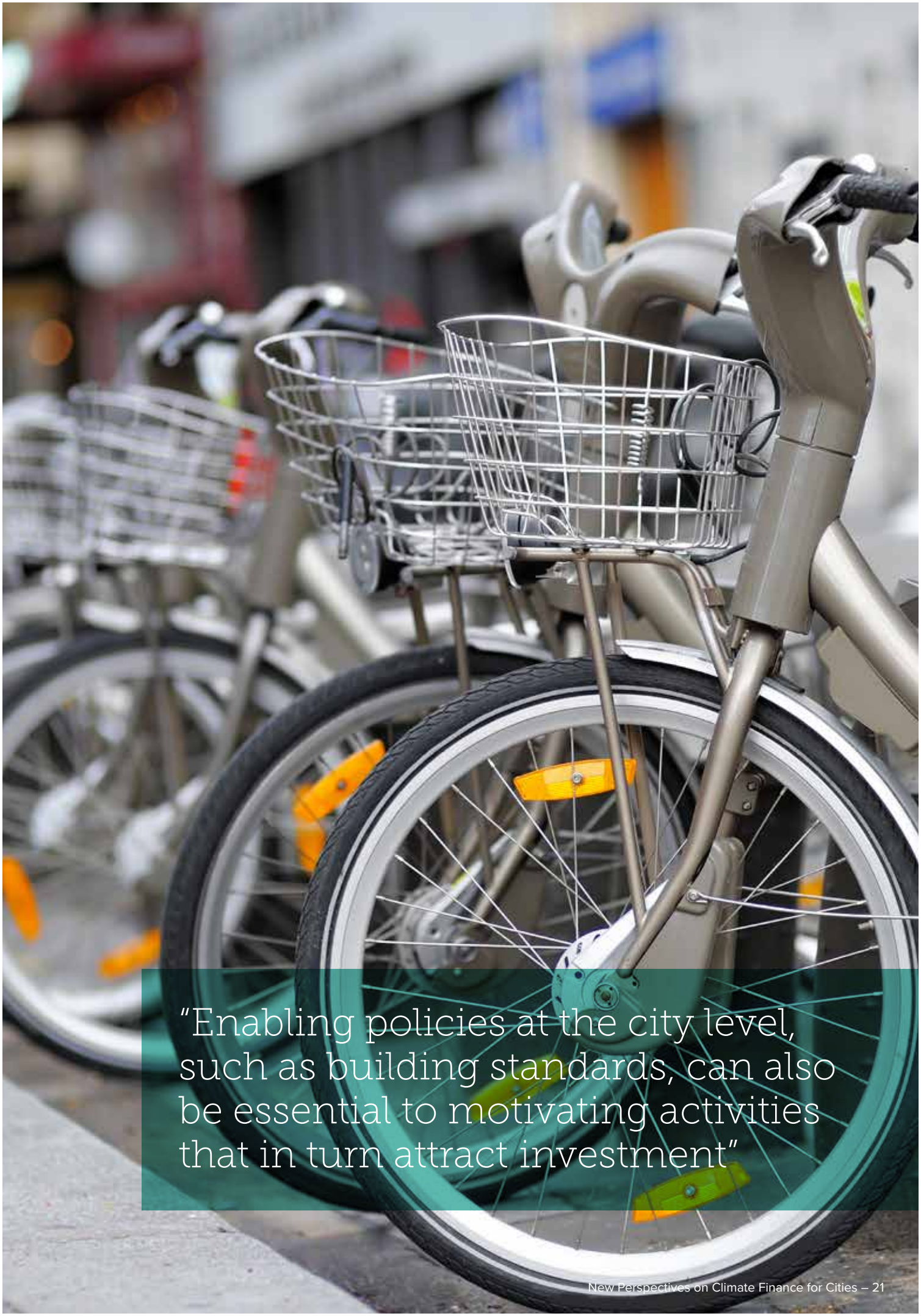
A broad range of factors influence the decision-making regarding financing for new and existing approaches to infrastructure. These factors are present at both the city administration and project levels. Section 3, 'Creating the conditions for infrastructure delivery in cities', explores some of the macro challenges facing cities and some of the ways in which city administrations can address them. At the city level, for example, the creditworthiness of the administration can be an important factor. C40, the World Bank and other institutions have been pursuing interventions such as training and capacity building around creditworthiness to help cities put in place plans to tackle this challenge. Enabling policies at the city level, such as building standards, can also be essential to motivating activities that in turn attract investment.

An interesting consideration regarding some new approaches to sustainable infrastructure is that issues at the city administrative level may be less relevant or even irrelevant. For example, the credit rating of the jurisdiction may not be relevant if the infrastructure resides within private companies or property, this is often the case with storm-water and energy efficiency programs. In cases such as these enabling policies at the city level can be fundamental to the degree of program (and infrastructure delivery) results.

This section of the paper focuses primarily on project-level factors; the unique attributes of a project and how they can inform financing, but does so in the context of city-wide factors.

Key factors in determining whether to finance infrastructure projects





"Enabling policies at the city level, such as building standards, can also be essential to motivating activities that in turn attract investment"

Project level attributes – Choosing the right finance mechanism

The project-level attributes that inform investment decision-making and how they overlay with new and existing approaches to infrastructure are important. Financing will in some cases be more difficult than in others. Understanding why and the mechanisms that can be applied to overcome barriers is essential. This section focuses on six factors that help answer the following key financing questions. Who is responsible for repayment and what is the likelihood of repayment?

A framework for financing sustainable infrastructure decision making

Taken together the six factors (set in the boxes on the opposite page) can determine both infrastructure choices and the best finance route. The risk matrix illustration (opposite) shows that different approaches have different complexity levels across all factors. This risk matrix also highlights ways in which complexity can be managed. It should be read vertically by factor. Different approaches score differently depending on the degree of complexity.

For example ownership options increase in complexity from public owned through to public and private partnerships. The degree of complexity (shown on the y axis) for each factor increases as you move upwards. The complexity threshold (the green horizontal lines) across the risk matrix show significant increases in complexity.

New, alternative approaches to infrastructure present new opportunities to capture value such as reduced implementation and operating costs, and environmental and social benefits. The risk matrix shows the challenges that need to be considered and overcome in order to realize these new approaches.

Strategies and measures to overcoming financing challenges

A number of strategies and mitigants exist that cities can pursue to help attract financing and investment for infrastructure; a number of which have been demonstrated in the previous sections and case studies. The first strategy to consider is to not start with the “hardest to do”. Cities should consider the degree of difficulty and whether or not there are opportunities to start at the easier end of the spectrum, establish successful precedents, and then build on them to tackle harder to do elements. This strategy is important both within a specific factor, and the set of factors as a whole. Successful projects often opt to “push the boundaries” within one or two factors; not all of them.

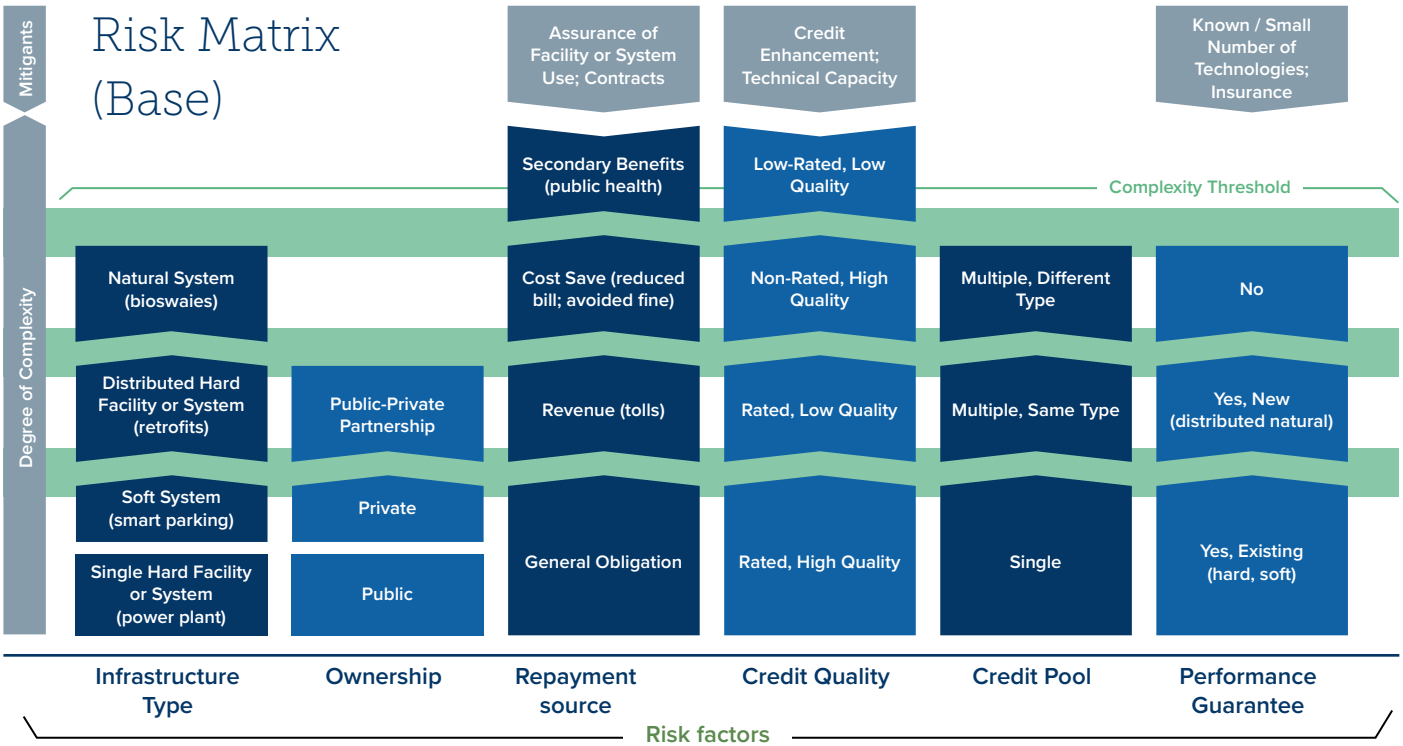
Another common strategy, in cases where the credit is unknown or weak, is to secure a form of credit enhancement. This is typically provided by a public agency with a mission to support new types of infrastructure that deliver environmental and social benefits. Enhancements can “de-risk” the extension of credit for traditional sources of capital.

To address a lack, or insufficient quantities, of performance data, proxies or analog precedents might be used. For example, with regard to bioswales as an alternative form of infrastructure for managing stormwater, there may be examples of bioswales used in other applications or geographies. And with respect to credit extended to property owners for stormwater improvements, one might be able to understand repayment likelihood and behavior from credit extended to property owners for other types of improvements such as energy.

The case study overleaf shows an example of how challenges to delivering energy efficiency in homes, principally around scale and the ability to access capital, can be overcome.

A departure from these “baseline” factors (movement upwards within a vertical) often represents a change associated with new, alternative approaches to infrastructure, as well as an increased degree of difficulty.

What cities and other market actors are most familiar with is an infrastructure that has attributes positioned at the bottom of each vertical. Alternative approaches are pushing cities and market actors up the verticals, requiring improved understanding and new tools for financing. Subsequent sections explore specific tools and additional illustrative cases.



Infrastructure Type

What is the infrastructure? Is it a single, fixed-point facility such as a sewage treatment plant, or a collection of property-based improvements such as stormwater retention measures? Is the infrastructure technology-based or reliant on a natural resource such as wetlands?

Repayment Source

What is the source of repayment (or return in the case of equity)? Does the infrastructure generate revenue (e.g. a toll road), or does it help to avoid costs or fines (e.g. compliance regimes)? Or does a general obligation support the debt? If the repayment is dependent on policy-based compliance regime, how long will the regime be in place, and what is the likelihood it will remain?

Credit Pool

Credit Pool is closely linked to credit quality, but describes the number of existing credits and how easily they can be analyzed? A single credit might be easier to analyze, but a pool of credits, depending upon their characteristics, could help to diversity and mitigate risk.

Ownership

What entity owns the infrastructure? Is the infrastructure owned by the city administration, privately-owned, or some combination of the two? A sewage treatment plant and the sewage and stormwater pipes and interconnections could be publicly-owned, while the sources of sewage and stormwater alleviation could be publicly (e.g. a park) or privately (e.g. a residence) owned.

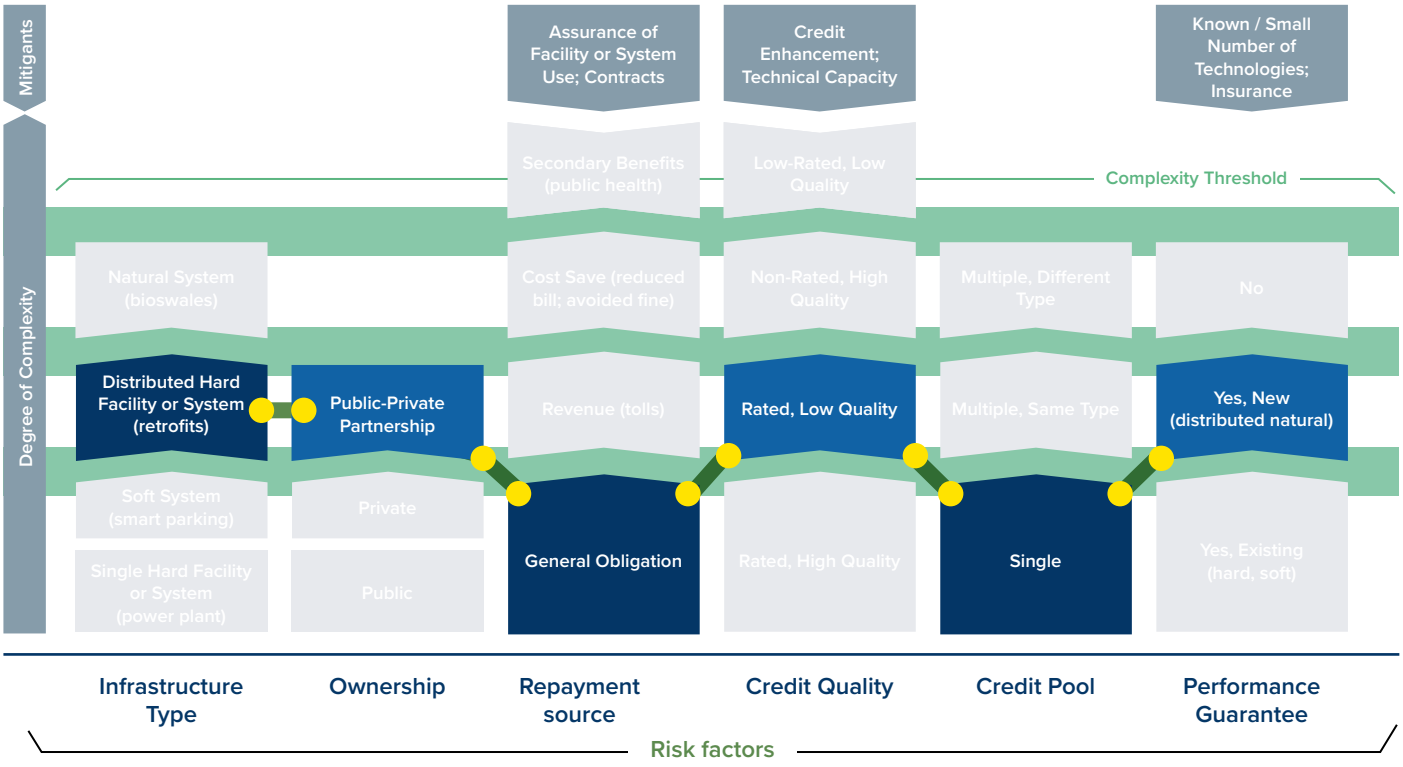
Credit Quality

What is the risk of default? What is the likelihood the borrower will be able to repay the loan? How easy is it to determine credit quality? Is there publicly available information available such as a credit rating? If not how difficult is it to understand credit quality? In cases where a rating does not exist, or the rating is insufficient, some combination of credit support and capacity-building may be needed.

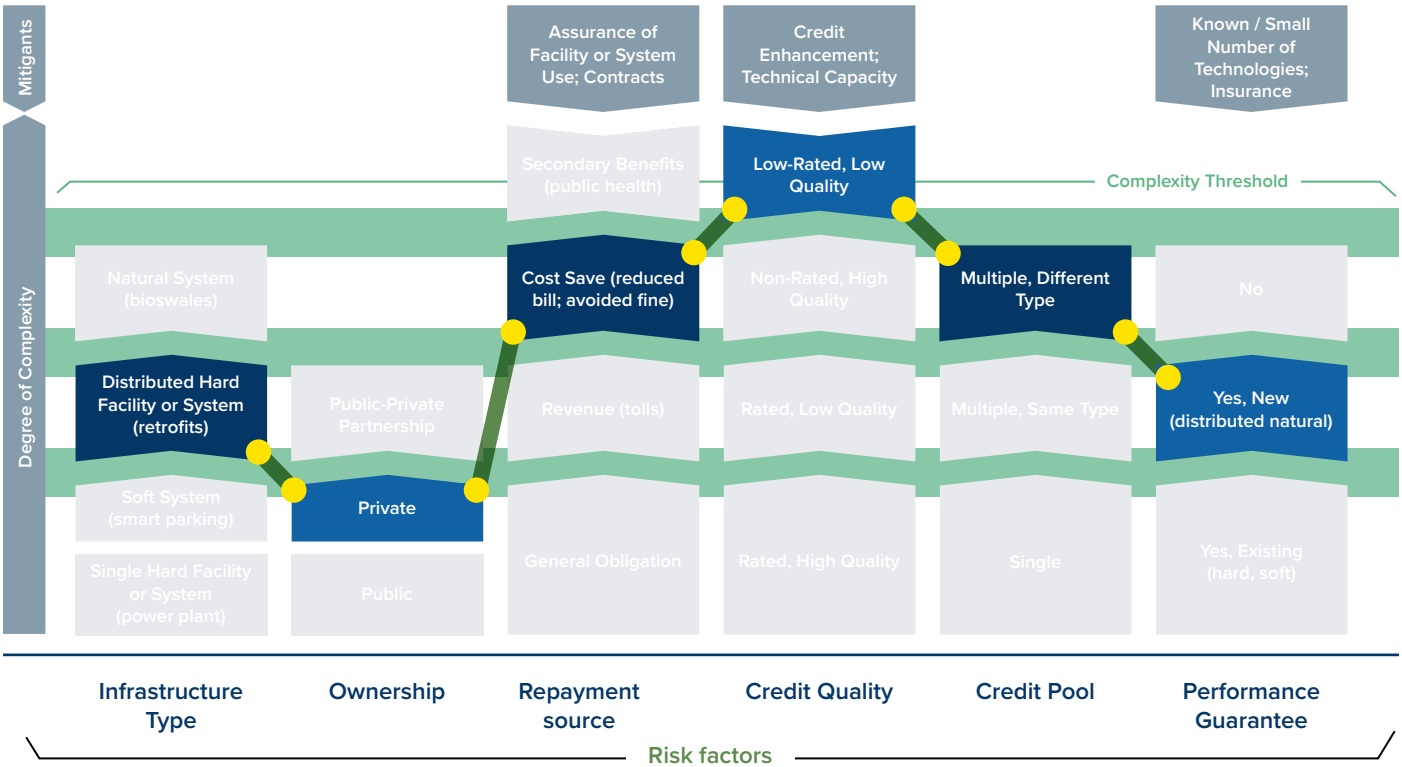
Performance Guarantee

Is the performance of the infrastructure guaranteed? If the technology approach is new or being applied in a different context, how much experience does the contractor have? Is there sufficient experience and performance data that an engineer can use when evaluating performance? New approaches lack performance history, so proxies or supplemental forms of support may be needed.

Risk Matrix Replacement Public Lighting PPP project



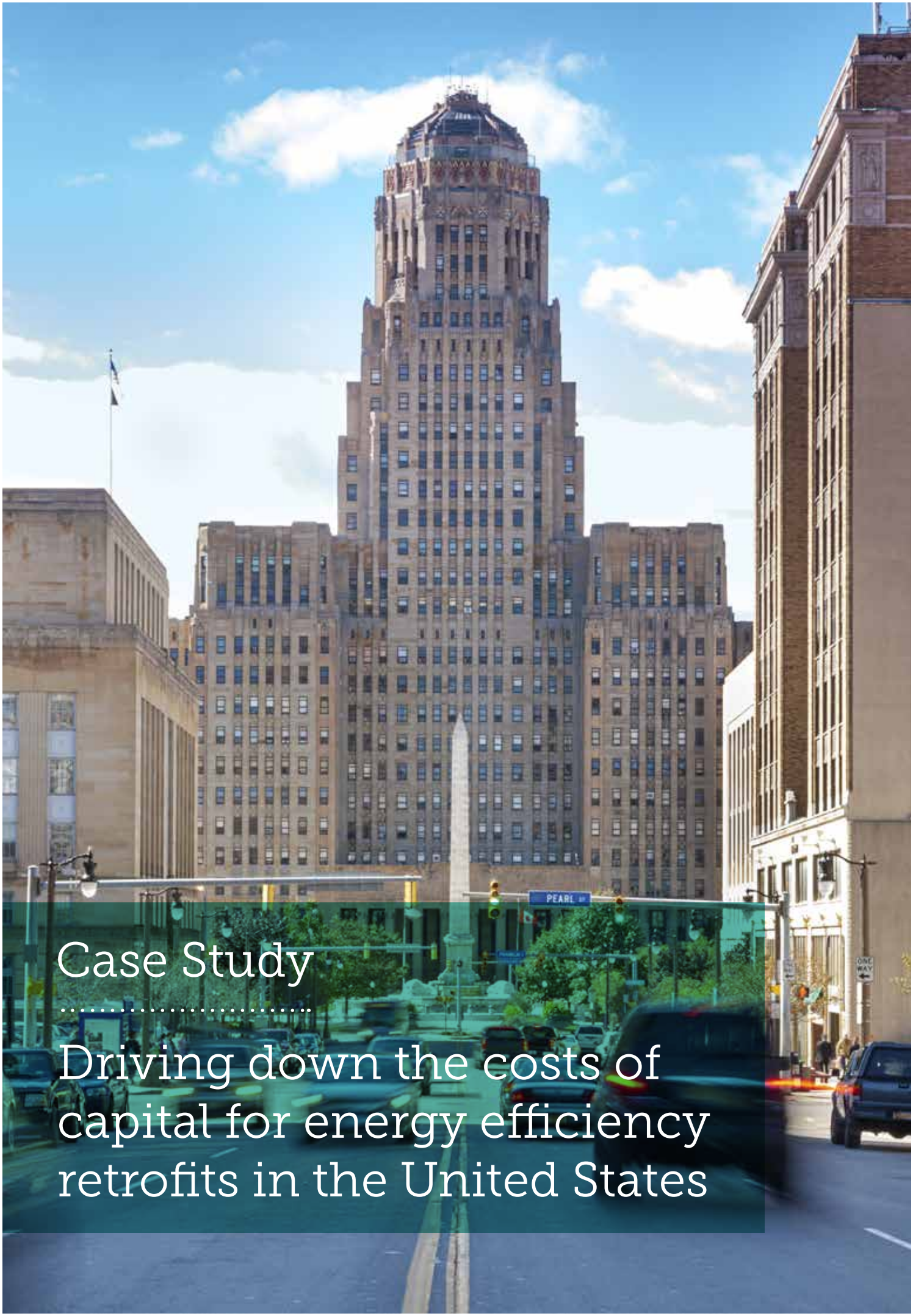
Risk Matrix Energy Performance contracting program for industrial customers



"Cities should consider the degree of difficulty, and whether or not there are opportunities to start at the easier end of the spectrum"

Case Study

Driving down the costs of capital for energy efficiency retrofits in the United States



Case Study

Driving down the costs of capital for energy efficiency retrofits in the United States

Energy efficiency is often cited as one of the least expensive measures for GHG emission reductions. However, barriers including sufficient scale, geographic diversity and performance data have limited it from accessing capital.

WHEEL (Warehouse for Energy Efficiency Loans) is a facility in the US that commits a financial institution to purchase and "store" (warehouse) loans that meet certain agreed upon criteria until the aggregated value of the loans is sufficient to be securitized (meets the size and other criteria of larger institutional investors). It builds on the success of a large number of state and locally-sponsored energy efficiency programs that have been running for a number of years; building-up volume and performance data.

By aggregating state and local energy efficiency programs, WHEEL drives down the cost of capital and thereby incentivizes additional activity; and provides an appropriate vehicle for institutional investors with a desire to invest in energy efficiency.

A "socialized" credit enhancement facility is built from state contributions of public, utility benefits charge, or other monies to help support from a credit perspective the specific policy objectives of a participating state (e.g. interest rates offered to households, or inclusion of certain income levels).

WHEEL is supported by several policy framework-related provisions including state and local programs that develop a sufficient pipeline that can be aggregated, the Federal government's allowance for American Recovery and Reinvestment Act (ARRA) funds which are used in the socialized credit enhancement facility.

The consortium closed the first asset-backed securitization of energy efficiency loans to market in 2015. Subsequent securitizations will continue as the facility fills, and depending on program growth the facility could be resized, and the frequency of securitizations increased, accordingly.

WHEEL involves a range of stakeholders, from philanthropic organizations that provided seed funding (e.g. Rockefeller Foundation and Ford Foundation), NGOs that were instrumental in its development (e.g. Energy Programs Consortium, National Association of State Energy Offices – NASEO), state and local programs (e.g. Pennsylvania's Keystone Help), Federal agencies such as the Department of Energy that facilitates use of Federal funds and financial institutions such as AFC First, Citi and Renewable Funding.

A number of lessons were learned in the development of WHEEL. These include the multiple components and stakeholders required to deliver the scale of aggregation needed. Whilst capital markets are not a panacea they do offer a path to larger quantities and more efficient capital, a key ingredient for program growth. As such, it was critical to ensure that state and local programs, and their aggregation, meet the needs of the capital markets in terms of size, diversity (across several dimensions of risk), and required data/information. The time required to establish and launch WHEEL was considerable. Establishing new asset classes in the capital markets takes time but now that it is established, a platform exists to rapidly grow energy efficiency programs and provide larger amounts and more efficient sources of capital.

"WHEEL drives down the cost of capital and thereby incentivizes additional activity; and provides an appropriate vehicle for institutional investors with a desire to invest in energy efficiency."

Section 3

Creating the conditions for infrastructure delivery in cities

Creating the conditions for infrastructure delivery in cities

A number of common themes emerge around delivering sustainable infrastructure in our cities. These include:

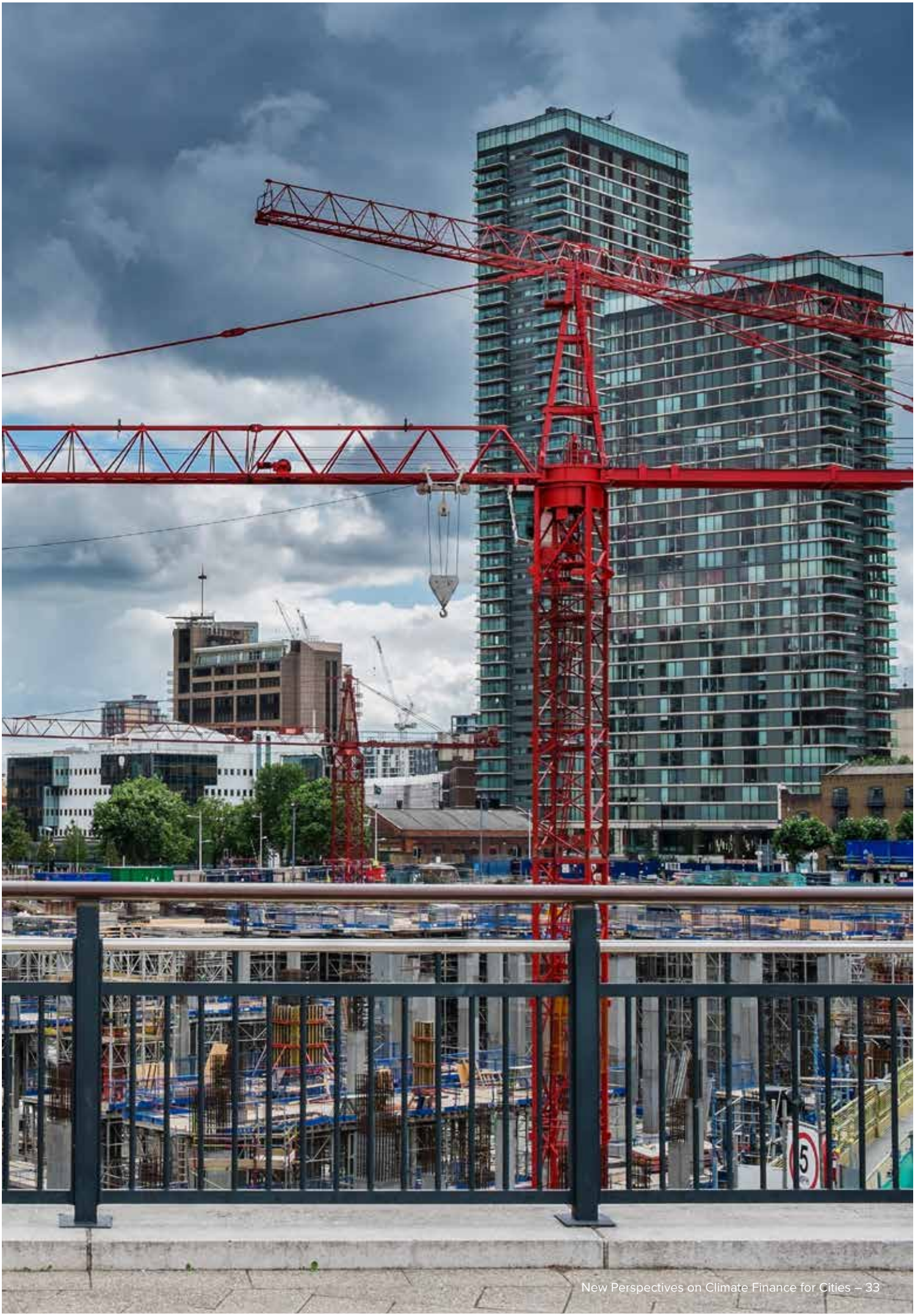
- The need for significant sums of money to be invested in sustainable urban infrastructure.
- The need to quicken the pace of that financing and investment to cope with our growing cities and climate-related impacts.
- The challenge of redirecting capital to finance a transition to a low carbon economy, with financing accessible and targeted more effectively to where it is most needed.
- Cities exploring and pursuing new approaches to infrastructure and corresponding ways to finance their climate change-related activities.

Cities also face a number of constraints when seeking to deliver infrastructure, especially new approaches. These include:

- **Creditworthiness:** Cities with low creditworthiness have a very limited set of finance options, with many investors unwilling to provide debt or equity finance to these cities or the capital is offered at prohibitively high rates. The World Bank estimate that every $1 spent on correcting creditworthiness levers $100 of private sector finance.
- **Legal powers:** Cities need to consider their legal duties, their ability to raise capital, assets and how they can use them as well as any legal powers they may have in assessing where and how to focus their efforts.
- **Accessing international funds:** In many cases funding cannot be accessed directly by cities. Some international funding is available via national governments or with their explicit agreement via a sovereign guarantee.
- **Tightening Budgets:** Many cities also face tightening budgets or have fiscal rules in place that control their access to finance.
- **Technical and financial expertise:** In many cases cities do not have the necessary expertise or knowledge to take forward complex infrastructure projects.
- **Market familiarity:** new approaches require market actors to become familiar and comfortable with structural dimensions of new approaches (e.g. the ability to secure performance guarantees).

$100

The amount of private sector funding attracted for every $1 spent on improving creditworthiness in a city



Actions for city governments: creating the conditions for financing and investment

So what are the things that cities can do to make them attractive prospects for financing and investment? Figure 4 breaks these activities into four main areas. Whilst this list is not exhaustive it does illustrate some of the actions that they can take.

Figure 4: City activities to support infrastructure development

Governance

Investor confidence is essential to attracting investment. The governance of the administration and its finances must be transparent and accountable in order to give investors the confidence to invest. A city's financial management in areas such as municipal revenue collection is directly linked to the ability it has to raise private capital for infrastructure projects. The World Bank estimates that of the 500 largest cities in developing countries only four percent are creditworthy on international financial markets and 20 percent on local markets. Subsequently, the World Bank has established the City Creditworthiness Program to help city finance officers to conduct reviews of their municipal revenue management systems and begin the first steps to qualifying for ratings.

Export Credit Agencies can play a role as an intermediary financing or underwriting of business in developing countries. Their function is explored in more detail later in this report.

Siemens along with PWC and BLP recently published Investor Ready Cities, a report looking at the measures cities need to put in place to ensure they have the governance in place to make them attractive places for private sector investment.

Policy and planning

Government can set the right market conditions to attract private sector finance through the development of appropriate policy and planning regulation for the city.

Clear, evidence based policy supporting the city's strategic aims and targets for climate change mitigation and adaptation can create the conditions to encourage investment and private sector confidence. Clear, deliverable and consistent policy gives the framework to allow financiers to invest over the medium to long term. For example London's spatial development planning policy sets out very clear climate change policies around strategic development for the period of the plan. In 2013 these development policies secured:

- GHG savings 36 percent higher than required by UK Building Regulations
- Commitments for the provision of Combined Heat and Power capable of producing 25MW of electricity and a similar amount of heat
- Significant investment in energy demand reduction measures in buildings
- £120 million investment in heat network infrastructure and associated CHP capacity, supporting the strategic move to decentralized energy networks
- £13 million investment in photovoltaic panels and additional investment in other renewable energy technologies

Project pipeline development

A recent study by Long Finance and WWF which surveyed the finance industry identified that the main impediment to infrastructure investment at scale was a lack of investable projects. It goes on to state a pipeline of projects would meet the visibility and scale requirements of large investors, allowing them to release a greater proportion of their resources to infrastructure. Institutional Investors currently invest a meager one percent of their resources in infrastructure.

Within the context of the city's strategic aims and policies, cities need to assess their project opportunities. Rather than a wish-list of ideas, such an assessment should focus on prioritizing projects and assessing their feasibility, impact and the profile of risk and return. Cities need to take a realistic view on which projects can leverage investment from private investors by offering a reasonable prospect of return and clear revenue streams.

$225 million

The amount of additional private development through Portland's floor area ratio bonus

Getting projects through the pre-development stages is often the most challenging aspect of project development, as it can be resource intensive without offering any revenues. As a consequence, it can be difficult to secure the necessary resources and technical expertise to undertake the initial technical, legal and financial feasibility work for some projects.

Some cities are looking actively at how they can support the development of projects through these early stages. The importance of this work and the need to support technical and financial capacity within governments has also been recognized by some financiers. For example, the European Investment Bank and European Commission offer funding (49 million euros in total) towards the development of projects through its European Local Energy Assistance (ELENA). ELENA funds support local or regional authorities looking to implement their climate plans. They can be used to structure programs, develop business plans, undertake energy audits, prepare tendering procedures and contracts and pay for project implementation units. This technical capacity support is playing an important part in mobilizing €1.6 billion of investment in projects across Europe.

Incentivizing development

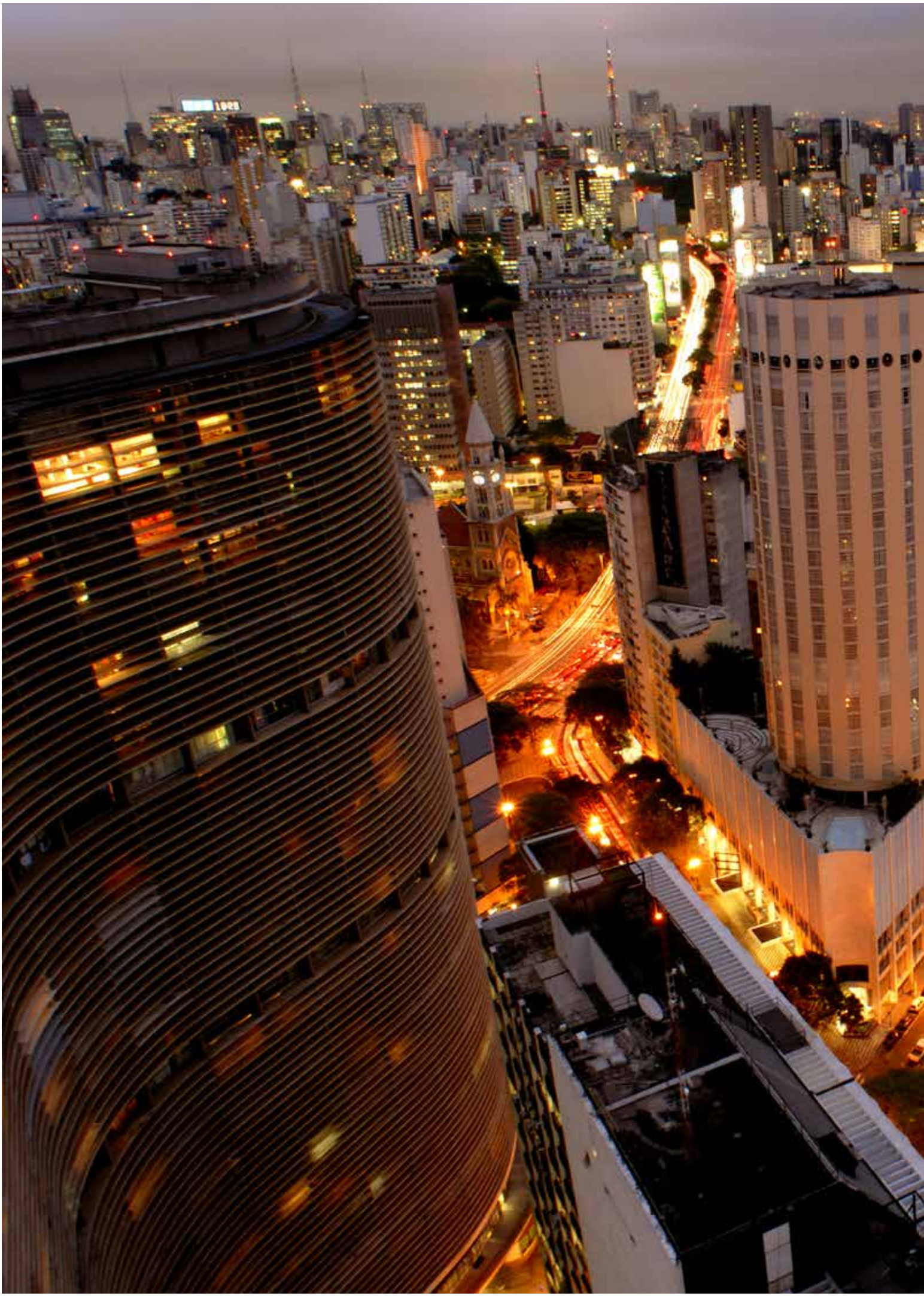
Tightening budgets and a growing recognition that cities must make themselves attractive places for private sector investment is leading to many creative ways in which cities are incentivizing investments in their areas. Portland, Oregon, USA is incentivizing green roofs through its planning system to alleviate pressure on its stormwater management systems. Portland's floor area ratio (FAR) bonus increases a building's allowable area in exchange for adding a greenroof. Portland has seen over $225 million in additional private development through this program, and more than 120 ecoroofs have been built in the center city district.

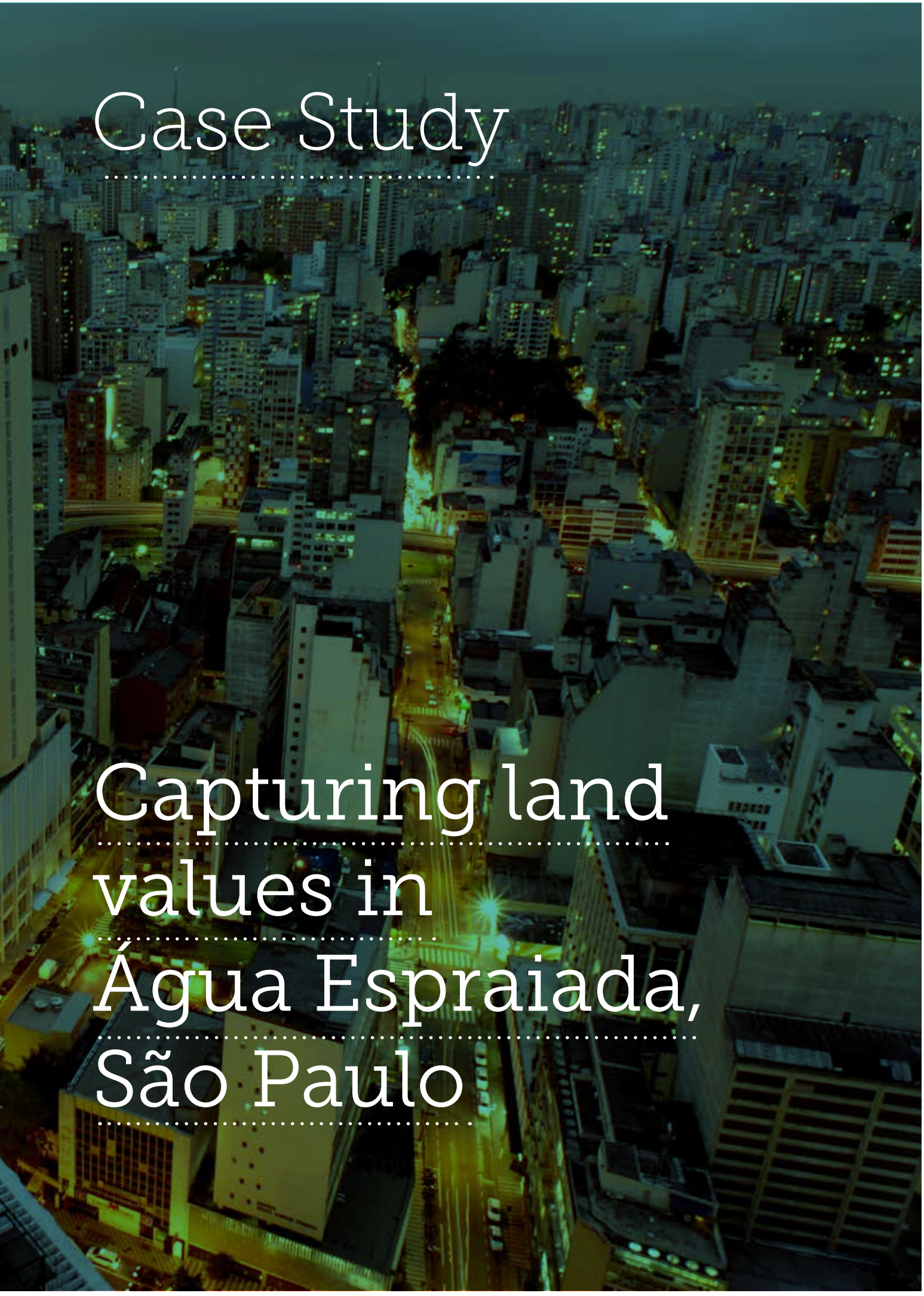
Cities can also use land value capture to raise funding to support development. Value capture is a public financing technique that 'captures' a part or all of the increases in private land values that will result from public investment in infrastructure. In such cases the beneficiaries of the infrastructure contribute towards its costs through tax on property or requiring an in-kind contribution, such as land or improvements from developers. The additional revenue can be used as a revenue source to fund infrastructure. The infrastructure in turn leverages more private investment in the area as it improves.

Increases in land value may arise from public investments like building a metro or transit line through a certain area, building a park or attracting private investment towards more intense development. By building transport infrastructure within neighborhood or local areas, the demand for land in the area is boosted as residents or businesses are attracted to locate nearby and benefit from convenient transport links. The potential rise in land value that results provides municipalities with the opportunity to capture some of this added value.

Cities as laboratories for innovation

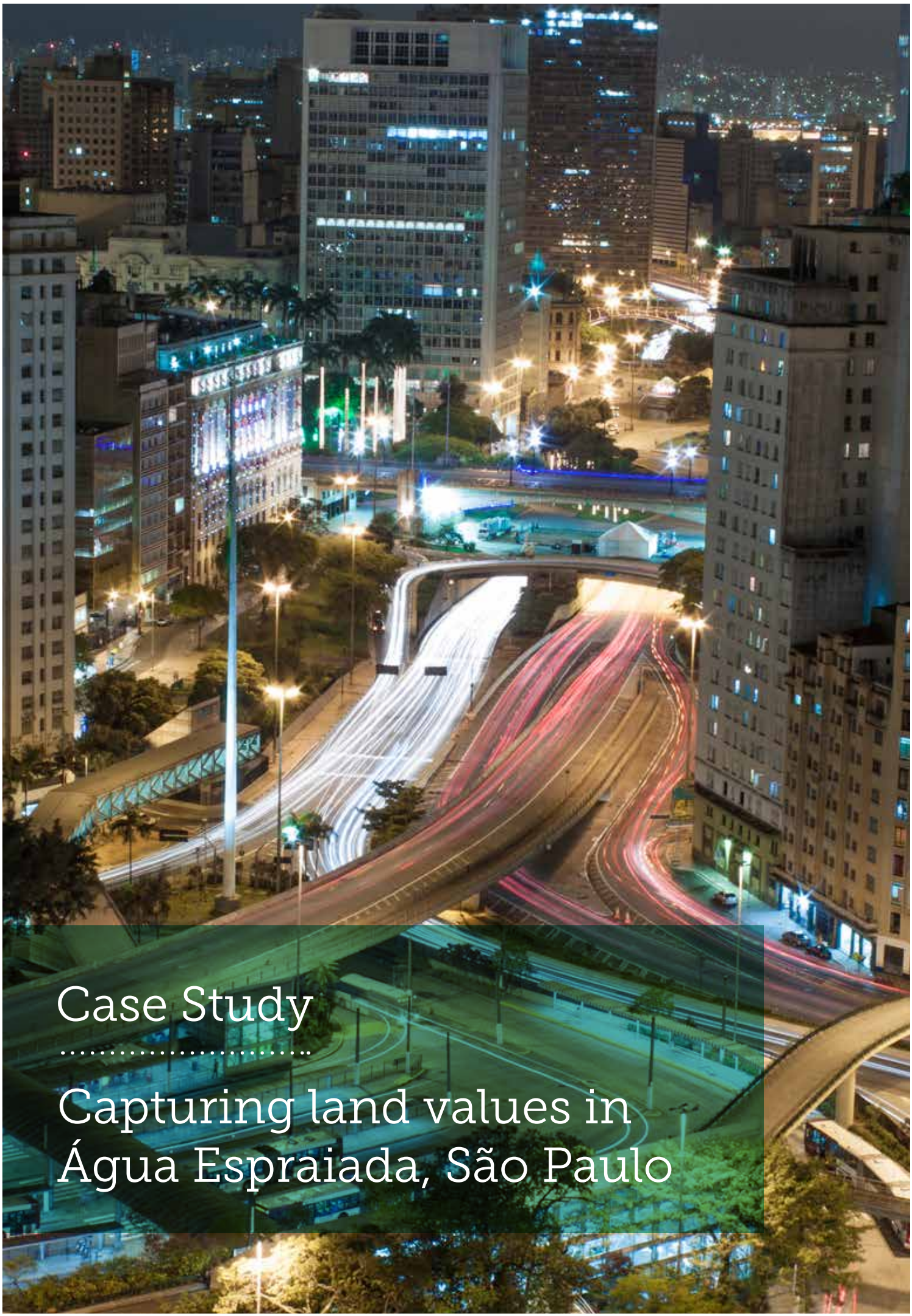
The confluence of new pressures and resources, factors that have always been present in city development are fostering the drive towards new approaches; approaches that both meet city needs and foster innovation, and the creation of new markets and norms. In this way, climate change, urbanization, big data, and new technologies are the latest factors feeding "laboratories for innovation" in cities around the world.





Case Study

Capturing land values in Água Espraiada, São Paulo



Case Study

Capturing land values in Água Espraiada, São Paulo

In recent years, the area around Água Espraiada has undergone a complete transformation including the development of a medical center.

The value capture strategy deployed by the local authority raised substantial amounts of public revenue to pay for infrastructure projects in the area, including social housing projects for displaced favela residents to move into. In 12 years, São Paulo has raised approximately US $2 billion through the sale of bonds, of which a staggering 75 percent came from Água Espraiada.

São Paulo identified the zone for redevelopment and established a bond trading scheme where developers could purchase bonds at an auction. A certain number of certificates permitting additional construction potential, known as CEPACs, entitle developers to build extra density in the area. The bonds were auctioned through the Bank of Brazil and certified by the Securities and Exchange Authority and have become an established investment vehicle for pension funds and investors. Developers are entitled to build bigger buildings than traditionally allowed by law. Proceeds from the bonds can be used by the government to invest in housing, roads and other infrastructure within the same zone.

"São Paulo has raised approximately US $2 billion through the sale of bonds, of which a staggering 75 percent came from Água Espraiada"

Section 4

Financing mechanisms for cities

Introduction

This section looks at some of the financing mechanisms available for climate related programs in cities. Climate finance mechanisms and solutions are designed to address or complement market gaps; gaps articulated in the previous sections that are often the result of alternative approaches to infrastructure.

There are many sources for climate finance including governments, commercial banks, private equity funds, infrastructure funds and other specialist funds. International financial institutions, multilateral and national development banks and export credit agencies, institutional investors such as pension funds, insurance companies and sovereign wealth funds, private companies and capital markets.

This section explores the role that different mechanisms such as emissions trading schemes, green bonds, climate funds and equity can play. It looks at the benefits and challenges of each approach, identifies the likely providers of the finance which vary depending on the financing mechanism. Importantly this is backed up by real examples of financing options being applied in cities.

Cities are increasingly creating their own incentives and schemes to reduce their environmental impact due to perceptions around the pace and complexity of processes at the national and international level. China for example is pioneering a number of Emission Trading Schemes in cities such as Beijing and Guangdong. Green Bonds are the method of choice in other jurisdictions such as Johannesburg in South Africa.

The scale and length of investment, appetite of investors, business case, risk and return profile, type of technology combined with the city's technical capacity, approach to financing and its governance will determine which mechanisms are appropriate and in which circumstances.

This section focuses on five climate finance mechanisms available to cities for sustainable infrastructure:

- Emissions trading schemes
- Green bonds
- International Financial Institutions and Agency Finance
- Climate funds
- Equity capital


"Cities are increasingly creating their own incentives and schemes to reduce their environmental impact"

4.1 Emissions trading schemes

Quick Look

- The combined value of emission trading schemes in 2015 is estimated at $34 billion globally
- Despite delays at the international level new schemes are emerging at the national and sub-national level, including in the two countries with the greatest emissions China and the USA
- 12 percent of global GHG emissions are covered through regional (EU) national, and sub-national trading schemes
- Whilst trading schemes offer flexibility they can be vulnerable to unexpected economic impacts

Introduction

GHG emission trading schemes are in operation in several countries around the world. A range of new schemes are also currently in development and the trend for trading between different schemes is also growing. If designed well, trading schemes can drive the most economic reduction in GHGs.

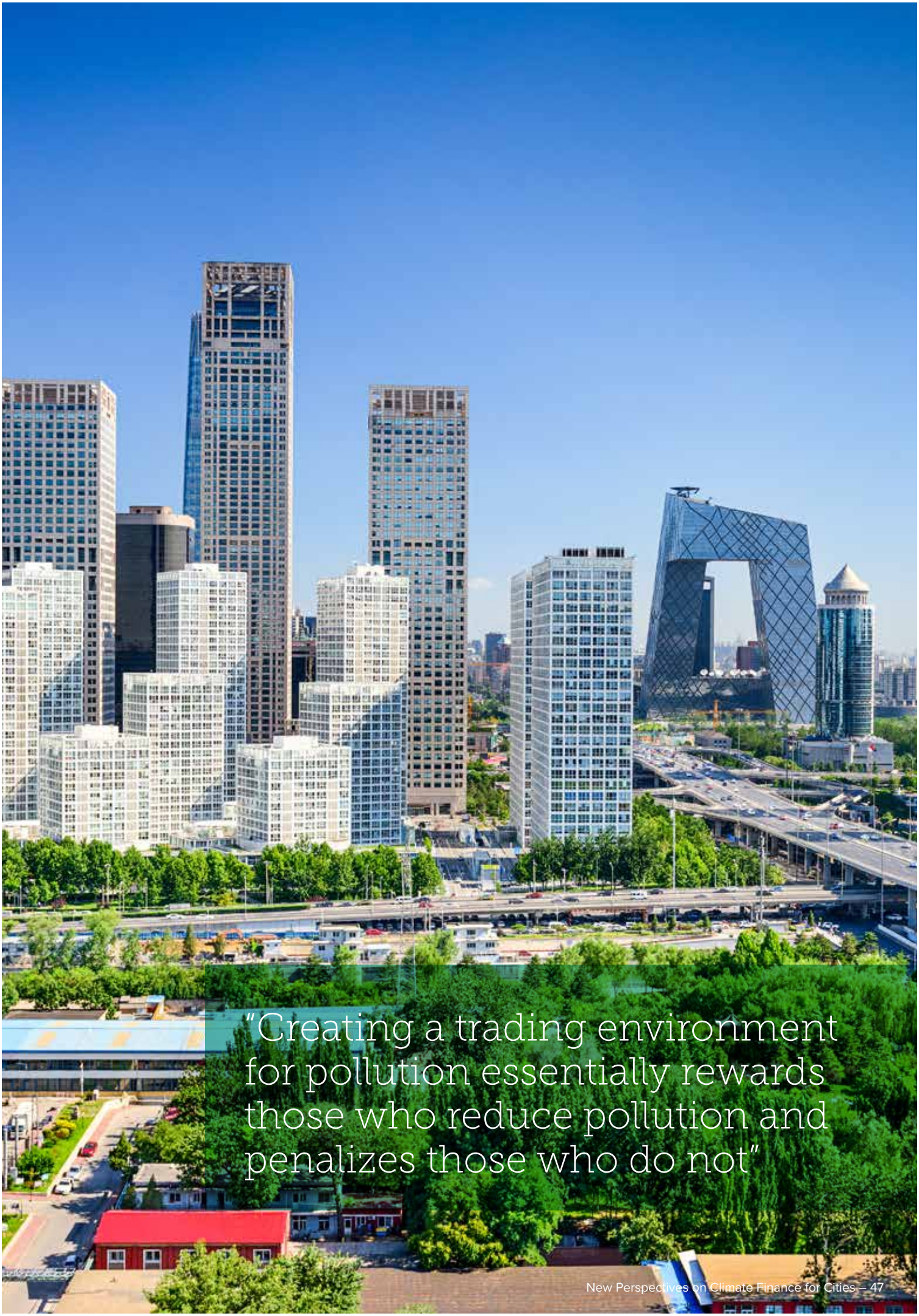
Emission trading schemes (ETS) deliver investment into GHG reduction. This approach uses economic incentives and disincentives to drive change in the market. Creating a trading environment for pollution essentially rewards those who reduce pollution and penalizes those who do not. The World Bank estimates that a price has been placed on about 12 percent of annual global GHG emissions.

Despite challenges at the international level for emissions trading schemes due to the over allocation of free allowances, the global financial crisis and protracted international negotiations around climate, there has been real traction at both the regional and city level. For example, state and city level trading schemes have been established in both the United States and China. The table below shows the significant interest at the sub-national level in emissions trading, with 13 schemes in operation, four scheduled for implementation and another 22 being considered.

Table 1: Summary of emission trading schemes at the regional, national and sub-national level

State of ETS	Regional	National	Sub-national	Total
Implemented	1 (31 Nations)	4	13	18
Scheduled for implementation	1	1	2	4
Under consideration	8	3	11	22
Total	10	8	26	44

Source: World Bank, 2014



"Creating a trading environment for pollution essentially rewards those who reduce pollution and penalizes those who do not"

Key facts about the mechanism

An emission trading scheme, sometimes called a 'cap and trade' scheme, sets a capped amount of GHGs for a sector(s). The scheme is devised to distribute allowances of permitted emissions to entities covered by the scheme. Where an entity exceeds its permitted emissions level it must buy additional allowances from another entity within the scheme. Entities that emit fewer emissions than their permitted allocation can sell their excess permits. The buying and selling creates a market for GHGs, placing a value on emissions and acts as an incentive for all entities in the scheme to reduce their emissions. The price placed by the market on GHGs will influence decisions about how a sector manages its assets and its investments in the longer-term. While providing certainty regarding the overall emissions level (the cap) it allows the market to determine the best way to deliver the target (the trade).

$985 million

Revenue raised across nine US states in 2012 through the RGGI emission trading scheme

There are a number of variations of emissions trading schemes. Firstly, how the permitted allocations are distributed to entities – they may be allocated as a free allocation or they may be distributed via auction. Auctioning permits can raise revenue for governments. The Regional Greenhouse Gas Initiative (RGGI) in the United States for example allocates 90 percent of its allowances to regulated electricity generators via auction. This approach in 2012 generated US $985 million in public revenue across nine states, the majority of which was reinvested in low carbon programs. The free allocation of allowances helps to reduce cost and competitiveness burdens to affected industries, especially those competing with regions not subject to regulatory carbon constraints. Another variation is that prices can be stabilized or contained in some schemes either through a price floor or ceiling or through allowing off-setting between years.

Emissions trading schemes are operating in a range of different emission sectors such as buildings, industry, transport and waste. In addition the scope of the emissions covered varies from scheme to scheme.

Trading schemes can cover different sectors. Schemes may also cover a broad range of the emissions within the geographic region it is located. For example Tokyo's cap and trade scheme covers 20 percent of the city's emissions, which is towards the lower end of existing schemes. The Chinese city pilots cover between 38 percent to 60 percent of GHG emissions. Schemes operating in the USA cover between 20 to 35 percent whilst the EU Emissions trading scheme covers 45 percent of emissions.

Can cities set up their own trading schemes?

Trading schemes have been set up internationally, nationally and at the regional or city level.

Where city schemes have been established, legislation or regulations have to be put in place by the appropriate body. In the USA schemes operating at the state level have been regulated by the state government. In Tokyo and Yokohama schemes are created and enforced by the metropolitan governments of the cities. The city governments were able to legislate through building regulations for a cap and trade scheme, whilst in China the national government has provided the mechanisms through which their emissions trading scheme was established. Cities need to be mindful of the features that make emission trading schemes successful. According to the IMF these are:

- A broad coverage of emissions
- A uniform price for all emissions, regardless of the fuel type or the user
- Stable and predictable prices
- Alignment of prices with carbon reduction targets
- Maximizing the benefits – good schemes ensure that they capture revenues raised and use them productively through either reducing broader tax burdens or funding socially desirable climate related projects
- Carefully developed compensation schemes for vulnerable households and businesses

Table 2: Sectors and proportion of emissions covered by different schemes

Jurisdiction	Start date	Power & Heat	Industry	Liquid fuels	Building	Transport	Waste	Forest	Coverage (%)	Coverage (Mt Co_2e)
EU ETS (28+3)	2005								45%	2,000
New Zealand	2008								50%	37
Kazakhstan	2013								55%	153
Switzerland	2013								7%	3.5
Republic of Korea	2015								60%	400
RGGI (9)	2009								22%	104
California	2013								85%	395
Alberta	2007								45%	108
Quebec	2013								85%	61
China's Pilots (7)	2013								70%	1,000
Tokyo	2013								20%	13
									Total	4,275

Source: World Bank

What is the authorizing environment for emissions trading schemes?

The authorizing environment depends on the nature of the scheme. For schemes operated through the Kyoto protocol the authorizing environment is set by the United Nations Framework Convention on Climate Change (UNFCCC). In other cases schemes have been set up to deliver voluntary emission reduction goals.

The Clean Development Mechanism

The UNFCCC is the governing and authorizing body of the Clean Development Mechanism (CDM). The CDM is a Kyoto Protocol instrument that allows a country with an emissions cap or reduction commitment to implement an emission-reduction project in developing countries. These projects can generate certified emission reduction (CER) credits that can be counted toward meeting the Kyoto targets. One CER is equivalent to one ton of CO_2 reduced through a CDM project.

A CDM project must provide emission reductions that are additional and would not have occurred otherwise. That means that the project reaches profitability through the additional revenue stream provided by the CERs generated. The projects are registered under a rigorous UNFCCC process and ultimately approval is given by the designated national authorities.

The Voluntary Standards

Other carbon markets, beyond the CDM mechanism, offer more flexible forms of reducing GHGs in the atmosphere. Companies, governments and organizations, even individuals can participate in those markets by supporting GHG reducing projects generating verified emission reductions (VERs). VERs can be certified according to various methods and by different bodies. The Gold Standard offers voluntary market participants to apply the same rigor as the CDM does and hence opens the door for VERs to be traded in the CDM market in the future.


"The Gold Standard offers voluntary market participants to apply the same rigor as the Clean Development Mechanism"

Case Study

Case study: Driving down building emissions in Tokyo

Case Study

Driving down building emissions in Tokyo

Tokyo has a population close to 35 million. In 2006, Tokyo emitted 59.6 million tons of CO_2e, 95 percent of emissions were from energy-related activities.

Electricity generation accounts for 50 percent of emissions, oil 28 percent and gas 17 percent. Tokyo generates around one-fifth of Japanese GDP.

The Tokyo Metropolitan Government's Bureau of Environment developed the world's first city level emissions trading scheme. The scheme came into effect on April 2010 and covers around 1,340 large buildings and facilities including:

- Industrial factories
- Public facilities
- Educational facilities
- Commercial buildings

The Tokyo emissions trading scheme started as a voluntary program that evolved into a cap-and-trade program with mandatory targets for Tokyo's biggest emitters. Credits can be banked by entities but not borrowed.

The City aims to reduce emissions from buildings by 25 percent from 2000 levels by 2020. CO_2 reductions are aimed at 6-8 percent of 2000 levels in the first compliance period (2010-2014) with a possible further 17 percent reduction by the end of the second compliance period (2015-2019).

On top of GHG reductions the scheme has made a significant impact on Tokyo's electricity consumption. Peak power demand has reduced by 10 gigawatts from Tokyo's previous peak demand of 60 gigawatts. Energy-efficiency efforts are now taken jointly by tenants and building owners, which has led to an increased public awareness of climate change issues.

In developing the program, the Tokyo Metropolitan Government (TMG) held public meetings to engage stakeholders. Including stakeholders from the beginning afforded TMG the chance to tailor the ETS to the actual everyday workings of each individual company while simultaneously developing a program responsive to the ambitious reduction goals.

TMG benefited from already having in place mandatory emissions reporting and were able to use this to assess what reduction targets were possible. The ETS effectively was a logical next step from the existing arrangements in place. Strong top-down leadership backed by legally binding and enforceable measures strengthened the process for planning effective actions in Tokyo. In order to gain acceptance a simple reporting system was developed which relies on existing data from electricity, gas and fuel bills, and equipment inventory lists. This also gave the ETS a reliable source of data. Submissions are audited by third parties who ensure the facilities are reporting correctly, and market participants are ensured that the credits they are buying are accurately calculated.

"Strong top-down leadership backed by legally binding and enforceable measures strengthened the process for planning effective actions in Tokyo"

Role of the authorizing body?

The authorizing body sets the controls of the emissions trading scheme. They decide on the types of units allowed - for example they can decide whether trading is allowed beyond the geographic boundaries of the scheme or with another scheme.

The authorizing body also determines the period of time the emission trading scheme will operate, review cycles, the overall permit cap for the scheme, the number of permits allocated to each entity in the scheme and the parameters for the schemes participants. The authorizing body may also decide to allow permits of credits to be carried forward to later years if levels are exceeded. They may also set fine levels for those within the scheme who fail to achieve their permitted emission levels (either by meeting the permitted level through their own efforts of purchasing credits or permits).

How long does it take to establish a trading scheme?

The authorizing body sets the controls of the emissions trading scheme. They decide on the types of units allowed - for example they can decide whether trading is allowed beyond the geographic boundaries of the scheme or with another scheme.

The authorizing body also determines the period of time the emission trading scheme will operate, review cycles, the overall permit cap for the scheme, the number of permits allocated to each entity in the scheme and the parameters for the schemes participants. The authorizing body may also decide to allow permits of credits to be carried forward to later years if levels are exceeded. They may also set fine levels for those within the scheme who fail to achieve their permitted emission levels (either by meeting the permitted level through their own efforts of purchasing credits or permits).

The benefits and challenges of emission trading schemes

Benefits	Challenges
■ Guarantees a minimum GHG reduction level from those participating in the scheme ■ Provides additional revenue for those investing in measures to mitigate their emissions directly ■ Drives the cheapest options for GHG reduction first (where there is a demand for permits) ■ Long term certainty to members ■ Flexibility for members in how they meet their requirements ■ Revenue generation for government if permits are auctioned	■ Price of allowances can be vulnerable to unexpected economic factors and disrupt market function (over supply or low demand) ■ Market based approach supports the least-cost options, which can narrow the focus of mitigation efforts to a few winning sectors or technologies ■ Highly profitable projects are often not eligible for support through emissions trading schemes such as the CDM ■ Registration phase for projects can be long

Getting the design right

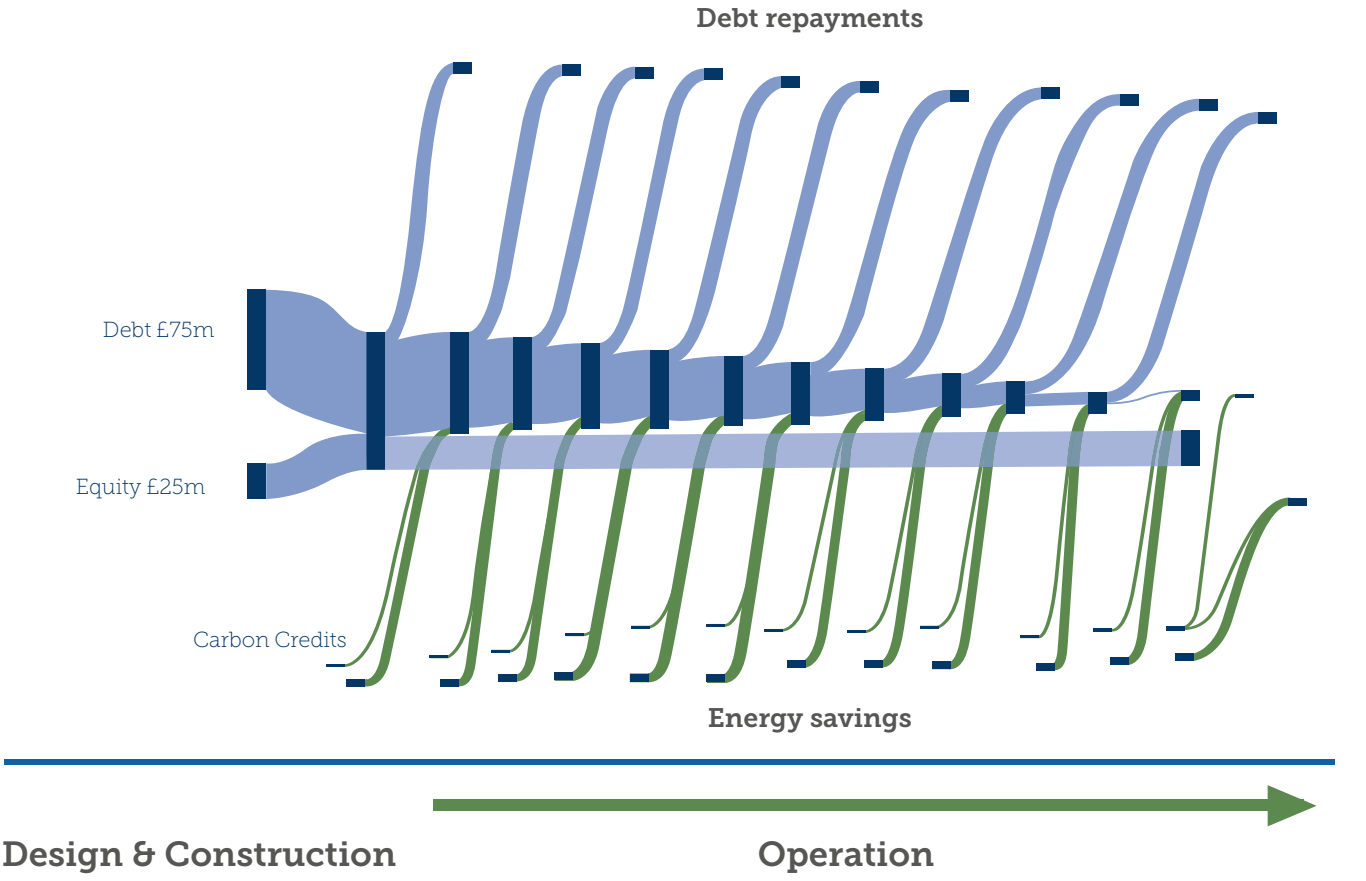
Design is key to a successful emissions trading scheme. International Kyoto credits are now at an all time low price. They have suffered greatly from an imbalance between demand and the existing portfolio of projects that have the potential to generate significant credits. This leaves the scheme grossly unbalanced and unlikely to recover.

In light of the economic downturn, allowances in the EU ETS have become readily available and depressed the value of the permits at €4-7. The EU however has designed a plan to enable backloading (delaying the sale of permits due for auction) in the short term and a proposed stability reserve in the future. Such designs provide flexibility in coping with changing economic conditions.

How long do emissions trading schemes last?

Schemes should build in review cycles and be aligned to relevant goals or targets that the city wishes to implement. The length of time a scheme operates is dependent on the regulations at the time it is set up, but needs to allow a reasonable amount of time for the sector to respond. There are examples of schemes operating to 2020 and beyond. Tokyo's scheme has two compliance periods of four years up to 2019.

Figure 5: Emissions trading schemes (illustrative draft)



Next steps for a city

A city considering implementing an emission trading scheme will need to:

- Establish the appropriate body to enact an emissions trading scheme
- Define the appropriate allowance scheme for the municipality including:
  - What target is the scheme being aligned with?
  - What is the cap? Will it decline each year towards a final emission goal?
  - How long will the scheme operate?
  - Will there be review periods for the scheme?
  - Who is covered by the scheme and are there exemptions?
  - Will permits be allocated free or auctioned?
  - How will trading transactions take place?
  - Will there be a floor or ceiling price for permits?
  - Can entities bank or borrow their own allowances between years?
  - What is the process for regulated entities demonstrating compliance with the scheme every year?
- Identify the sectors to be covered by the scheme
  - Most existing schemes apply to the power sector and heavy industry (e.g. cement manufacturers, metals, chemicals, the oil and gas industry, ceramics, pulp and paper, mining, et.al.) An increasing number of programs – including California, Quebec, China pilots and Korea also cover transport fuels, New Zealand's covers forestry, and the European Union Emissions Trading System now applies to flights within the Euro zone. China will also consider including aviation under its national program, set to launch in 2016 and building on experience gleaned from its seven existing pilot cap-and-trade programs
- Consult with entities affected by the proposed scheme


"Design is key to a successful emissions trading scheme"

4.2 Green bonds

Quick Look

- There is growing interest in green bonds amongst investors
- Bonds are appropriate for funding large infrastructure or aggregated programs over the medium to long term
- Bonds are beginning to play a larger role in resilience, through catastrophe bonds
- Whilst multilateral development banks remain an important issuer of green labeled bonds, the municipal market is becoming larger and more important
- The returns on green labeled bonds are similar to traditional bonds

Introduction

Bonds are not a new instrument. They have long been used to raise capital finance for large infrastructure projects with a medium to long-term investment period. Due to the length of the investment period, the returns on investment tend to be lower but more certain. Green bonds however are a relatively new market which has grown from a niche product just a few years ago.

How large is the bond market?

The bond market as a whole currently has over $100 trillion outstanding which is almost 50 percent greater than the size of the global equity market. Mobilizing bond financing will play an important factor in providing the capital needed to drive forward city infrastructure.

What are green bonds?

A green bond is a bond whose proceeds are used to fund environmental projects. Examples include investments in the following themes:

- Renewable energy
- Energy efficiency
- Drinking water and water treatment
- Sustainable land use (forestry, agriculture)
- Biodiversity

and

- Waste

Labeled green bonds are specifically marked as 'green' by the issuer of the bonds. Green labeled bonds have some additional transaction costs as the issuer has to track, monitor and report on the use of the proceeds.

Green Bonds operate along the same principles as normal bonds. A bond is a loan which governments, banks and companies use to raise finance for projects or programs. The borrower of the money (the bond issuer) owes a lender the debt over an agreed term. The bond issuer is obliged to pay back the amount lent plus an agreed level of interest at an agreed point in time.

1 hour

The time taken to sell the IFC's $1 billion green bond

Bonds are normally used to raise significant sums of funding for large projects. The period of the loan tends to be 10-30 years giving an investor a reasonable expectation of a return on the investment.

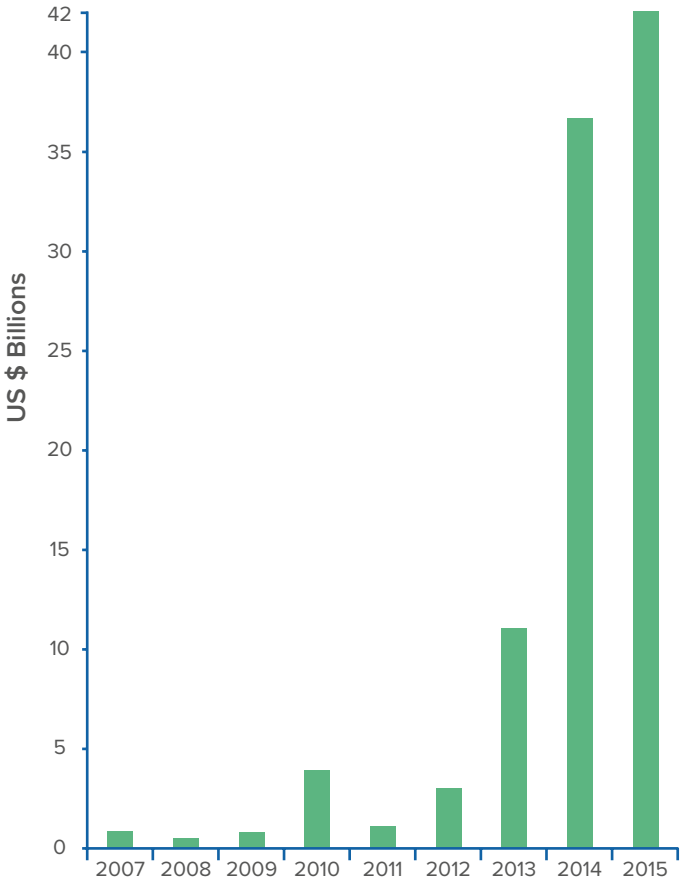
Green Bonds tend to attract investment from large institutional investors like pension funds and fund managers. The medium to long term investments with fairly stable rates of return make bonds attractive to this market. The demand for labeled green bonds is extremely high, with numerous bond issuances being well over-subscribed. As an example the IFC's $1 billion green bold sold out within one hour.

What's the size of the labelled green bonds market?

The Climate Bond Initiative estimates the Climate-Aligned Bonds market, which includes labeled green bonds and unlabeled climate-aligned bonds, to be $598 Billion in 2015. The majority fund transport solutions (around 72 percent) and energy (15 percent). Unlabeled green bonds are an important source of finance for projects that have an impact on reducing GHG emissions, for example a new railway.

The labeled green bonds market has grown substantially from $0.8 billion in 2007 to an $42 billion in 2015.

Figure 6: The exponential growth of the green bonds market



Source: Climate Bonds Initiative

What are catastrophe bonds?

With increasing frequency and intensity of weather and other disasters, catastrophe bonds (or Cat bonds) act effectively as an insurance policy which pays towards the costs of rebuilding infrastructure and assets following a disaster. In return for this investment, investors receive a coupon (rate of interest returned on the principal). The key difference to green bonds is that these bonds protect against the risk of a catastrophic event. If it doesn't happen the investment is returned with interest. The level of risk is high for the investor and therefore the rates of return on investments are necessarily high as well in order to attract the necessary investment. On average the interest rate in 2013 was nine percent. Catastrophe bonds typically have a lifespan of one to three years.

Why label a bond as green?

Labeled green bonds (or climate bonds) are issued according to the same rules and principles as conventional bonds and offer a similar performance. The key difference is that the proceeds are used to invest in green or climate related projects or programs. What's more they attract additional groups of investors who want to know their investments are being spent in a climate friendly way, often unlocking deals that would otherwise not happen.

In addition to diversifying the investor base, green labeled bonds have a very positive marketing story which many investors and issuers benefit from.

The relative newness of the green bonds market means that it was slow to gain traction; however it is now accelerating rapidly. Much of this is to do with investor perception that green bonds are higher risk, but this is changing. For example, 89 percent of all green bonds are investment grade. Interestingly, many investors have indicated that given the same terms for time, investment return and conditions they would select green bonds over other options.

Green bonds are raised from three sources. First, bonds raised by issuance from the city or regional government – called Municipal Bonds. Second, bonds that are backed by International Financial Institutions or sovereigns and third, Corporate Bonds, issued to raise capital by large companies.

When interest rates and financing costs are low, bonds become an extremely attractive way of financing infrastructure.

Municipal green bond issuers have also highlighted the benefit of breaking down silos within governments. The process of structuring a green bond can promote cooperation between different teams and agencies, including the finance, sustainability and infrastructure agencies, leading to greater synergies and teamwork within a municipal government.

Sources of green bonds

The majority of green bonds (including unlabeled bonds) are currently being issued by government entities (around three quarters). Governments or large state backed entities issuing bonds tend to have very good credit ratings (over grade A). The vast majority (almost two thirds) of issuances are from China, UK, USA or France. Development banks make up six percent of the total. Development banks and increasingly corporate issuers are both playing an important role in driving this market forward; in fact, corporate issuances are growing quickly.

However, there is a growing trend towards municipal entities issuing bonds. Massachusetts became the first state to issue green labeled bonds worth $100 million. Since that issuance, the City of Gothenburg and the City of Johannesburg have followed suit with bond issuances of $79 million and $136 million. Another C40 city, Portland in the United States passed a resolution in June 2015 supporting the use of green bonds and directed officials to develop guidance for future green bond issuance.

Authorizing environment

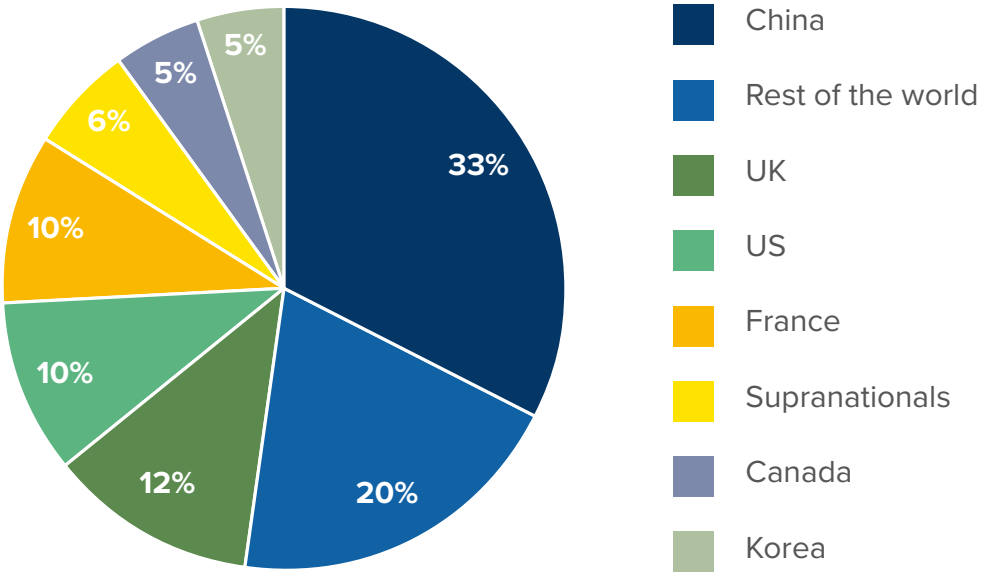
As the market for labeled green bonds is fairly new, assurance is particularly important to ensure that the market has credibility and to assure investors that investments are being made in climate related activity.

The bond issuer will need a credit rating and should look to get independent verification or certification for the investment. This assessment ensures that the bond is eligible as a green project. Ideally, any assessment should be made public.

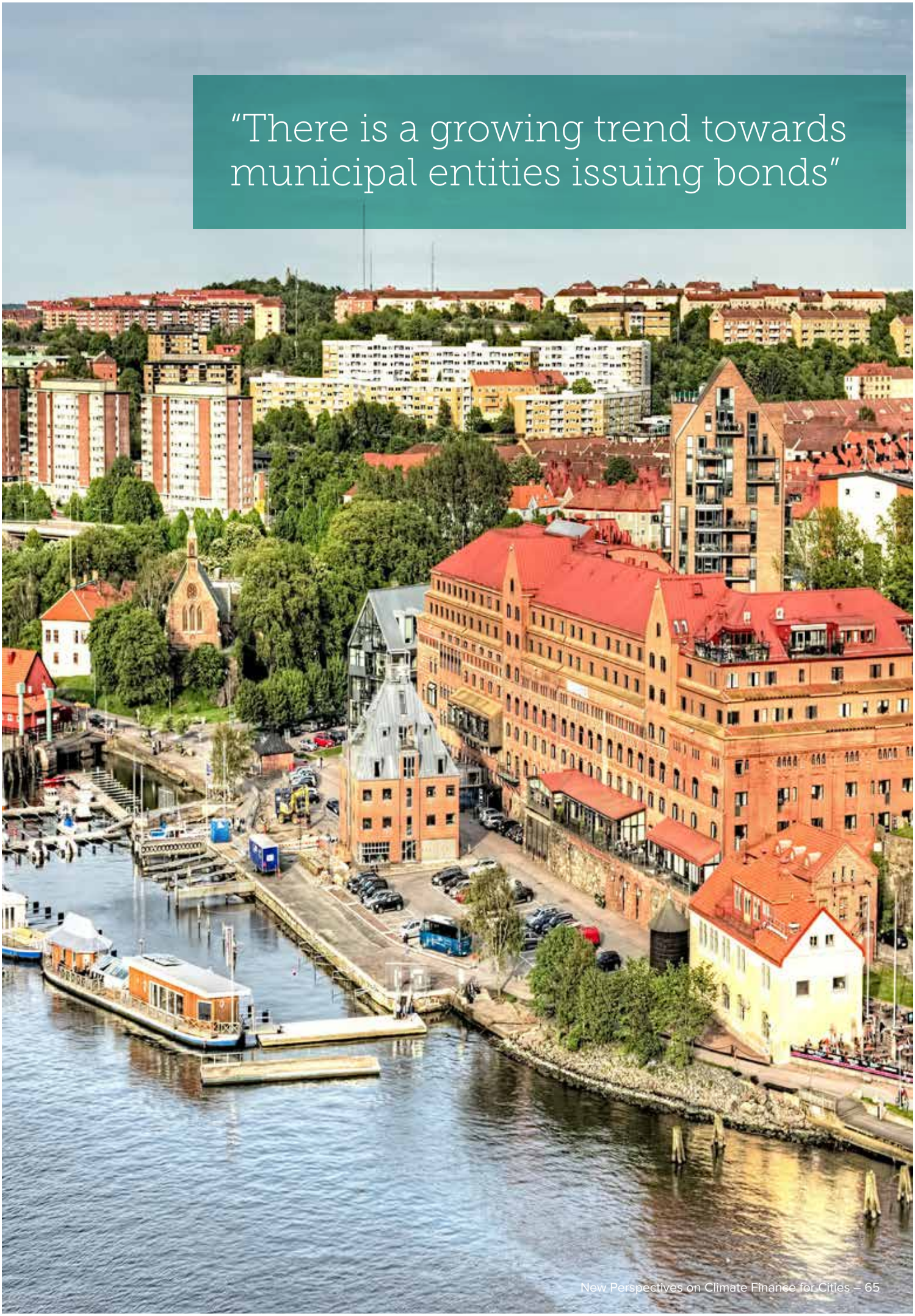
A number of standards are being developed to define a credible green bond. As recently as January 2014, the Green Bonds Principles were published by a number of investors, issuers and underwriters of the green bonds market. The Principles provide voluntary guidance to issuers, setting out the key components of a green bond. The Principles support investors by ensuring that necessary information is available to assess the environmental impact of the bond and finally to assist underwriters by providing standard disclosure information. The Green Bond Principles are set out on the International Capital Market Association website.

A range of other institutions are playing a role in providing guidance, standards and information on green bonds. The Climate Bonds Initiative has developed environmental standards which projects must comply with to be certified. This provides assurance to investors that their capital is supporting climate change solutions.

Figure 7: Breakdown of climate bonds by issuer (labeled and non-labeled)



Source: Climate Bonds Initiative


"There is a growing trend towards municipal entities issuing bonds"

How long does it take to issue a bond?

Green bonds are no different with regard to structuring, launching and issuing as conventional bonds. The timetable of a bond issue can vary from a few days to several months depending on the complexity of the deal, the parties and their jurisdictions, whether the issuer is a first-time issuer and whether and where the bonds are to be listed. One of the preconditions of a successful bond is existing investor demand, ideally beyond the issuance volume. Testing the appetite of the market is critical to a successful issuance.

What project structures are suitable for projects?

Proceeds of a green bond are ringfenced for green or other sustainable projects. Due to the large volume and investor base that bonds attract, this form of finance is best suited for larger infrastructure projects. However, small and medium scale projects can still be financed through bonds by pooling a large number of projects together. Such a portfolio approach offers the capital necessary to provide the upfront financing for an envisaged ESCO (Energy Service Company) scheme in Mexico City. Once the ESCOs are operational and generate returns, they will be securitized and brought to the capital markets thus freeing up capital for additional ESCO projects.

The benefits and challenges of green bonds

Benefits	Challenges
■ Investor demand for green bonds is high ■ Bonds support significant upfront investment into larger and longer-term investments ■ Similar performance as regular bonds (including risk profiles) ■ Green bonds can help diversify the investor base ■ Positive marketing outcomes for green bond issuers and investors ■ Green bond preparation and issuance promotes collaboration between different government departments ■ Potential for longer bond tenors than traditional bonds	■ Green bonds require public reporting of the use of proceeds and can involve other optional verification processes ■ Green bond secondary markets are less developed than those for traditional municipal bonds ■ As with regular bonds, prices fall when interest rates rise and some green bonds are callable (meaning the bond must be paid off early)

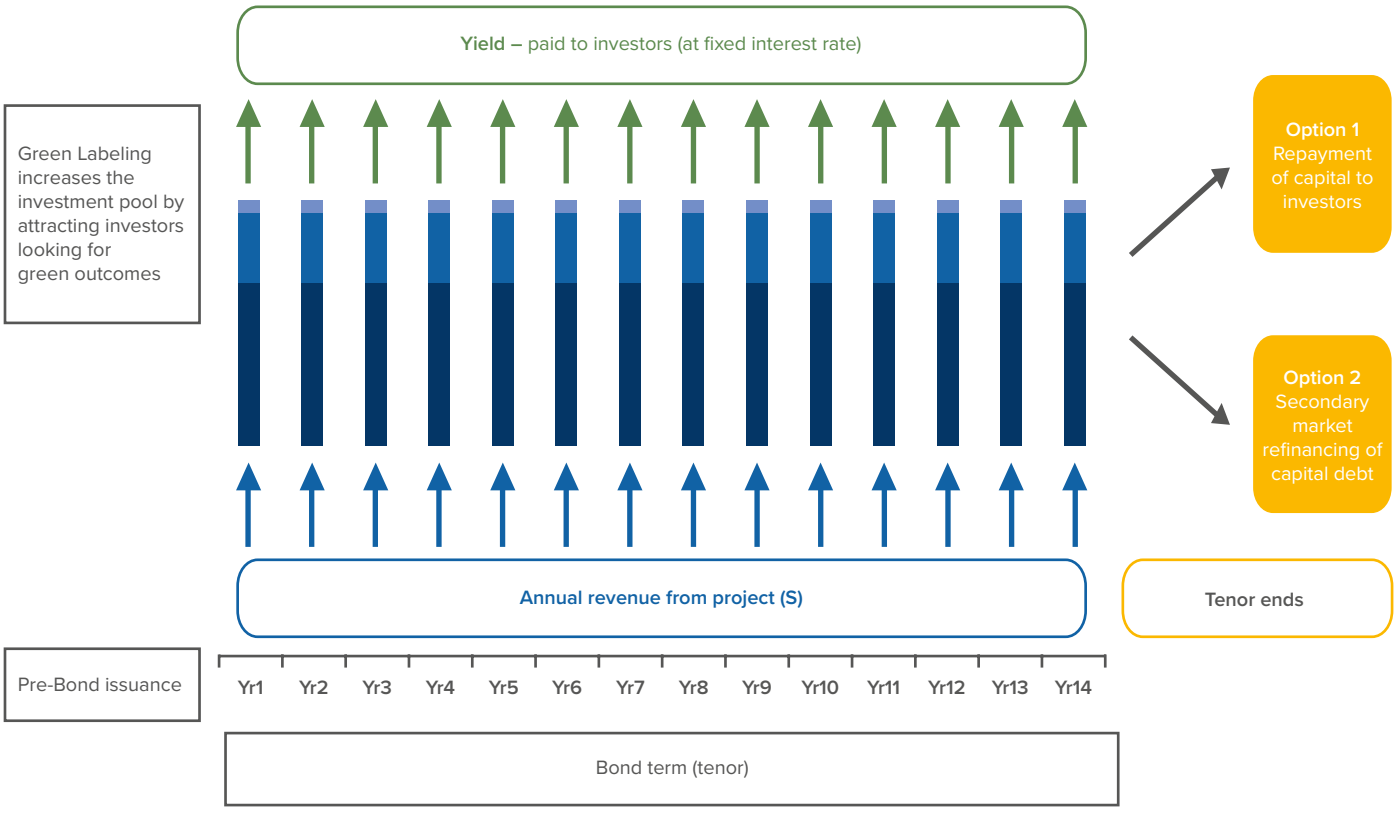
What is the maturity of bonds?

Arrangements can vary in length. However, bonds tend to support investment tenors of 10 years or more. There have recently been examples of ultra long term bonds. For example, in Washington DC, the District of Columbia Water and Sewer Authority (DC Water) has issued a $350 million 100 year green bond. The bond is helping to finance a portion of the DC Clean Rivers Project, a $2.6 billion project to construct tunnels that will transport combined sewer overflows, to DC Water's Blue Plains Advanced Wastewater Treatment Facility. The project serves several "green" purposes including improving water quality for the District, flood mitigation and waterfront restoration.

At what scale does green bond financing work?

Bonds tend to support large infrastructure projects or aggregated projects. The value of bond issuances tend to be over $50 million but real benefits occur at a scale of $100 million or more, as funding infrastructure through bonds is more costly due to the interest rate and time period over which bonds are repaid. However, it makes sense at the larger scale of investment to pay this extra cost as it enables large projects to be put in place sooner than would otherwise be possible. These large projects provide services over many years, funding them upfront would require substantial increases in taxes or other charges.

Figure 8: Green bonds (illustrative)




Carlton Eastbound

Case Study

Investing in Johannesburg's critical infrastructure

Case Study

Investing in Johannesburg's critical infrastructure

The issuance of Johannesburg's green bond follows the city's previous bond issuance of R850 million in March 2011.

With a total of seven long dated bonds issued prior to their green bond, the City of Johannesburg has been a consistent issuer in the debt capital markets having issued a total of R8.5 billion in bonds and commercial paper totaling R6.1 billion.

In June 2014, Johannesburg successfully issued a green bond, becoming the first C40 city to do so. The bond, with a value of US$143 million, was 1.5 times oversubscribed and will finance a wide range of green infrastructure projects across the energy, water, waste and transport sectors, including:

- 42,000 smart meters
- 22.5GW of solar water geysers
- Biogas to energy
- Energy efficiency
- Upgrading the water network
- Landfill gas to energy
- Separation at source recycling
- 150 new dual fuel buses
- 30 buses converted to biogas / diesel

Many of the projects to be financed by the green bond will help the city to reduce its emissions. As part of the process of labeling the bond 'green', the city has undertaken to report to investors on the emissions reduced as a result of the projects financed.

As well as raising new finance for sustainable projects within the city, the project has had the co-benefits of increasing the investor base in the city, giving a significant boost to the media profile of the city's efforts to reduce emissions.

The bond also provides critical investment into four key areas of city infrastructure power, water, parks and transport. The investment supports wider benefits such as the provision of energy efficiency lighting and solar heating to low income households in the City.

The investor prospectus for the green bond differed from a regular city-issued bond. Whilst it contained similar financial information as other bonds the city has issued, it had a specific section focused on the green strategy of the city, the importance to the city of reducing its emissions, project selection criteria and a list of key green projects to be supported by the proceeds of the bond.

"As well as raising new finance for sustainable projects within the city, the project has had the co-benefits of increasing the investor base in the city"

Next steps for a city

A city considering issuing a bond needs to undertake the following:

- Identify qualifying green projects and assets
  - The key feature of a green bond is that the proceeds are earmarked for green projects or assets. The underlying physical assets or projects are critical to the bond being classified as Green. Guidance about what assets or projects qualify as green can be found at the International Climate Bond Standards Scheme.
- Arrange an independent review
  - A credible independent review and verification of the proposed projects protects the reputation of a city. Verifiers can also help identify potential green assets. Verifiers include Clean Development Mechanism or Emission Trading Schemes-qualified organizations.
- Design and set up tracking and reporting mechanisms
  - The value of the assets or projects must stay equal to, or greater than, the amount of the bond. The issuer needs to track this and be able to show how they are doing it – transparency is essential.
- Gain approval from regulators
  - The usual steps apply here, as for any other conventional bond:
    - Seek required issuance approval from regulators;
    - Gauge investor appetite and evaluate project portfolio;
    - Structure the bond working with an investment bank or advisor and get credit rating for the bond;

  and
    - Market and price the green bond.
- Set up processes to monitor use of proceeds and report annually
  - Confirm at least each year, through a public report, that the funds are properly allocated to green projects. This can be done by an auditor or in a letter signed by an authorized officer of the company.

"The key feature of a Green Bond is that the proceeds are earmarked for green projects or assets"

4.3 International Financial Institutions and Agency finance

Quick Look

- Export Credit Agencies can offer support through direct loans or interest rate support or through export credit insurances
- International Financial Institutions and Export Credit Agencies have broad policies to support certain sectors and market development. In some cases IFIs may invest in projects that are considered too risky by commercial banks
- Borrowers are typically in developing markets
- Loans guaranteed by an International Financial Institution provide low risk exposure to emerging markets and are backed by the creditworthiness of an OECD government of multilateral agency

Introduction

International Financial Institutions (IFIs) are multinational entities, whose founders and shareholders are states. Member states define the purpose or mission of the institution and the conditions on which the institution can operate. The mission statement of an IFI sets the priorities, which the IFI is obliged to follow when entering into projects.

Every IFI has its own project cycle, which prescribes the procedures which have to be followed leading to the final approval of a project.

What all IFIs have in common is that their highest priority is defined by the mission statement and therefore the economic soundness of a project may be evaluated less rigorously than in the commercial market. In some cases, projects are only financeable with IFIs because it carries risks which commercial banks are not willing to consider.

Well-known IFIs are Multilateral Development Banks such as the World Bank Group, Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD) and European Investment Bank (EIB).

Export Credit Agencies (ECAs) are government backed institutions (state-owned institutions or private companies operating on behalf of governments) for the promotion of exports of goods and services. Such support can take the form either of “official financing support”, such as direct loans to foreign buyers or interest-rate support, or of “pure cover support”, such as export credit insurances for loans provided by private financial institutions.

For example the Export-Import Bank of the United States (US Ex-Im Bank) provides both direct loans or loan guarantees while other institutions such as Euler Hermes (EH, Germany), Compagnie Française d’Assurance pour le Commerce Extérieur (Coface, France) or Nippon Export and Investment Insurance (NEXI, Japan) only provide insurance covering risks that arise from trade transactions and overseas investment.

ECAs who participate in the Arrangement on Officially Supported Export Credits from the OECD adhere to OECD export credit rules. These rules stipulate the most generous financial terms and conditions that members may offer when providing officially supported export credits.

IFIs and ECAs have broader policy goals to support certain sectors and/or market development. Sectors such as infrastructure and clean energy are highly regarded by the agencies. Municipalities, as long as they are eligible, directly profit from favorable financing conditions as well as indirectly from companies which obtain better access to capital when policies fostering sustainable infrastructure are implemented within the jurisdiction of the municipality.

"Sectors such as infrastructure and clean energy are highly regarded by the agencies"

What types of loans are supported by IFIs or ECAs?

- Borrowers are typically in the developing markets, with some exceptions.
- Types of loans include short term trade finance, long term corporate financing, aircraft and ship financing and complex project financing; however, the majority of guaranteed loans are for the financing of capital goods for trade purposes.
- With the exception of short term trade finance transactions, tenors are typically between 7-15 years.
- Finance is primarily in hard currency, such as USD, EUR or Yen. However, some institutions provide guarantees for select local currencies.
- Both fixed and floating rate finance are supported.

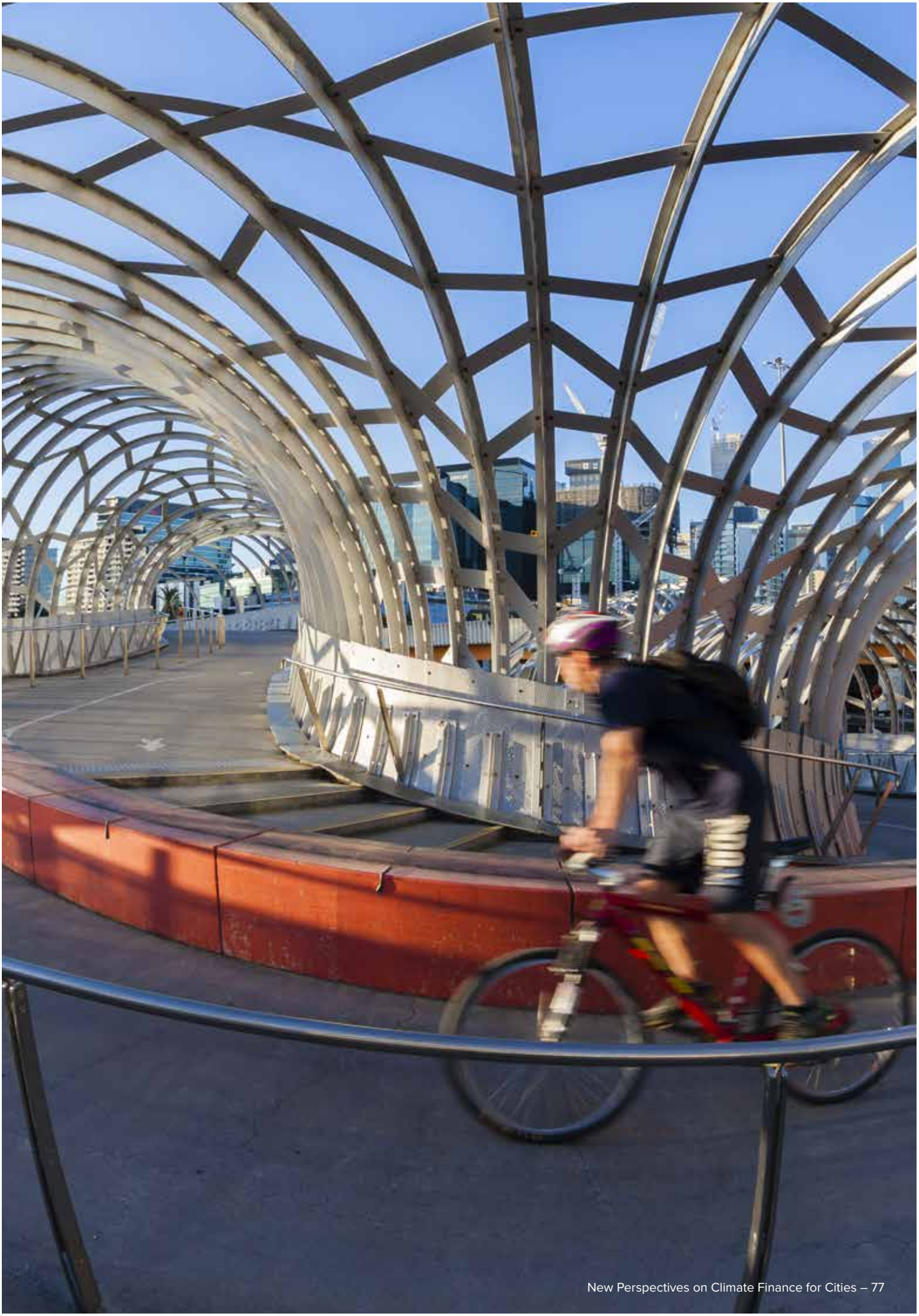
What is the nature of the guarantee provided by an IFI or ECA?

- Guarantees are backed by the creditworthiness of an OECD government or multilateral agency (typically rated AAA/AA+).
- Highlights of loans guaranteed by an IFI within e.g. a project finance structure:
  - Typically highly structured with multiple sources of repayment (borrower, IFI) and often with additional asset security
  - Provide low risk exposure to the emerging markets and project finance
  - Allow investors to diversify from traditional sovereign investments

and

  - Transaction documentation is well-vetted and market standard and prepared by international legal counsel together with opinions on the enforceability of the guarantee

Benefits	Challenges
■ Mitigate political and commercial risks of lending ■ Mitigate political and commercial risks for exporters ■ Support short, medium and long term investments	■ Restricted by mission statement and objectives ■ Risk premiums are charged for supporting transactions ■ Deal complexity

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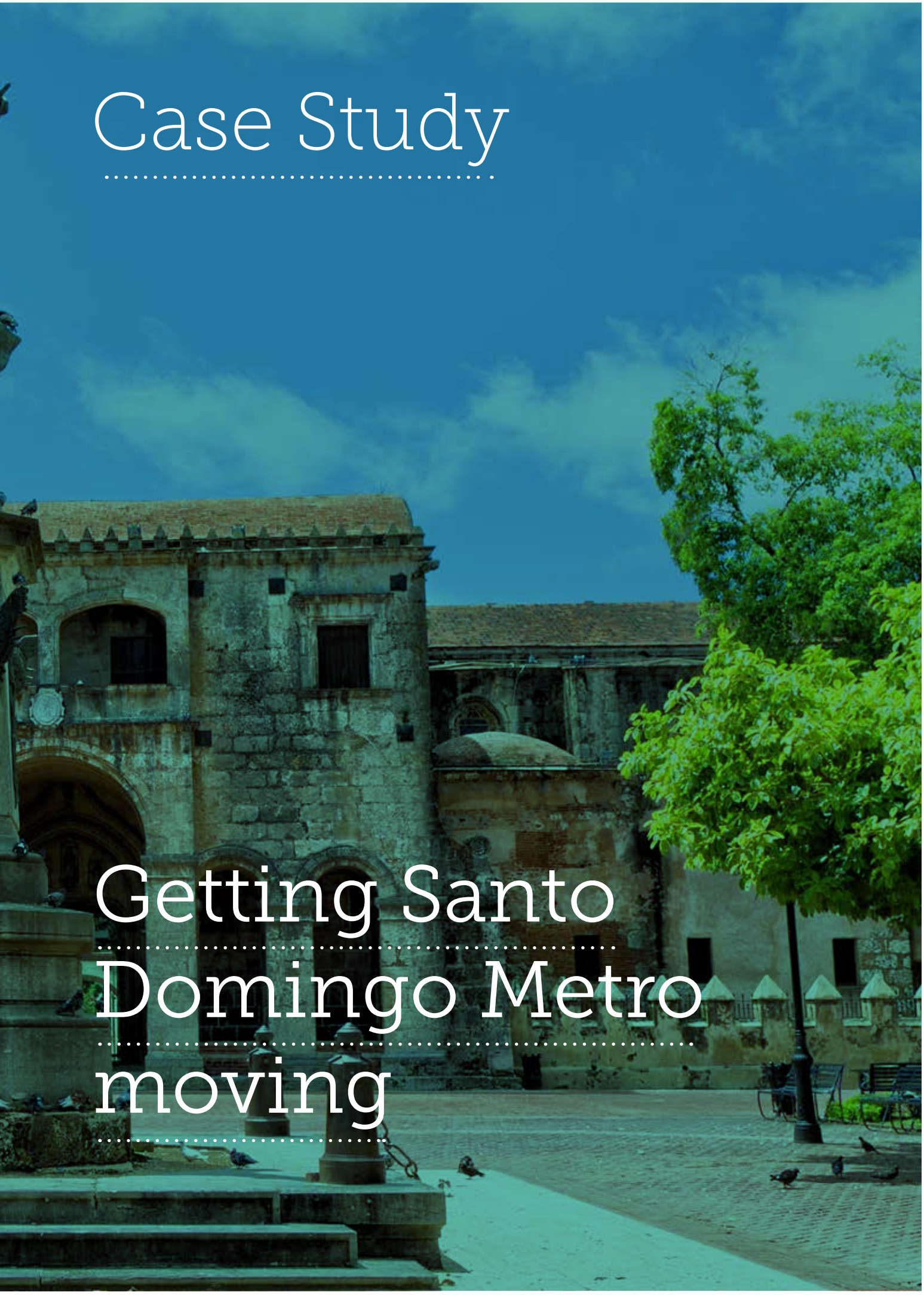
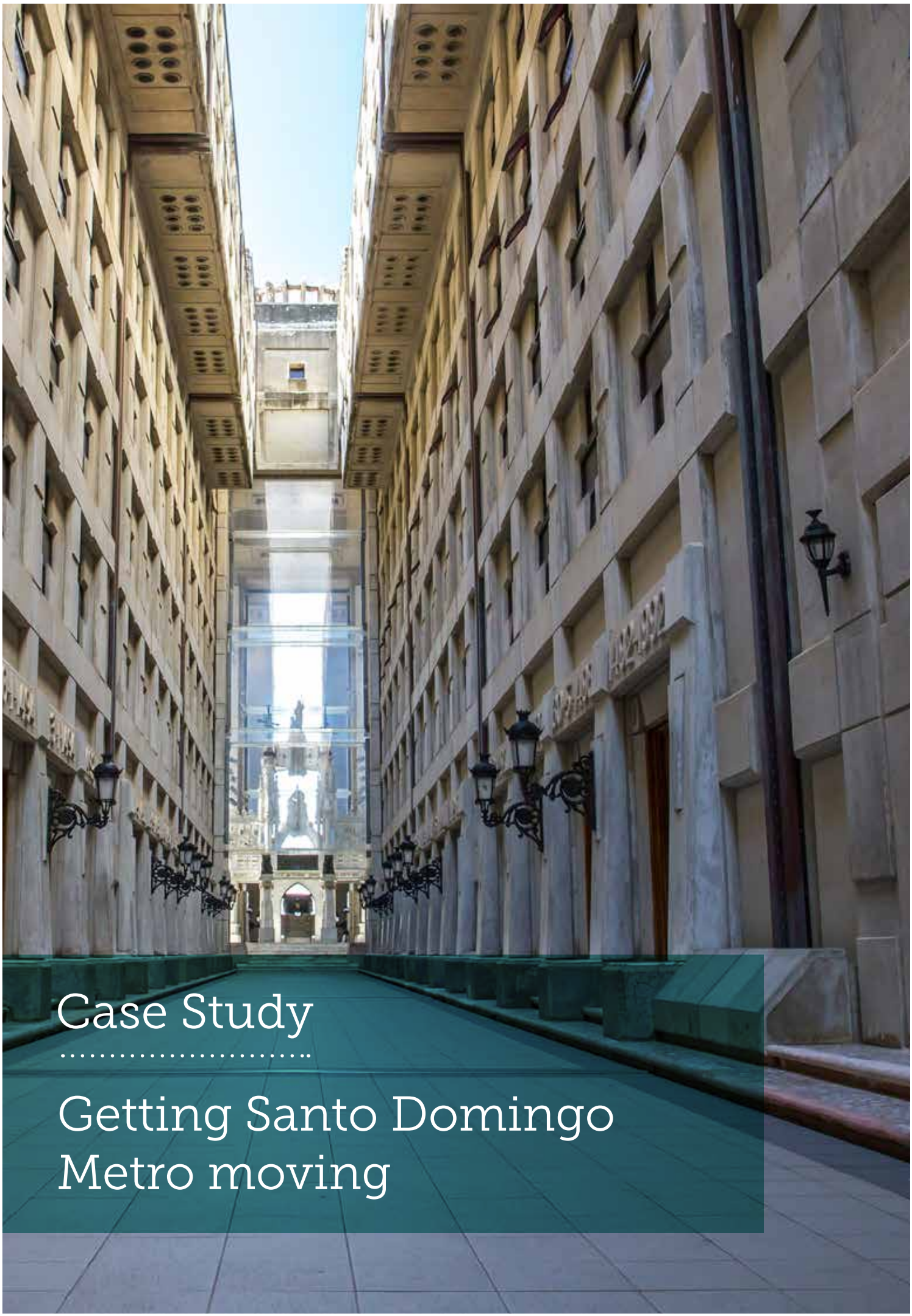


Case Study

Getting Santo Domingo Metro moving



Case Study

Getting Santo Domingo Metro moving

Almost one third of the total population of the Dominican Republic, approximately three million people live in the capital Santo Domingo.

Until a couple of years ago overcrowded share taxis and minibuses pushed their way through the city's narrow streets. The solution developed by city planners was to build a metro network to reduce road traffic congestion and air pollution.

In its call for bids for Line 2A, the government transport authority "Oficina para la Reorganización del Transporte (OPRET)" requested that competing companies include a financing proposal in their bids.

On average, people who take the metro save over an hour of travel time each day and collectively reduce daily CO_2 emissions by 70 tons in the process according to official estimates.

The city's first metro line entered into service in 2009. In 2010 the Eurodom consortium, consisting of German, Spanish, French and Dominican companies, was awarded a contract to construct the second line. The engineering, procurement and construction (EPC) contract included the supply and installation of the rail line's entire electrification, signaling and communication systems. It also involved track construction and a three year maintenance contract. Siemens Financial Services put together a multisource financing package totaling more than €133 million for the project and closed the financing deal with a consortium of banks.

Besides the Eurodom consortium and the government authority OPRET, the Ministry of Finance acted as borrower for the multisource export credit agency covered financing.

Bringing together all the requirements of three export credit agencies, four banks, and three financing contracts was challenging. In the end the same relevant conditions were included in each loan contract and Financial Closure was achieved in time.

An export credit agency insures suppliers of goods and services — in this case Siemens and its consortium partners as well as banks against default. Such agencies provide a safety net for suppliers and banks that are generally located in industrialized nations but that have customers abroad, particularly if they are in emerging markets and developing countries.

As banks will often not make long-term loans to projects where the risks are deemed high, an export credit agency can play a significant role in allowing such deals to happen. As they are supported by the domestic government of the company trading, they can assume up to 95 percent of the risk of default. In such cases the lending bank thus only bears a five percent risk. This guarantee in the case of default, allows the bank to issue a loan to the borrower for the project, which pays the loan back in installments. If the borrower defaults, the ECA steps in.

"On average, people who take the metro save over an hour of travel time each day"

4.4 International and regional climate funds

Quick Look

- Many grant funds are available to support city climate projects
- Funds range across regions and in the type of support available
- Many funds require approval from the national government in the applications process
- The Green Climate Fund has over $10 billion to invest in climate change mitigation and adaptation projects in the developing world and began investing in 2015

Introduction

Across the world, green infrastructure development can be supported by a range on grant funds. Some funds support project preparation at different stages in the project lifecycle, others extend to offering part of the project capital itself.

Funds are generally focused on specific types of project, and each fund will have its own criteria for access. Many require the support of the national government as a condition of applying. Some have a specific allocation per country, others are allocated purely based on the quality of projects submitted and not linked to any specific country allocations. Globally, tens of billions of dollars are available through funds, however many of these take considerable time and resource to access, with no guarantee of success.

Cities in the European Union have a wide range of funds to access. Some are using JESSICA (Joint European Support for Sustainable Investment in City Areas), a financial instrument managed by the European Investment Bank (EIB), which enables the blending of EU structural funds with additional private and public resources through the creation of urban development funds to fund climate change mitigation projects. ELENA (European Local Energy Assistance), the technical assistance platform of the EIB, provides grants to local authorities in order to support the early stage development of energy efficiency and renewable energy projects, such as technical feasibility studies. Horizon 2020 provides grant funding to innovative projects with cutting-edge technology and approaches to tackling environmental issues and shifting to a low-carbon economy.

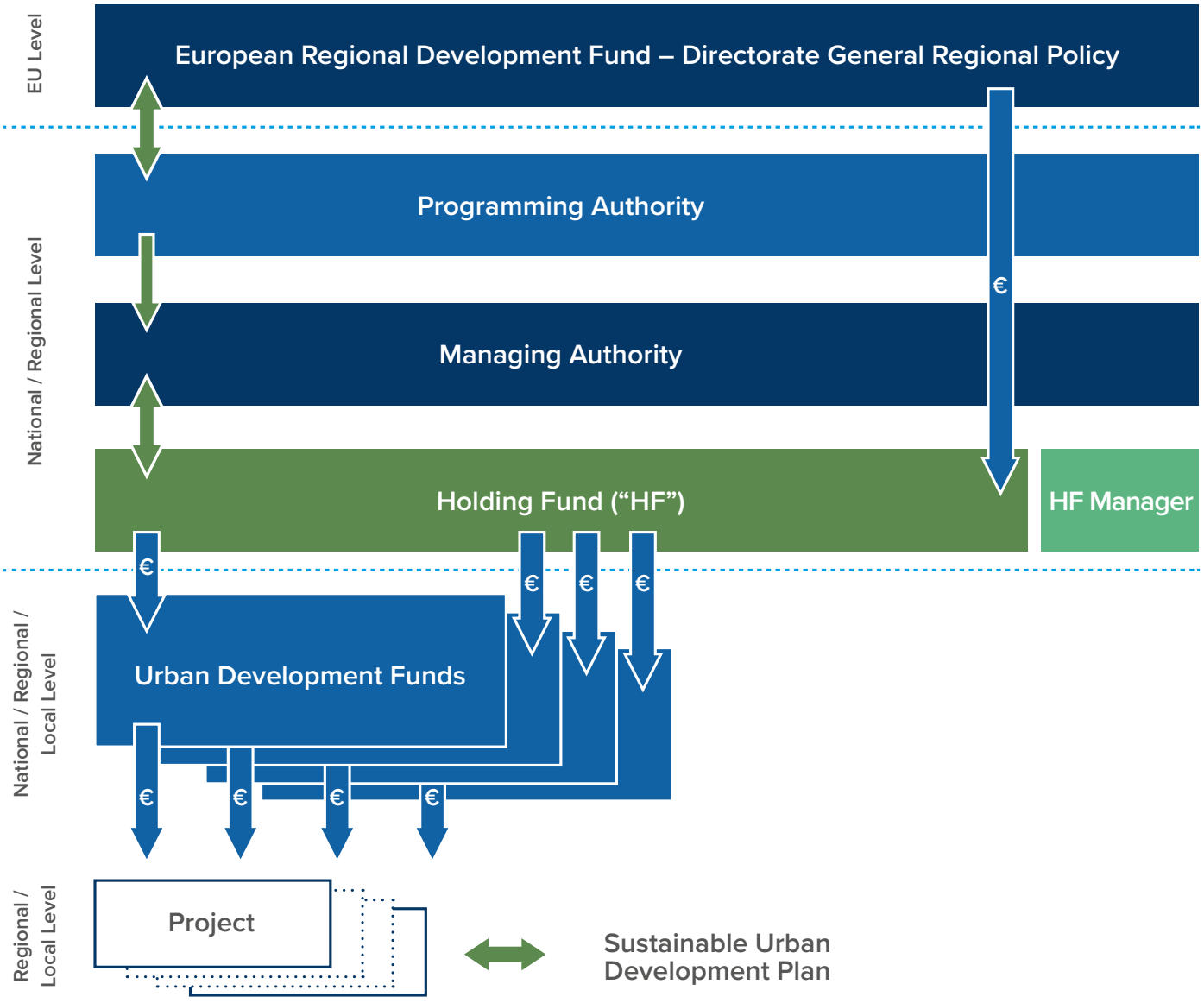
On a global scale, the Global Environment Facility (GEF) – capitalized with more than US$4 billion and the Green Climate Fund (GCF) – capitalized with more than US$10 billion are major funds accessible to cities in developing countries.

The GEF offers grants, as well as technical support and capacity building to develop climate change adaptation and mitigation activities. The GEF's current focus areas include biodiversity, climate change mitigation, chemicals and waste, international waters, land degradation and sustainable forest management. The GEF has a specific allocation per country, and requires support for applications from the country's national government.

The GCF aims to be the largest fund provider for climate change adaptation and mitigation projects in developing countries. The Fund has now been capitalized, following donations from developed countries of US$10bn in 2014, and approved its first eight investments in late 2015.

Many other funds exist, often operating on a regional or country level and delivered in partnership with regional development banks. The Japanese Ministry of Foreign Affairs, the Inter-American Development Bank and the Asian Development Bank all have funds available for example.

Figure 9: Cities have successfully set up urban development funds using the JESSICA model in Europe



Ssource: European Investment Bank

Can cities access international funds?

Whilst many funds available internationally are designed for cities to implement, many require the support of the national government before they can be considered. Some also require that the national government makes the application.

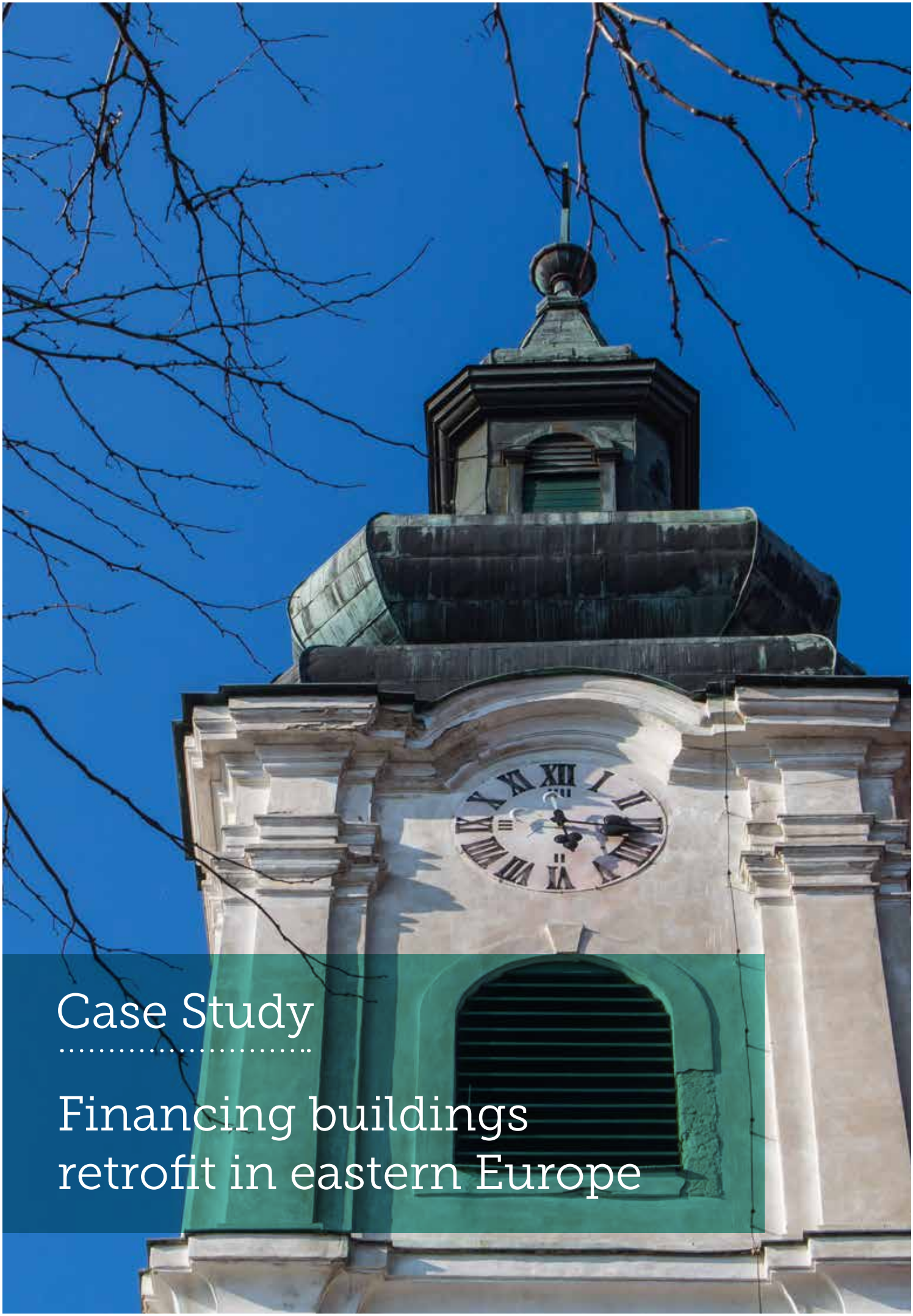
Many funds are restricted to specific geographical areas or regions. North America is the least well-supported region.

What are the timelines?

Timelines vary by fund. It is advisable to be very clear on the timelines and delivery milestones before making an application.

Case Study

Financing buildings retrofit in eastern Europe



Case Study

Financing buildings retrofit in eastern Europe

In the 35 countries where the European Bank for Reconstruction and Development (EBRD) operates, approximately 40 percent of energy is consumed in buildings.

Much of this is used inefficiently as buildings have very low energy efficiency standards and there is great potential to both save energy and improve comfort levels. Much of this potential is in the public sector including schools, hospitals, universities, offices and other buildings providing essential communal services. Despite this potential little has been achieved because public budgets are so limited and public authorities lack the necessary technical resources to design and implement effective energy saving programs – even though very often such investments may be fully or partially funded from realized savings.

The EBRD launched its public sector energy efficiency program to provide technical and financial support to assist participating governments and cities in preparing and tendering energy performance contracts which enable energy service companies (ESCOs) to design and implement energy saving measures funded from their own resources and repaid by the client from the energy savings they achieve.

The program launched in 2010, now runs in Ukraine, Russia, Bulgaria, Romania, the Western Balkans, and Baltic states. The EBRD works with:

- Central government to address regulatory constraints limiting the use of performance contracting by public authorities;
- Participating cities to help identify and appraise buildings for improvement, prepare draft contracts and tender documents, and support the tender and implementation process;
- Local ESCOs to raise awareness and support them in working under these new structures; and
- Local banks to support due diligence of ESCOs undertaking projects which require finance and structure the appropriate financial instruments.

Energy savings are typically in the range 20 to 30 percent compared to business as usual figures. Depending on the energy used GHG reduction can be calculated on a case by case basis. In addition to significantly reduce CO_2 emissions the program helps local authorities reduce the cost of energy. Finally after refurbishing buildings to improve energy efficiency users benefit from improved comfort levels and better buildings to work in.

The limited knowledge of performance contracting and the complexity of putting the concept into practice meant that significant initial resources were needed to develop model contracts and procedures that could be replicated more easily. The implementation of this approach requires a supportive regulatory environment. Whilst potential ESCOs had the necessary skills to successfully realize savings, they needed encouragement to take on the financing required. Equally whilst financing for ESCOs is available, banks need support to initially understand the concept and possibly share the risks with institutions such as the EBRD until a track record of successful financing is established. Once these issues are addressed the concept has the potential to be widely replicated using only local resources.

The main financing mechanism is for local banks to lend to ESCOs. However as ESCOs undertake additional performance contracts they will be unable to keep raising new debt and therefore re-financing mechanisms such as forfeiting (purchasing of receivables under performance contracts) which allow ESCOs to transfer debts to third parties are also needed. The EBRD is working with banks and other institutions to establish and capitalize such facilities.

In each participating country the timeline from starting the program to launching the first tenders was approximately two to three years. Typically projects were implemented within a year with a contract period of up to 10 years. One key aspect of the program was the technical assistance to support governments and cities to prepare the first projects.

"After refurbishing buildings to improve energy efficiency users benefit from improved comfort levels and better buildings to work in"

Benefits and challenges of international and regional funds

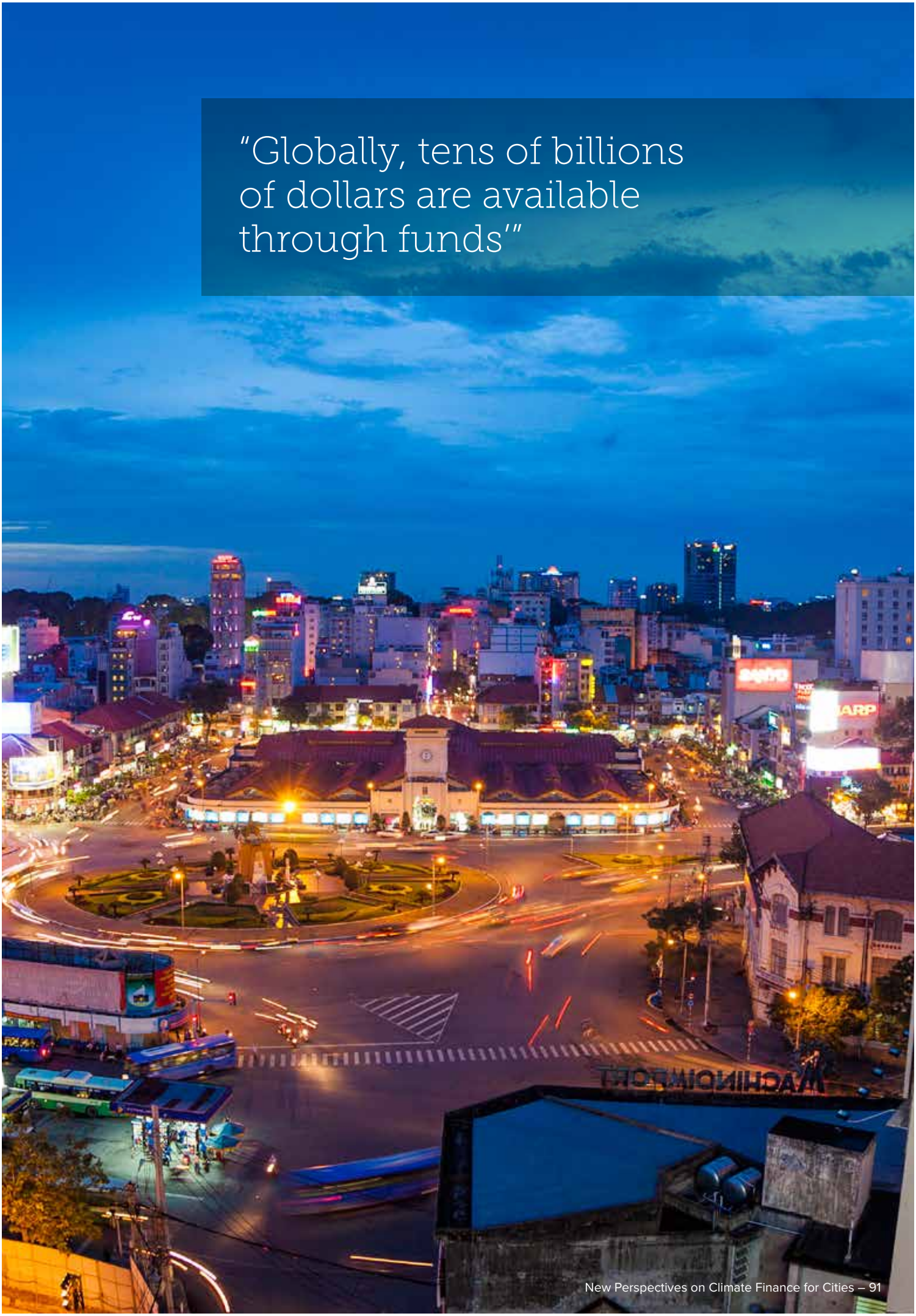
Whilst many funds available internationally are designed for cities to implement, many require the support of the national government before they can be considered. Some also require that the national government makes the application.

Many funds are restricted to specific geographical areas or regions. North America is the least well-supported region.

Next steps

- Cities should review potential sources of international and regional funding. Assess eligibility criteria, assess likelihood of success and conditions related to funding (there may be specific requirements related to reporting on programs and projects). C40 Cities have access to a database of potential funding sources via the C40 Exchange, an intranet for C40 city members.
- Assess project opportunities and fit with identified funding sources. Assess the limitations of the funding and ensure that other conditions can be met. Ensure that legal and financial issues related to funding are well understood.
- Identify cities or departments that have previously accessed funding for similar projects or programs. If possible discuss their experiences of utilizing the funding.
- Identify a project lead to take forward the application. Identify resources required and map out timescales to ensure that project deadlines are met.
- Identify key stakeholders to meet to understand requirements of funding and to get feedback on your developing proposals.
- Consider fallback positions for the project if the funding is not secured. Are there other possible avenues to deliver the project?
- Develop project proposals.

"Globally, tens of billions of dollars are available through funds'"



4.5 City government backed funds

Quick Look

- More and more city governments are establishing their own funds to catalyze activity in their cities
- City funds can be an effective way of attracting other sources of financing to projects from the private sector
- Cities can ensure that funding is directed towards their own priorities
- If established to provide loans or equity, financing can be reinvested in other projects
- This approach can de-risk or open up new markets where the private sector is unwilling to lend directly on its own

Why are cities investing in city climate funds?

More and more cities globally are using their own finance to establish funds which are investing directly in climate related projects within their administrative boundaries. The priorities change from city to city. The way the funding is delivered to projects also varies. This can take the form of grants, loans, equities or guarantees. Some funds are revolving, meaning that they are repayable over an agreed period and can, if the city wishes, be reinvested in other climate change related projects in the future. This maximizes the value of the fund.

The real value of this approach is three-fold. First, it shows the commitment of the city to its own priorities and provides certainty to other potential investors in projects. Second, it can de-risk finance from more conventional routes. That means (depending on the approach to risk taken by the city) it can either bridge gaps in financing that enables access to commercial lending (known as mezzanine loans). Alternatively, city funds can act as a guarantor/underwriter to a project (or part of a project) which can enable a project to access affordable debt from other lenders. Funds can unlock private sector financing to projects and enable unproven or riskier projects to secure financing. Third, by investing its own funds, the city can ensure that projects are delivering against the priorities of the city government – it gives them skin in the game.

Unlocking new ways of driving investment in city projects

Cities are looking at new ways of delivering their climate change targets. Traditional approaches include providing grant funding to projects or tendering for a private sector partner directly to deliver a project and pay for its delivery through an agreed payment over a contractual period.

Climate funds can enable a city to extend its reach. Rather than funding its own direct activities, it can influence or provide incentives for other stakeholders in a city not directly under their control to act. For example, a city government may have little or no control over the commercial building stock in the city but reducing emissions in that sector might be integral to meeting city reduction targets. By establishing funds to invest in retrofitting of commercial buildings, the city immediately has an opportunity to drive investment into the retrofitting of that particular building stock. By providing some funds, the city can also unlock other investment from other financiers. If the city makes funds available as loans or equity stakes they also pay back in time, meaning that they can be reinvested in other projects.

Cities need to consider carefully how they utilize their own funds. In some instances cities may not be allowed to provide loans and have set up separate legal entities to perform these functions. Equally the city needs to have a good understanding of the market which it is trying to influence and whether there are finance-related market barriers that a fund could address. The benefits of providing funding to types of projects that can readily access affordable finance already are questionable unless the fund is providing other benefits to overcome market barriers, such as more flexible finance terms. Otherwise city funds are simply replacing existing sources of funding. Cities need to think carefully about the risks and their own appetite for risk. Does the city expect to always see a return from the money it invests or is it comfortable funding some projects which have a higher risk of failure but that can unlock new markets if successful? Cities need to strike a balance between an acceptable level of risk and likelihood of return of the investment. Finally if cities want their role to be a catalyst for private sector investment, they must be confident that the approach and levels of funding they are offering are attractive to private sector investors. If a city is looking to attract investment in projects that are deemed far too risky they are very unlikely to get it. They must strike a balance. Projects seeking private sector investment must have a reasonable prospect of providing a return on investment.

€75 million

Being invested through the Amsterdam Investment Fund in commercial and social projects

Different approaches across the globe

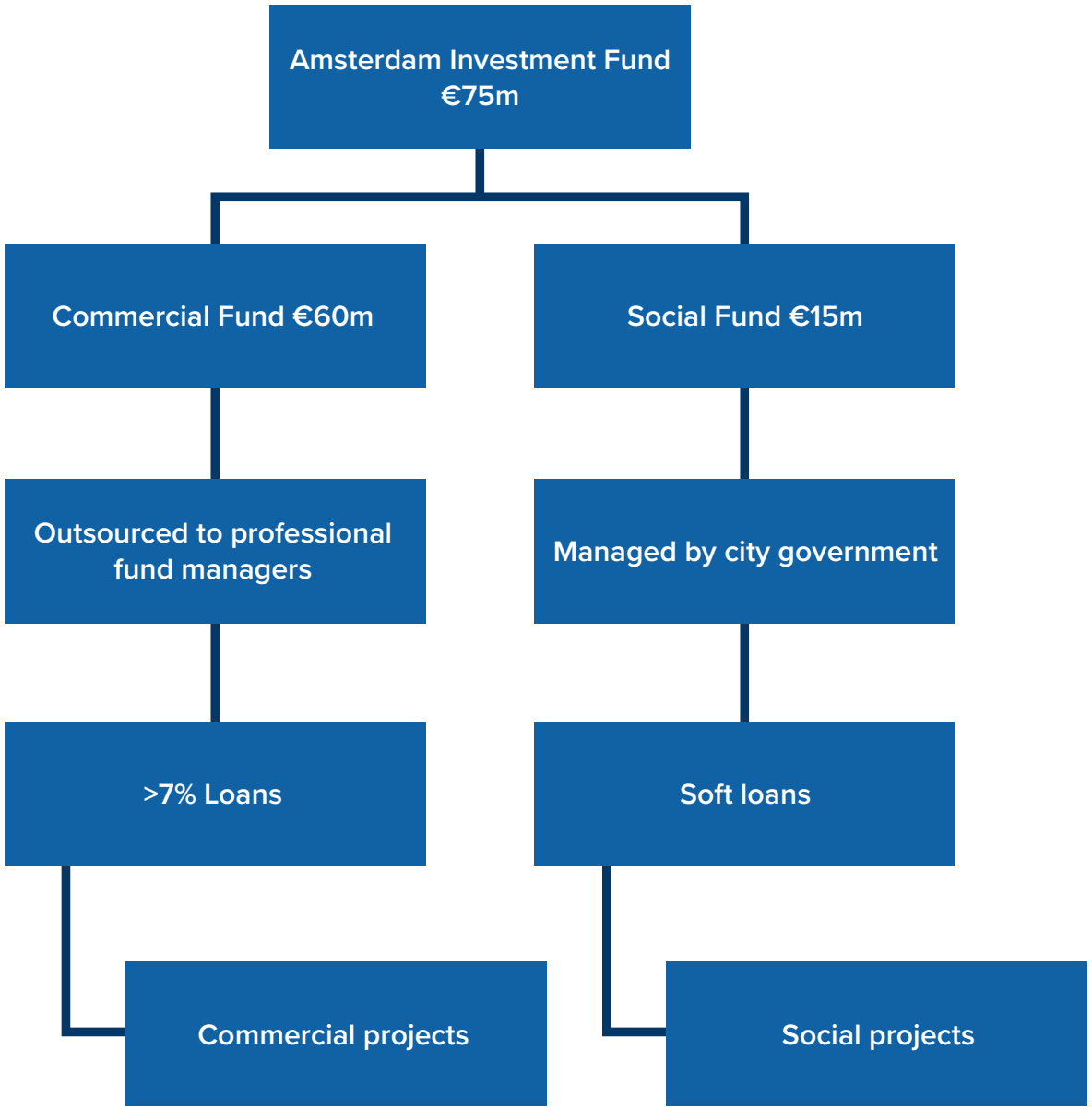
New York City and the state of New York have created the New York City Energy Efficiency Corporation (NYCEEC) which has funded $75 million in cogeneration and energy efficiency projects as of February 2016. Along with other financial institutions the NYCEEC provides financing for energy efficiency and clean heating projects. The NYCEEC was established as an independent, non-profit financial corporation and focuses on implementing the City's Greener, Greater Buildings Plan. In December 2011, NYCEEC closed its first transaction with Transcend Equity Development Corporation (now acquired by SClenergy) for a $1.4 million retrofit project at 125 Maiden Lane in Lower Manhattan. Transcend provided a turn-key retrofit and financing solution using a managed energy service agreement (MESA). NYCEEC participated in the MESA by providing credit enhancement, thus, permitting the financing to close and construction to start.

Amsterdam has developed the Amsterdam Investment Fund (AIF) which is supporting the delivery of its Amsterdam Energy Strategy 2040. The city is investing €75 million to projects. Projects are evaluated on the environmental impact per euro spent and the amount of co-investment attracted. Four further criteria are assessed, innovation, duplication, diversification and visibility. The Fund provides low interest loans, guarantees and equity. It is designed to support everything from large-scale commercial projects, smart energy start ups, energy efficiency measures for home owners and social initiatives. 80 percent of the Fund targets commercial projects and 20 percent targets social projects. The Fund offers loans at a fixed rate of 1.99 percent, repayable over a maximum of 15 years. The commercial element of the fund is managed by a commercial fund management company.

The City of Melbourne has established a Sustainable Melbourne Fund which is investing in ventures that deliver both economic returns and environmental benefits. The Fund supports innovative, early-stage projects that are scalable, profitable and deliver a sustainability outcome. To date, the Fund has invested through loans, over 9 million in building upgrades, renewable energy systems, residential neighborhood innovations, lighting solutions and software technology resulting in the reduction of over 100,000 tons of GHG emissions.

The Sustainable Melbourne Fund also plays a role in retrofitting commercial buildings through 'Environment Upgrade Agreements' (EUA). These allow building owners, tenants and investors to access long term finance at attractive terms. The EUA is an agreement between the property owner, a bank and the city government to upgrade a building to improve its energy efficiency. The property owner approaches Sustainable Melbourne Fund for assistance in upgrading the building. The Fund then seeks approval from a bank for the work, the funds are advanced by the bank for the retrofit. The City of Melbourne then declares an Environment Upgrade Charge (EUC) on the retrofitted building. This charge is collected through the rates system. Upon collection of the EUC the city then pays the finance back to the bank. As the loan is attached to the property and repaid via the EUC through the council rates system, this gives the applicant access to low-cost loans, which can be secured more readily, at lower interest rates and for longer terms. Other cities have introduced or are designing similar funds, including Chicago, Toronto and Boston.

Figure 10: Amsterdam's Investment Fund



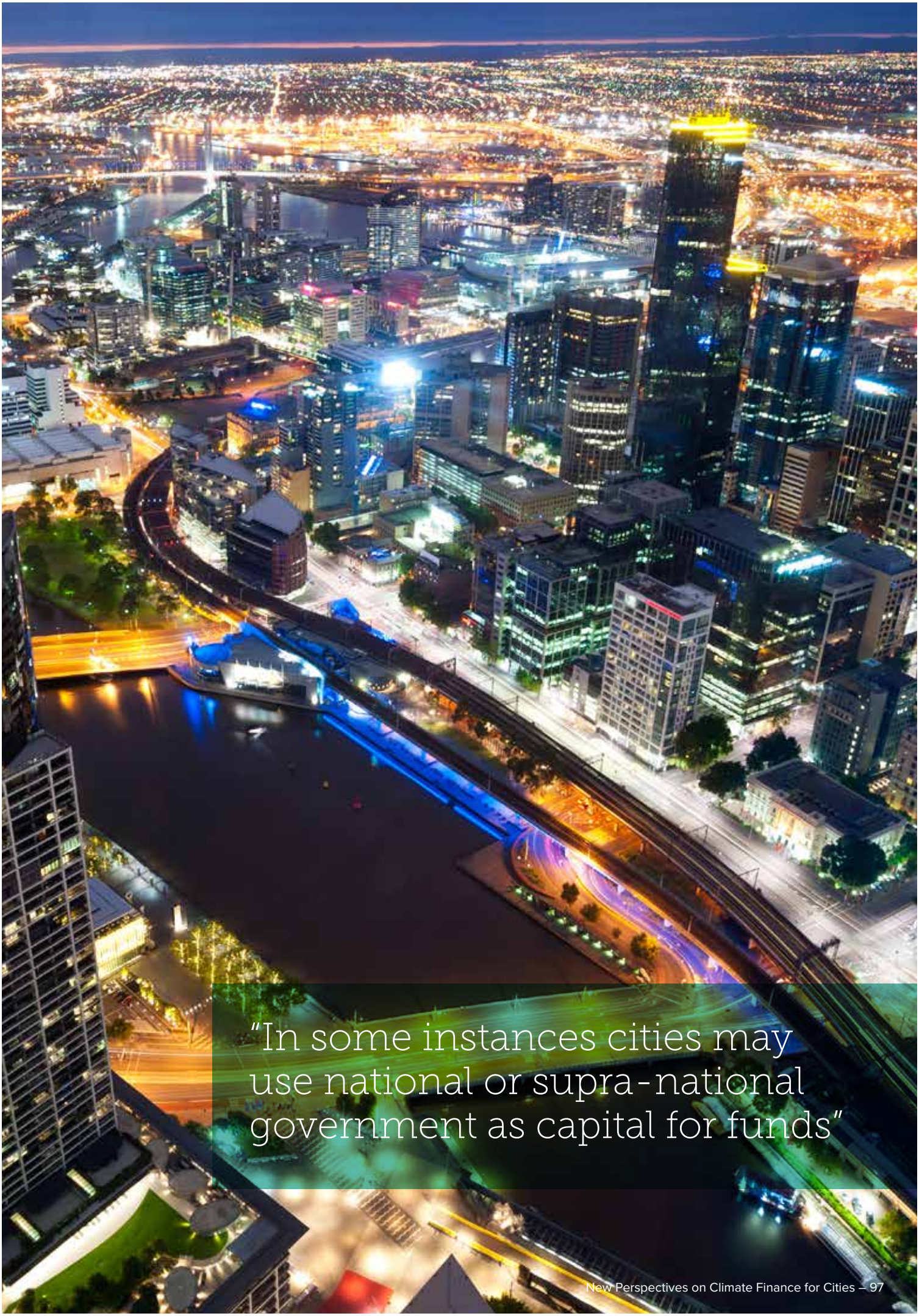
Common features of city approaches

Whilst there are a number of different approaches to city climate funds, several common features exist.

1. All of the examples in this section offer finance with the expectation that the finance is repaid. This moves away from a more traditional role fulfilled by city government as a grant giver. Irrespective of the funding mechanism, there is an expectation that the finance can be repaid.
2. Finance is often offered at low levels of interest or over a longer repayment term than would be possible with commercial lending.
3. Financing directly relates to delivering city priorities.
4. Whilst the funding priorities are set by the city, the commercial funds are managed by independent professional fund managers.

Using national and international funds to establish city funds

In some instances, cities may use national or supra-national government as capital for funds. Where this is the case, it is likely that support from government will be needed. In the case of the London Green Fund, the use of European Regional Development Funds to set up the London Green Fund did need approval from the UK Government, as the managing authority for this source of funding.


"In some instances cities may use national or supra-national government as capital for funds"

What is the authorizing environment for city funds?

Criteria for a fund and its priorities should be set (or agreed by) the city government. However, the day-to-day management of the funds including decisions related to investments should be undertaken by independent professional fund managers. They would ultimately need to be responsible via contract to the administration body (in this case the city). The city should through the contract process set performance criteria for the fund. This is important to ensure that the most appropriate projects for the criteria set by the city are met.

An advisory or funding board would usually be set up to set the strategic direction of the fund. The role of the Board would be to:

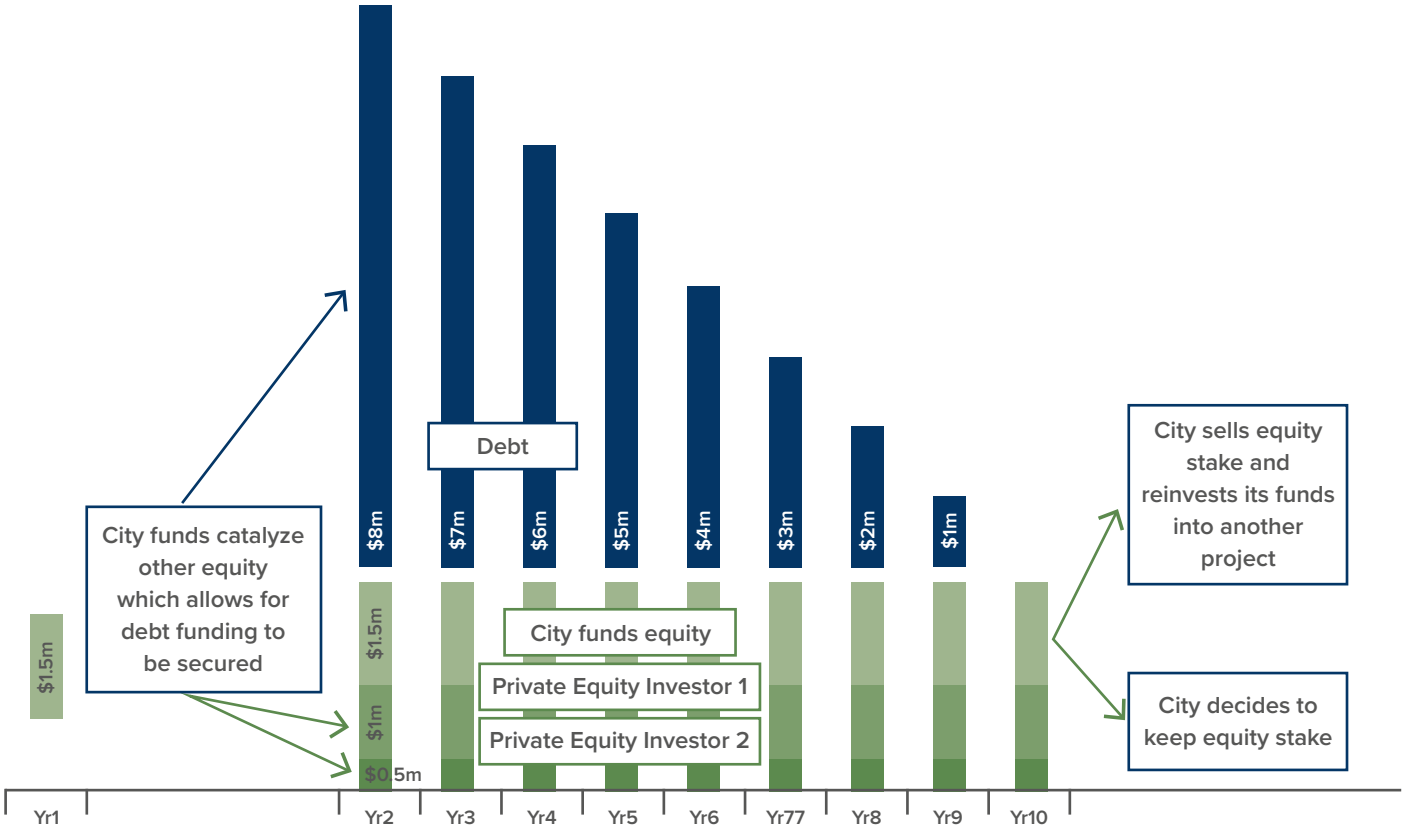
- Set the objectives and priorities for the fund
- Set and agree investment criteria
- Appoint fund manager
- Review performance of fund

and

- Agree revisions to Board functions and Fund functions.

Benefits	Challenges
■ Directly invests in priorities	■ City needs to identify funds
■ Funds can be revolving	■ If poorly devised, they can replicate existing forms of financing
■ Attracts private sector investment	■ Requires market appetite for investment in the sector
■ Fund managers provide expertise in determining projects to fund	■ Projects not directly controlled by the city
■ Can accelerate private sector investment into projects	■ City needs to balance project risk and likelihood of investment return
■ Can de-risk other debt funding	■ Lengthy process to establish fund, appoint fund managers and test market appetite

Figure 11: City funds (illustrative)



Case Study

Investing in London's energy and waste infrastructure

Case Study

Investing in London's energy and waste infrastructure

The London Green Fund was developed under the European Commission's JESSICA initiative (Joint European Support for Sustainable Investment in City Areas) which allowed European regions to use a portion of EU grant funding to make repayable investments in projects, thereby creating a revolving investment fund for the regeneration of urban areas.

The London Green Fund is a Holding Fund, managed by the European Investment Bank and is made up of £50 million from the European Regional Development Funds and £50 million in match funding from the Mayor of London and the London Waste and Recycling Board (LWaRB).

The Fund provides equity, loans or guarantees to projects at an early stage of their development or construction phase where project risks are higher, to encourage further commercial investments in environmental projects of this nature. It supports projects in line with the priorities of the Mayor's strategies.

The London Green Fund is in a position to take a longer-term view of the scale and timing of financial returns expected from their investments than the commercial markets, particularly in the current economic environment.

The Fund consists of three Urban Development Funds (UDFs).

- Waste – £35 million financing via equity or guarantees in waste to energy, reuse, recycling or reprocessing facilities
- Energy efficiency – £60 million primarily debt financing (and equity where appropriate) to retrofitting and decentralized energy projects in existing public, private and voluntary sector estates. This has been matched by up to £50 million of funding from Royal Bank of Scotland
- Greener Social Housing – £12 million in the refurbishment of social housing. Investment is in the form of loans to social housing providers

The London Green Fund has effectively used public sector funding to attract private sector funds into city priority projects. As the Funding is in the form of loans, equity or guarantees it is revolving, so it can be reinvested into other projects in the future.

The UDFs are managed by reputable external fund managers to ensure projects are fully analyzed from both a financial and environmental perspective prior to investment. The process allows the Mayor to determine the strategic objectives for the fund and its investment criteria whilst the independent fund manager ensures that the fund is focused on investment and delivery. As of June 2015, the London Green Fund had invested £97 million in 16 projects valuing approximately £700 million.

"The Fund provides equity, loans or guarantees to projects at an early stage of their development"

Next steps for a city

A city looking to establish its own Fund needs to undertake the following activities:

- Identify projects/sectors to support and alignment with policy
- Analyze market failures, suboptimal investment situations
- Assess possible value added of using financial instruments and market appetite
- Evaluate possible public/private co-financing
- Identify other city schemes and take on board lessons learnt on similar instruments
- Draft investment strategy(ies)

and

- Identify expected financial and non-financial impacts

4.6 Equity capital

Quick Look

- A range of equity investors exist. Institutional investors alone manage $71 trillion of assets in the OECD
- There is a significant and growing interest in investing in climate projects from equity sources
- Some cities are providing equity to projects to encourage further private sector funding as debt or equity
- Typically, institutional investors look for more mature and proven technologies, whilst venture capital is to take a greater degree of risk and invest in new or unproven markets and technologies

Introduction

Mobilizing private finance is central to delivering sustainable infrastructure. Whilst the majority of that financing will be in the form of debt investment, equity is a crucial component of most projects. Equity providers known as 'sponsors' play an essential role in securing debt financing. It is the injection of equity into projects that enables the release of debt financing. Equity can also significantly influence the terms of debt financing.

As a general principle the greater the ratio of equity to debt, the more affordable the debt financing of a project will become. In riskier projects this gearing of equity to debt will be higher to reassure lenders that debt can be repaid in difficult circumstances. Typically, lenders' risks will be limited in projects by allocating the greater share of risk to equity investors and others (such as guarantors, contractors).

Hence, equity plays an essential role in opening up access to debt financing. Since equity holders or sponsors bear the main risks they will seek a higher return on the funding that they provide.

The role of venture capital and private equity

A number of sources exist for equity investments in projects and programs. These range from individuals or organizations through to investment funds managing money on behalf of investors looking to purchase stakes in enterprises or projects.

In addition both national and city governments are using their own funds to attract both equity and debt financing into projects and programs. The type of equity investment will vary depending on the investor's approach to risk and return. For example, a venture capitalist or fund will seek an equity stake in small to medium sized enterprises with strong growth potential. These types of investments are typically characterized as high risk and high return investments. At the other end of the spectrum, institutional investors, such as pension funds or insurance companies are broadly looking for investments that provide a steady, long-term and more predictable income stream.

This means that the types of projects that institutional equity and venture capital equity are likely to invest in vary. Institutional investors will typically look for more mature and proven technologies, whilst venture capital is to take a greater degree of risk and invest in new or unproven markets and technologies. These approaches to risk are also reflected in expectations of returns on equity investments.

Institutional investors manage an estimated $71 trillion of assets within the OECD. The level of interest in investing in climate change related projects is increasing and is demonstrated by the number of groups formed to represent their interests (see Table 3 below).

Table 3: Institutional Investors Climate Change Groups

Group	Type of Investors	Size of total assets under management	Objectives
IIGCC	75 European institutional investors, including major pension funds	EUR 7.5 trillion	Catalyze greater investment in low carbon
Investor Network on Climate Risk (managed by Ceres)	100 USA institutions	USD 10 trillion	Identify opportunities and risks in climate change, tackle the policy and governance issues that impede investor progress towards more sustainable capital markets
Investor Group on Climate Change	Australian and New Zealand investors	AUD 700 billion	Raise awareness, encourage best practice in terms of analysis and provide information relating to climate change
Asian Investor Group on Climate Change (AIGCC)	Financial institutions from across the region, including prominent asset owners and fund managers	TBD	To ensure there is a clear Asian investor voice on climate change to understand the issues as they affect the region and to compliment the work of other investor groups around the world (being established)
Long-term Investors Club	14 mainly public sector financing institutions	USD 3 trillion	Identify long-term investment funds and vehicles
Climate Wise	40+ leading insurance companies and related organizations	USD 3 trillion	Goals include leading risk analysis and incorporating climate change into investment strategies

The role of venture capital and private equity cont.

As well as providing an attractive environment for investment, cities or national governments can also provide equity in projects or programs. This is especially important where the technology has higher risks, for example, where a project is at an early stage of development or is pre-commercial. This approach has already been explored in some detail in the previous section, where some cities are looking to provide equity into projects.

An issue that keeps emerging in this report is the need to develop a project pipeline. It is most often this stage of a project where there is less interest from either institutional investors and equity capital. The OECD point out that a large proportion of breakthrough innovations come from new companies challenging existing business models. Therefore government has a critical role to play in removing barriers to entry and to support new technology.

Potential solutions to equity investor challenges

Investment in new technologies in cities presents a huge opportunity for equity. For example, energy efficiency measures in commercial buildings can reduce consumption by between 25-40 percent. Despite this opportunity, only a fraction of buildings are being addressed. Some common factors often impact on decisions to invest in improving building infrastructure. Firstly, owners require very immediate return on the capital investment and secondly, the lack of resources to dedicate to energy efficiency projects. In addition, even in very cost conscious environments there is still little pressure to save on energy consumption. Dramatic energy savings are not seen as realistic and providers who propose comprehensive solutions are met with skepticism. Efficiency upgrades require investment and hence a willingness to take a certain amount of risk

Many equity investors are looking to provide funding for energy efficiency improvements. For example, Crowley Carbon is an investor focusing on energy efficiency projects. In particular, they are focusing on large factories and commercial buildings across diverse energy markets in Europe, the Middle East and soon North America and India. The range of industries spans from food processing, manufacturing to commercial office space. Despite such a project variety, a recent review of Crowley's customers' figures showed average savings of 30 percent and pay back periods of generally less than five years.

Many organizations are seeking third party capital and off-balance sheet structures as a way to deliver energy efficiency improvements in their buildings.

Tulum Trust, another equity investor, is investing in energy efficiency and Energy Savings Companies. Many of

The role for the city

the challenges facing delivery in this sector have been addressed including:

- Access to third party capital – there are exchanges operated by companies like Noesis that match projects with capital, but the majority of capital is actually being provided by the normal banking system.
- There are a variety of off-balance sheet structures which recognize the needs of corporate customers to shield their capital.
- There is a healthy insurance industry willing to underwrite the savings.
- Many ways have been found around the tenant / landlord issue of split incentives.
- Many different incentive programs have been implemented, which smart market participants have taken advantage of but which generally end their term with excess funds available.
- There is a robust range of excellent technologies that deliver significant savings, some at very little risk.

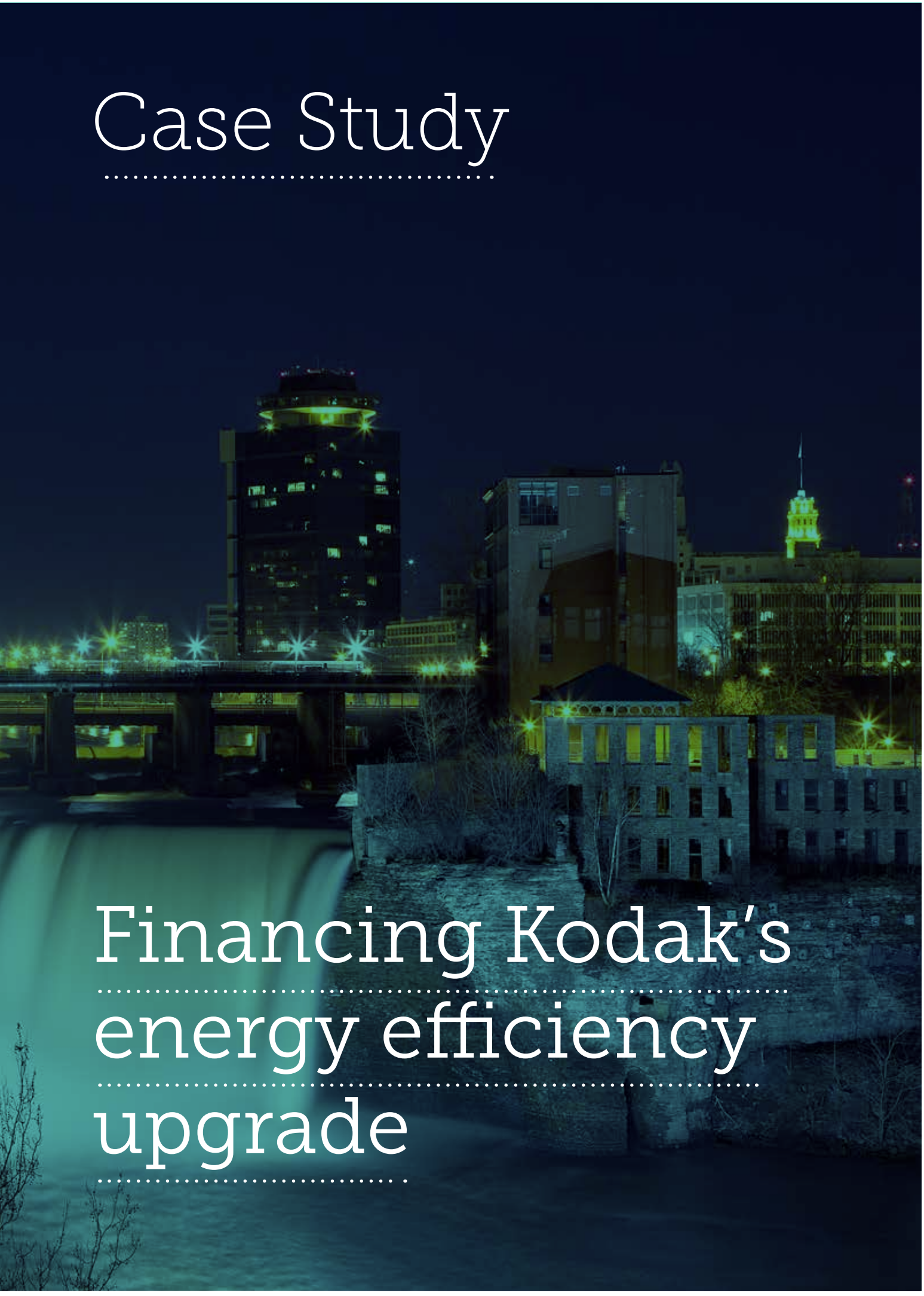
City administrations have an important role to play in creating the conditions to make equity investment attractive to the private sector. As explored in section 3, getting the policy environment right and providing incentives for investment give the right signal to possible investors. This framework is essential to attracting the interest of private sector investors.

Certification programs and incentives programs are two examples of how cities have looked to reward investing entities and catalyze investment.

Benefits and challenges of equity capital

Benefits	Challenges
■ Can leverage other sources of funding including debt financing with lower interest rates ■ Private equity can be reinvested in other projects ■ Earnings from equity investment can be a source of income to a project	■ Dilution of control ■ Can be complex to arrange and resource intensive

Case Study



Financing Kodak's energy efficiency upgrade

Case Study

Financing Kodak's energy efficiency upgrade

Kodak's power infrastructure at Eastman Business Park, one of the USA's largest industrial complexes was revitalized through an energy efficiency upgrade with Tulum Trust as the main equity partner that financed a replacement of a coal fired turbine to a gas turbine.

Located outside Rochester, New York state, the Eastman Business Park contains over 100 buildings over 500 hectares. The location was Kodak's primary manufacturing site for more than a century and is still home to Kodak employees but now houses many other tenants, including many from the clean energy sector.

The utility business today provides electricity, steam, chilled water, compressed air, industrial water, sewer services, nitrogen, natural gas and potable water to the park's more than 40 owners and tenants. Recycling Energy Development the project developer will deliver $80 million investment over five years in a variety additional energy efficiency projects.

Due to the expected long term returns, prospects for the equity provider are very good. In addition to providing equity capital and sharing the risk, the investor also assumes the role of an operator of the energy-efficiency equipment. Thus, off-balance structures or special purpose vehicles are created that assume the risk of operating the installation. This unlocks more capital that again attracts additional investment.

Complicated energy-efficiency projects that often face capital constraints can be financed in such a way. Depending on the region, the GHG reduction that comes along with energy-efficiency projects can be monetized via the carbon markets and provides an additional revenue stream for the project. This is particularly the case where several such upgrades are bundled under the same project.

"Due to the expected long term returns prospects for the equity provider are very good"

Next steps for a city

A city looking to attract equity investors needs to undertake the following activities:

- Identify projects and sectors where third party equity capital is needed for the implementation of projects
- Analyze market failures, sub-optimal investment situations
- Evaluate possible public-private risk-sharing models to create appetite for the market
- Create communication platform to engage with potential environmentally minded equity investors
- Identify expected financial and non-financial impacts

Section 5

Conclusions

Conclusions

This is a critically important time for discussing climate finance for cities for the reasons discussed:

- There is great need for cities to deal with climate change challenges and to deal with them soon. Building solutions takes time and decisions made now will impact on our city infrastructure for the next 50 years.
- There is growing interest among investors in climate related projects as demonstrated by green bonds, the use of proceeds of which can be applied to sustainable infrastructure.
- All projects fall along a continuum of bankability or financeability. New approaches to infrastructure require new approaches to financing.

The good news is that new approaches to infrastructure are informing financing and the development of new financing solutions. This report describes this dynamic in a way that helps cities appreciate the opportunities and challenges of new approaches to both infrastructure and financing.

A number of approaches and examples are set out in this report. And more will follow that continue to expand how projects are identified and developed, taking account of financeability. Developing cities will be building a lot of infrastructure for the first time, and they have neither the internal mandate nor often the ability to follow traditional paths for funding this work. Developed cities will be both financing the optimizing existing infrastructure and developing capacity to finance new infrastructure. Given current funding realities, a change of mindset is needed for both. Fortunately, technical innovation is giving this a boost. Automation and digitalization are enabling both existing and new infrastructure to operate more efficiently than ever before. The impact of these technologies can be seen in the examples below.

Table 4: The impact of smart technologies on infrastructure

	Impact of smart technologies	
Rolling Stock	Save up to 30% in lifecycle costs	20 to 30% capacity increase with driverless trains
Road and rail	Approx. 20% increase in city traffic speed	
Power and utility grids	Integration of renewable: 25 to 40% lower investment (compared with traditional grid expansion)	
Buildings	20 to 30% less energy consumption	

Source: Siemens

Cities still need to capture more benefits of climate-related infrastructure projects to make them viable because they do not tend to have the defined revenue streams of traditional infrastructure. They must do this in two key ways: Financially, where one agency may be paying for the project but that project benefits or reduces the cost to many agencies, e.g. cleaner air, and; non-financial impacts, such as improving public spaces, community building, and other elements that improve the quality of the urban experience. Traditionally, these challenges have been seen as either public or private endeavors.

30%

Increase in train capacity and savings in lifecycle costs possible through smart technology

The new reality of climate-related infrastructure financing is that this is not so black-and-white anymore. Key partnership elements are highlighted in several of the financial frameworks described in this report. Cities sometime struggle to capture public support for infrastructure because much of what allows cities to function is invisible. The financing behind that infrastructure is less visible still. This paper brings some additional solutions to light, showing cities just how much is possible.

"The good news is that new approaches to infrastructure are informing financing and the development of new financing solutions"

Annex 1

What do we mean by sustainable infrastructure?

Cities require infrastructure to function. But it is important that cities take account of the impact infrastructure has on their development.

Infrastructure needs to be sustainable. That means that it needs to meet the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable infrastructure supports the goal of economic development, whilst minimizing or reducing the environmental impact and providing or maintaining a good quality of life. By sustainable infrastructure we mean infrastructure that has one or more of the following outcomes:

- Ensures the more efficient use of resources and reduces the negative environmental and social impacts of infrastructure (such as energy efficiency in homes and workplaces or low and zero carbon energy supply);
- Ensures the city is more resilient and adapted to the consequences of climate change for example smart grid infrastructure that allows cities to cope more effectively with impacts to losses of power on the grid caused by extreme events; and
- Protects or enhances natural ecosystems and habitats and integrates green infrastructure into city systems, such as increasing tree cover to reduce the urban heat island effect, or using natural systems to alleviate the impact of flooding.

The traditional infrastructure that supplies many urban services consists of a centralized, fixed-point service facility and a delivery network. Think energy (central power plants connected via transmission networks to end users), water (reservoir and pipes) and sewers (wastewater treatment plant and more pipes). Buildings and their occupants have largely been passive service recipients and end users at the ends of these chains.

The rising acknowledgement of the need to reduce GHG emissions and prepare cities to manage the challenges of extreme weather is beginning to turn traditional approaches to infrastructure on its head. Technological developments, such as advances in photovoltaics and big data, offer a way to address environmental concerns by thinking of buildings as energy producers or stormwater managers. When applied in the aggregate across the urban landscape, buildings themselves become the “infrastructure”; potentially not only a more environmentally friendly substitute for some modes of traditional infrastructure, but a more economical one as well.

Advances in technology, application of “big data”, and fiscal and environmental pressures are driving cities towards infrastructure approaches that are more efficient, intelligent and that generate fewer GHG emissions. Such approaches make better use of resources, leveraging data and information to act intelligently and optimize their own performance, whilst reacting to real-time situations. Some examples of the changing approaches in infrastructure are set out below.

	Traditional approaches	Sustainable approaches
Energy	Large, centralized fossil fuel plants providing energy to consumers. Grid supports the linear flow of energy from plant to consumers	Balanced energy mix with low and zero carbon plant, decentralized, smart grid, grid, storage, responsive
Buildings	No integrated planning design, high energy and water consumers met by the grid, carbon intensive materials, not connected to transport systems	Building Management systems, Sustainable design, low carbon materials, connected to sustainable modes of transport, low energy and waster consumers, low and zero carbon energy producers, greywater and blackwater recycling on-site
Water Management	Hard engineered stormwater infrastructure	Decentralized green infrastructure (such as parks, greenspaces and green roofs) to reduce demands on hard 'stormwater' infrastructure
Transport	Road infrastructure supporting private cars	Bus rapid transit, low and zero carbon vehicles, trains, trams, cycling, congestion zones
Waste management	Collection and disposal of waste to managed landfills	Circular economy, recycling, recovering heat and power from waste

Case Study

Long term solutions for stormwater management in Washington DC

Case Study

Long term solutions for stormwater management in Washington DC

The District of Columbia Water and Sewer Authority has raised finance via a green bond to deliver its plans to construct a drainage system that prevents excess rainwater and sewage from discharging into the area's rivers, an effort dubbed the D.C. Clean Rivers Project.

Currently, a 31mm storm generates about two million cubic meters of stormwater runoff which flows into storm sewers untreated and polluting the Potomac and Anacostia rivers.

The Authority sold $350 million of bonds with a 100-year maturity. The bonds rated as AA, were high enough to raise the initial sale from $300 to 350 million. The bond issuance was vastly over-subscribed with investors placing $1.1 billion of orders. Extra long term bonds such as this are rare, whilst they have been used by universities, sovereign nations and highly rated companies this is the first example of a green bond of this kind.

Traditional buyers for 100-year bonds include pension funds and insurance companies but about $100 million of the investor orders came from green-bond investors specifically.

Investors who bought the D.C. water authority's bond will be paid back with revenue from the water-and-sewer system, which collects fees from residential, commercial and governmental customers. In that sense, the bond is similar to a typical municipal bond from a water-and-sewer utility.

In addition, the District Department of Environment is requiring the retrofit of regulated projects with a land area greater than 465m^2. Regulations require such projects to retain the volume of a 31mm storm. Given that this regulation will be costly or difficult to implement in some cases, regulations allow for offsetting. In such instances projects can purchase stormwater retention credits (SRCs). In this system, pollutant-reductions can be achieved by paying for private-market stormwater retrofits at a lower price than it would cost to conduct those retrofits itself.

This framework requires regulated projects to retain at least 50 percent of the volume associated with their applicable retention standard onsite. The remainder can be met offsite. In order to pursue offsite retention, the project has the option of paying an in-lieu fee or using a privately generated (and tradable) stormwater retention credit (SRC). The cost of the in-lieu fee corresponds to 3.8 liters of retention for one year, also equivalent to 1 SRC and the DDOE's costs of installing the retrofits themselves.

This approach drives down the cost of stormwater retrofits and incentivizes developers to generate SRCs through further installations.

"Traditional buyers for 100-year bonds include pension funds and insurance companies but about $100 million of the investor orders came from green-bond investors specifically"

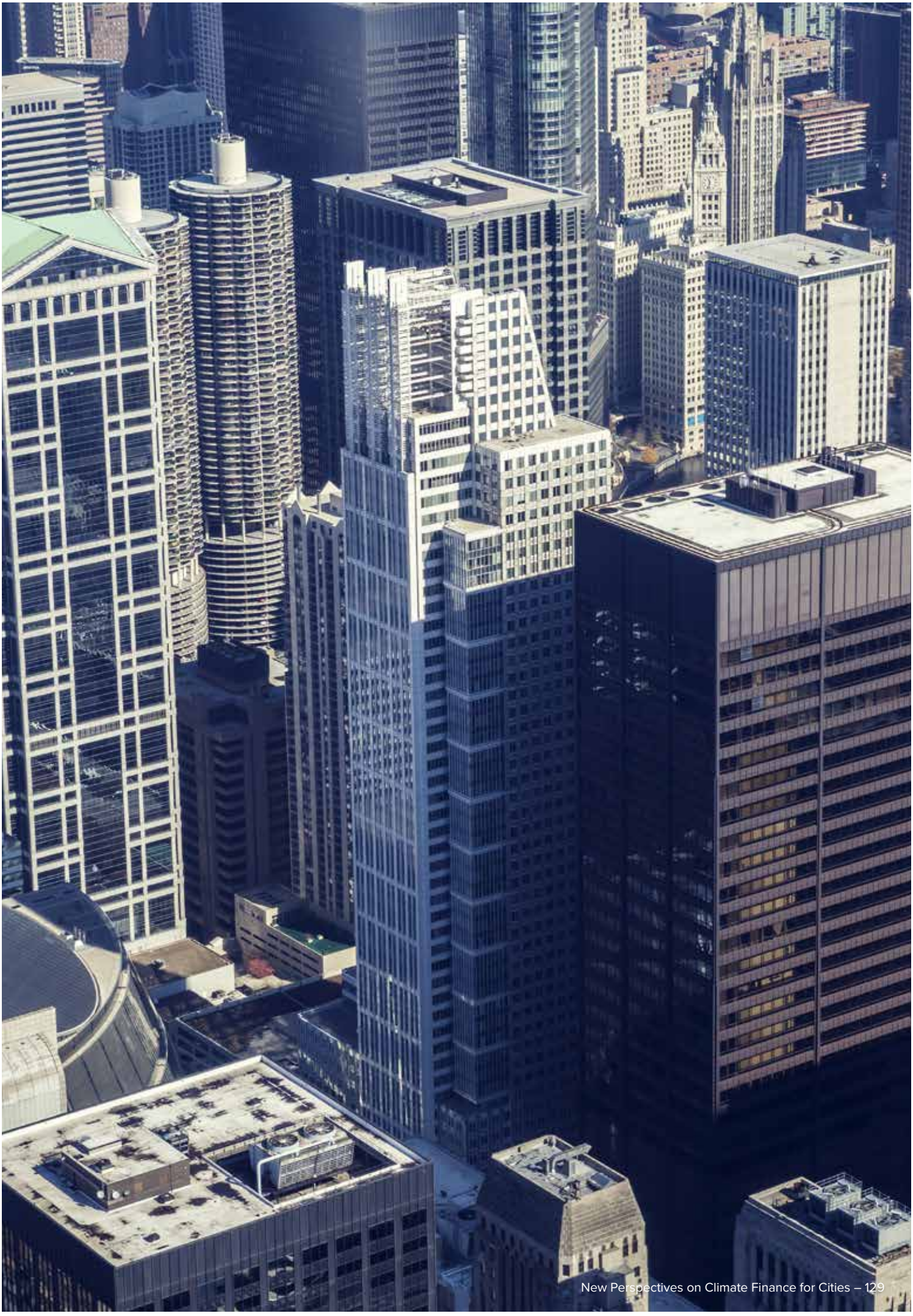
Locking in the benefits of sustainable infrastructure (and avoiding long term, unsustainable costs)

As our cities grow, we face important choices over the next two decades about how we provide new and replace existing urban infrastructure. Population growth, urbanization, climate change, and technology all present a golden opportunity to make our cities more sustainable, drive economic growth and drive down our greenhouse gas emissions. How we approach the infrastructure needs of our cities will 'lock-in' infrastructure solutions for the next 50 years. By planning and investing carefully now and adapting our economies and infrastructure so that they are sustainable, we avoid being locked into the dire long term consequences of unsustainable development and technology.

Sustainable development isn't simply about making the right technology choices, it also involves planning for how we manage the growth of our cities. The excessive and uncontrolled spatial growth of cities, known as urban sprawl is hugely wasteful and inefficient. It is estimated that urban sprawl costs the United States $400 billion every year. Nearly half of these costs are due to the increased costs of public services such as water, energy and waste. One fifth is due to the increased capital investment needed for infrastructure such as roads. Creating well planned, connected and compact development is important to ensuring our cities are sustainable.

Making unsustainable investment choices in infrastructure can also lock in other negative and long-term challenges such as congestion and air pollution.

A number of global initiatives are helping to shift cities towards more sustainable investment choices. This includes Financing Sustainable Cities, an initiative of the WRI Ross Center for Sustainable Cities and C40 Cities, funded by the Citi Foundation. The initiative is helping cities develop business models to accelerate the implementation of sustainable urban solutions and consists of three key components: the development of a learning community, the provision of technical assistance, and the delivery of an online engagement platform. Over the next two years, this Initiative will work directly with cities to help them identify suitable funding, finance and delivery options for sustainable urban solutions.



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Your Notes

Your Notes

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