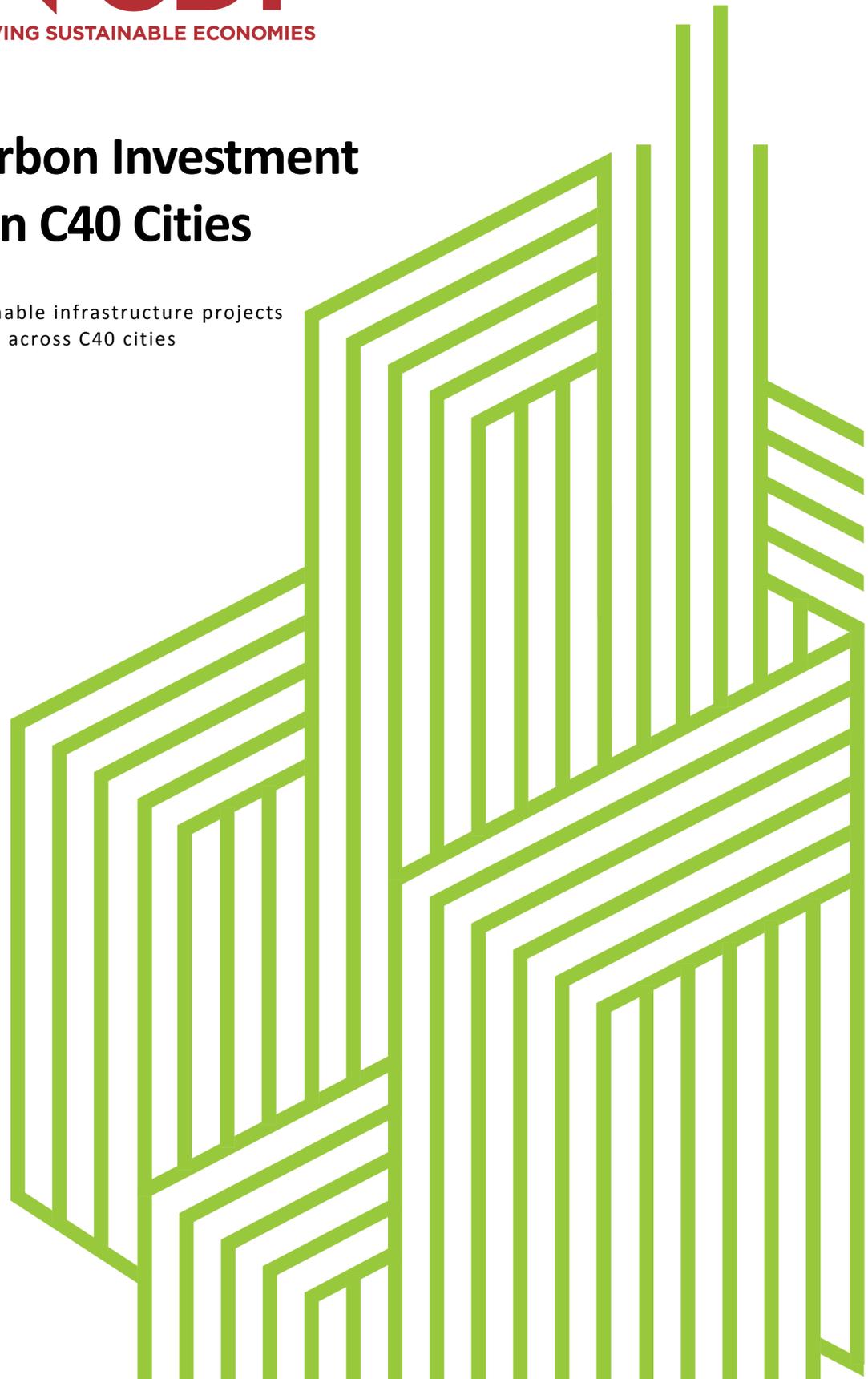




The Low Carbon Investment Landscape in C40 Cities

An analysis of the sustainable infrastructure projects currently in development across C40 cities



Executive Summary

Over the past few years, C40 cities have invested a reported US\$1.5 billion in sustainable infrastructure.

New analysis of the CAM 3.0 database shows that between 2011 and 2015, C40 cities reported having invested US\$1.5 billion in low carbon infrastructure projects and programmes.

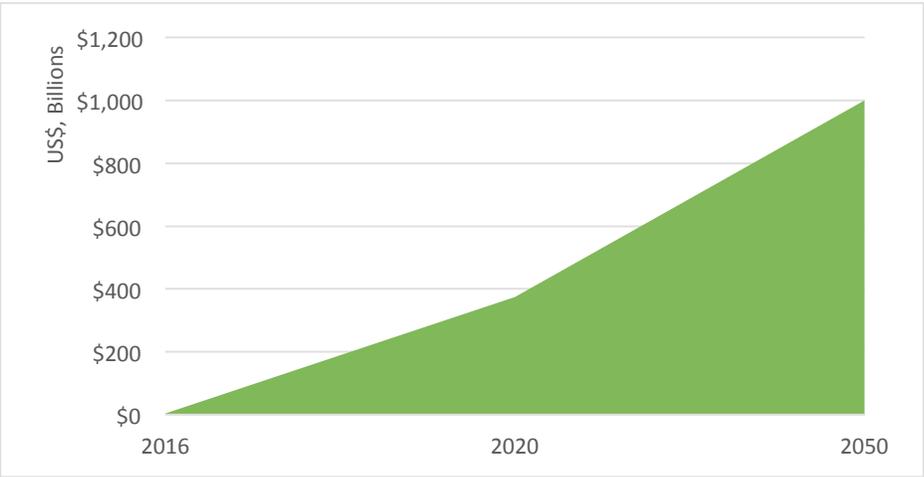
C40 cities are currently developing a huge number of sustainable infrastructure projects, with a total reported value of US\$15.5 billion.

C40 cities have disclosed capital costs for roughly 15% of the sustainable infrastructure projects currently being developed¹. Even this amounts to a planned investment of US\$15.5 billion – demonstrating the sheer scale of immediate opportunity for collaboration with the private sector. The accompanying spreadsheet is a beta pipeline of all the planned low-carbon infrastructure projects across C40 cities. It highlights that there are over 3000 low-carbon infrastructure projects currently being planned worldwide across C40 cities – an average of 20-40 per C40 city – and over 700 in the Buildings sector.

Over the next few years, C40 cities will need to invest US\$375 billion to get on the trajectory required to meet the ambition of the Paris Agreement.

Recent C40 research *Deadline 2020* has estimated that up to 2050, C40 cities will need to invest over US\$1 trillion on new climate action and in renewing and expanding infrastructure – with US\$375 billion of this needed over the next four years alone in order to get on the trajectory required to deliver a 1.5 degree scenario, as shown below.

Figure 1: Investment trajectory required to meet the ambition of the Paris Agreement



Source – CAM 3.0, CDP 2016 questionnaire (C40 cities only), *Deadline 2020*

This magnitude of investment can only be delivered through collaboration with business and investors.

The accompanying beta pipeline spreadsheet shows that investment in sustainable infrastructure is possible even in cities with modest city budgets. However, *Deadline 2020* and CDP’s 2016 Cities report both highlight that the magnitude of investment required can only be delivered through collaboration with business and investors. The public sector is unable to fully finance low carbon infrastructure across C40 cities, but it has a key role in creating enabling conditions to secure the required private sector investment.

¹ CAM 3.0 data and responses to CDP’s 2016 questionnaire

In order to accelerate climate action, capacity building within cities and investors is urgently required.

C40 research indicates that accessing and attracting finance are some of the most significant barriers that mayors face on delivering on their climate change plans², while the finance industry reports a lack of understanding of the low carbon technology being deployed and experience in the financing models cities use to fund infrastructure projects³.

Cities must rapidly improve project development information to attract finance.

The first step in increasing interface between cities and financial institutions is for cities to improve project development information and disseminate and communicate climate change-related projects to the finance industry – for instance, through CDP’s annual disclosure platform. The accompanying beta pipeline spreadsheet intends to drive this information improvement process by highlighting both the lack of project data but also the investment potential across C40 cities.

² https://issuu.com/c40cities/docs/unlocking_climate_action_in_megacit/4?e=10643095/35384119

³ <http://local.climate-kic.org/wp-content/uploads/2016/02/Final-White-Paper-Barriers-to-Investments-into-Urban-Climate-Mitigation-Projects-020220161.pdf>

Introduction

Cities are critical to delivering a climate safe future.

The COP21 Paris Agreement was a historic, global achievement that commits signatories to limiting global average temperature rise to 1.5 degrees above pre-industrial levels. Between 2011 and 2015, C40 cities reported an investment of US\$1.5 billion in low-carbon infrastructure. C40's *Deadline 2020* research has estimated that up to 2050, C40 cities will need to invest over US\$1 trillion on new climate action and in renewing and expanding infrastructure – with US\$375 billion of this needed over the next four years alone in order to get on the trajectory required to meet the ambition of the Paris Agreement⁴.

Collaboration and partnerships will be essential to meet the ambition of the Paris Agreement.

The future actions necessary as outlined in *Deadline 2020* will not only require cities to leverage their networks, stakeholders, and partnerships, and collaborate to drive change and also to manage significant pipelines of investment and employ innovative financing mechanisms.

The opportunity for investment in sustainable infrastructure projects across C40 cities is tremendous.

It is intended that publishing the details of the sustainable infrastructure projects planned across 90 of the world's megacities will demonstrate to financial institutions and sustainable solutions companies the scale of the market, immediate opportunities for scaling up investment and financing models that make urban investment a sustainable and financially viable solution.

C40 & CDP are already working towards overcoming barriers to financing climate change projects.

Accessing and attracting finance are some of the most significant barriers that mayors face in delivering their climate change plans⁵. This challenge is particularly acute in cities from developing countries and emerging economies where there is often a shortage of expertise in securing investment. Accordingly, the C40 Cities Finance Facility was launched during COP21 and will provide US\$20 million of support by 2020 to help unlock and access to up to US\$1 billion of additional capital funding, by providing the connections, advice and legal/financial support to enable C40 cities in developing and emerging countries to develop more financeable projects.

The financial industry also reports a lack of a) corporate understanding of the low carbon technology being deployed, b) experience in the financing models cities use to fund low carbon infrastructure and c) capacity within city governments to form partnerships and collaborate, when considering sustainable infrastructure projects⁶. CDP's Matchmaker programme aims to overcome these challenges by engaging cities early in the project development process and standardizing how these projects are disseminated to the market. Matchmaker will publicize these low-carbon infrastructure projects to CDP's growing number of investor signatories that currently represent over US\$100 trillion in assets.

This report and the accompanying spreadsheet aims to highlight the scale of opportunity for investors and to encourage cities to improve project development data in order to attract finance.

The accompanying beta pipeline spreadsheet is by no means a complete compilation of all the sustainable infrastructure projects that C40 cities are undertaking. It aims to highlight the a) scale of opportunity for investors and b) lack of project data to drive cities to improve project development information and to enable the market shift needed to ensure sufficient finance flows to these vital projects.

⁴ www.c40.org/researches/deadline-2020

⁵ https://issuu.com/c40cities/docs/unlocking_climate_action_in_megacit/4?e=10643095/35384119

⁶ <https://www.cdp.net/en/research/global-reports/global-cities-report-2016>

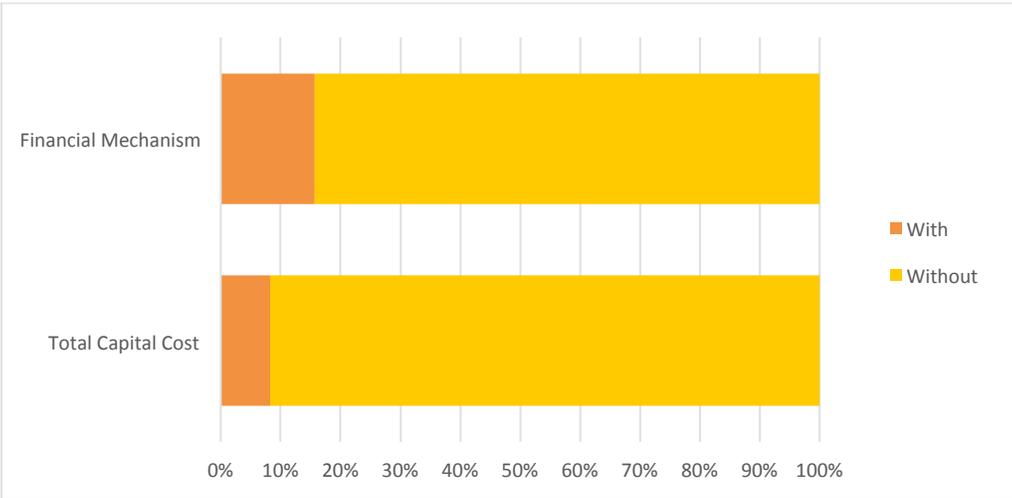
Methodology

C40 and CDP have detailed evidence on the action that C40 cities are taking to mitigate and adapt to the effects of climate change, from self-reported data between 2011 and 2016 as part of the C40-Arup research partnership *Climate Action in Megacities* (CAM) series of reports, and CDP’s annually updated global platform of environmental data.

In partnership with CDP, this data and analysis has been consolidated and is presented in the accompanying spreadsheet as a beta pipeline of planned sustainable infrastructure projects – new pilot projects and existing projects that are to be scaled up, projects for which cities hope to attract investment for – across C40 cities. The accompanying spreadsheet contains the publicly reported projects whereas this narrative report analyses both publicly and privately-reported low-carbon infrastructure projects. The full list of cities included in the analysis for this report can be found in the **Appendix**.

As shown below in **Figure 2**, not all CAM-reported or CDP-disclosed projects and programmes report information on capital costs or financing mechanisms. Nevertheless, there is still sufficient information to paint an informative picture about the immediate opportunities for the financial industry to invest in sustainable infrastructure projects and programmes in cities.

Figure 2: Percentage of projects disclosing financial information



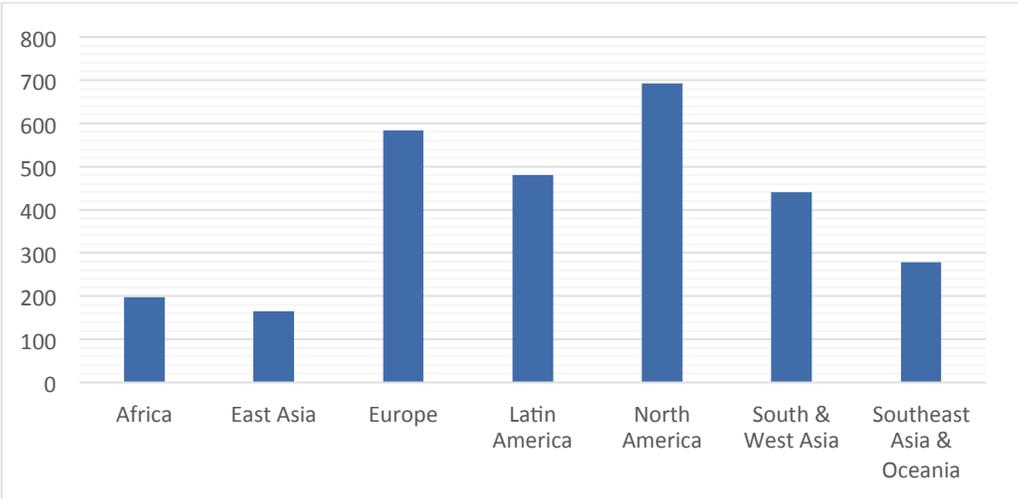
Source - CAM 3.0, CDP 2016 questionnaire (C40 cities only)

Where are C40 cities developing sustainable infrastructure projects?

Regional landscape

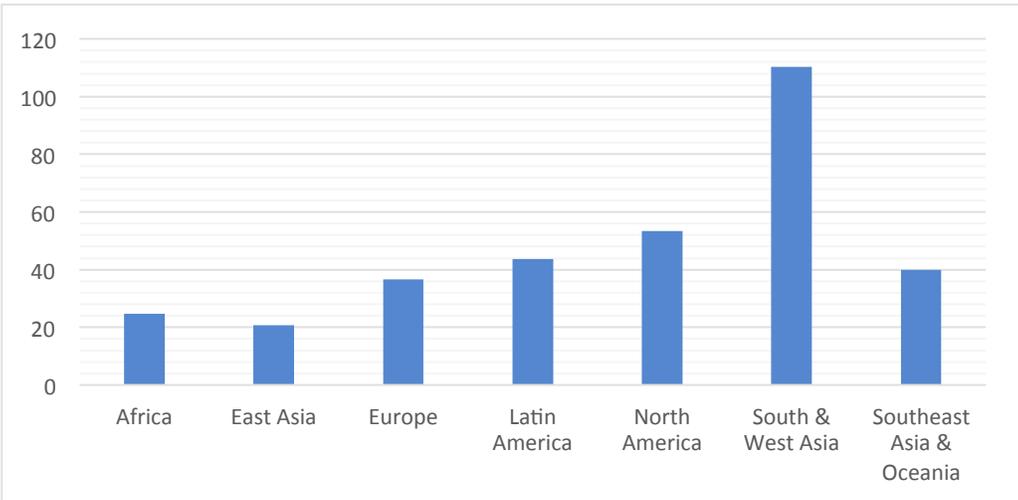
Recent CDP analysis found that cities across Asia and Oceania, Europe and North America see the most economic potential in increased infrastructure investment⁷. **Figure 3** mostly supports this and shows where new sustainable infrastructure projects are being developed globally across C40 cities. It illustrates that Europe, Latin and North America report the greatest number of projects out of the seven regions - although this may mostly be a reflection of the distribution of C40 cities.

Figure 3: Total number of new projects across regions



Source - CAM 3.0, CDP 2016 questionnaire (C40 cities only)

Figure 4: Average number of new projects per C40 city in each region



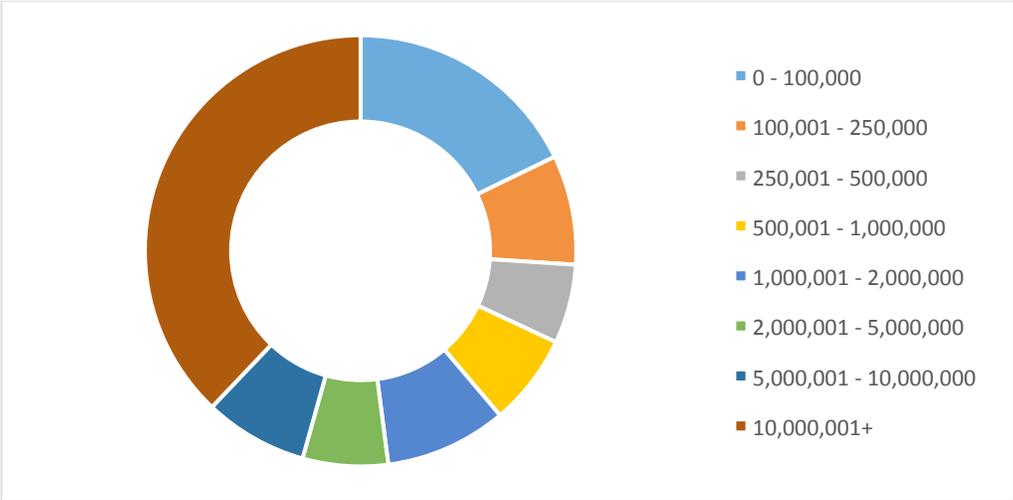
Source – CAM 3.0, CDP questionnaire (C40 cities only)

⁷ <https://www.cdp.net/en/research/global-reports/global-cities-report-2016>

Figure 4 demonstrates that across all regions, South & West Asia has reported developing, on average, the most projects per C40 city – with 110 low-carbon infrastructure projects compared to an average of 20-40 new projects per C40 city in other regions. The opportunity and requirement for investment here is critical – as outlined in *Deadline 2020*, there is a need to focus efforts and support in C40 cities in East Asia and South and West Asia, due to their large and growing populations and expected significant contribution to business-as-usual emissions out to 2100, while also recognising that some of these cities may be the least well-equipped to deliver the scale of action required.

C40 cities have reported total capital cost for roughly 15% of the sustainable infrastructure projects disclosed. **Figure 5** demonstrates the cost distribution of these projects – showing that C40 cities are developing low-carbon projects with a range of capital costs - from less than US\$100,000 to over US\$10 million for a single project or programme. Of the projects that have provided cost data, roughly one-third cost over US\$1 million, illustrating the ambition of C40 cities.

Figure 5: Total capital costs of new projects, US\$

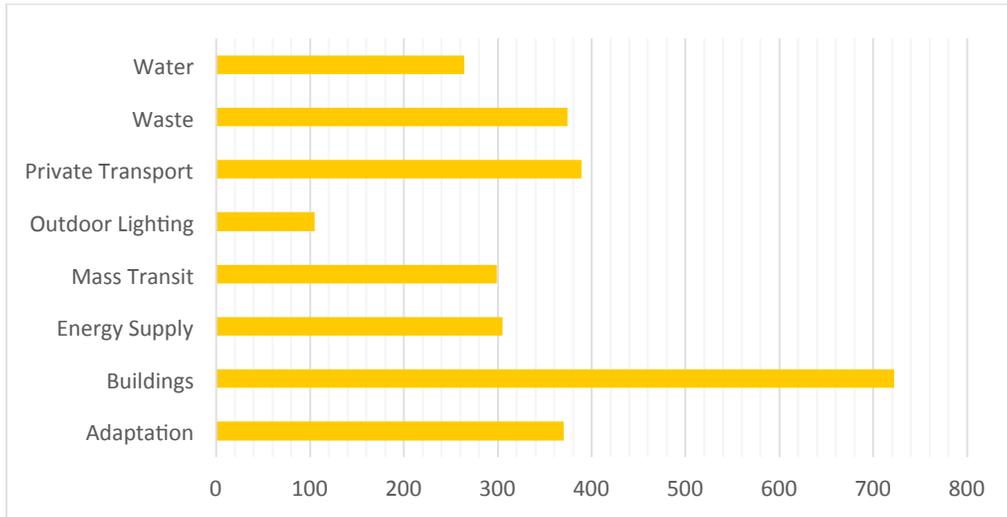


Source - CAM 3.0, CDP 2016 questionnaire results (C40 cities only)

Sectoral landscape

Figure 6 illustrates the distribution of sustainable infrastructure projects by sector. In total, C40 cities reported over 3000 individual projects or programmes currently in development. Just under a third of these are in the Buildings sector and across most sectors there are on average 250 projects in development. As outlined in *Deadline 2020*, the pathway to 2020 sees the expansion of a broad mix of action across sectors, with the majority in the Buildings and Transit sector, and so further investment and development of infrastructure projects in these sectors is required.

Figure 6: Number of new infrastructure projects across sectors

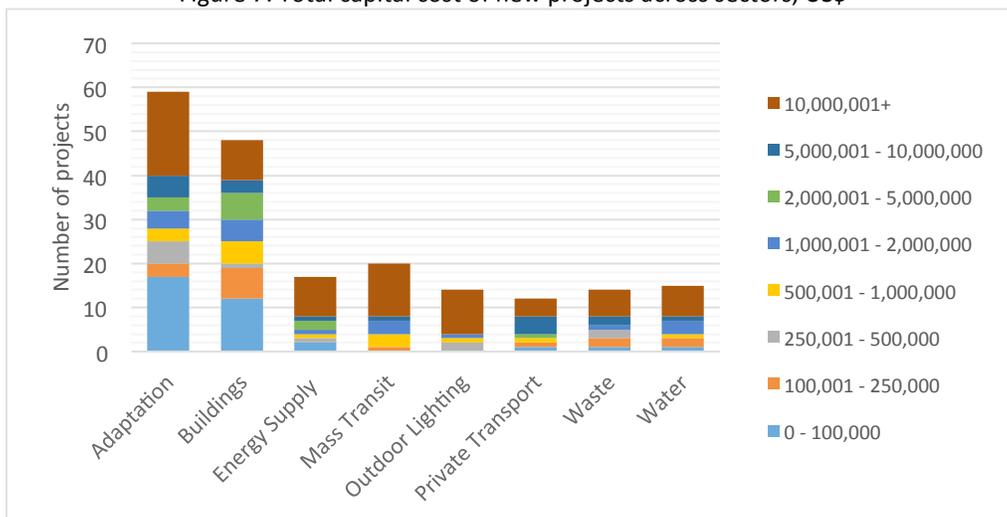


Source - CAM 3.0, CDP 2016 questionnaire results (C40 cities only)

Figure 7 shows the distribution of low-carbon infrastructure projects that C40 cities have provided a total capital cost for by sector. It demonstrates that certain sectors have a higher proportion of new projects with large capital costs - the Mass Transit, Outdoor Lighting and Energy sectors are good examples of this, where the majority of projects providing cost data reported capital investment requirements of over \$10 million.

Although extremely useful for investors, the findings from **Figure 7** are based on cities' capacity and willingness to quantify and disclose project costs. Cities have disclosed cost information for roughly 15% of the sustainable infrastructure projects in development, and as seen in **Figure 7** this has been predominantly in the Adaptation and Buildings sector. Cities often face numerous competing priorities and resource constraints that make it challenging to develop investable project plans and accurately quantify project costs, particularly in nascent sectors, which could offer an explanation for the variation in reported costs across sectors.

Figure 7: Total capital cost of new projects across sectors, US\$



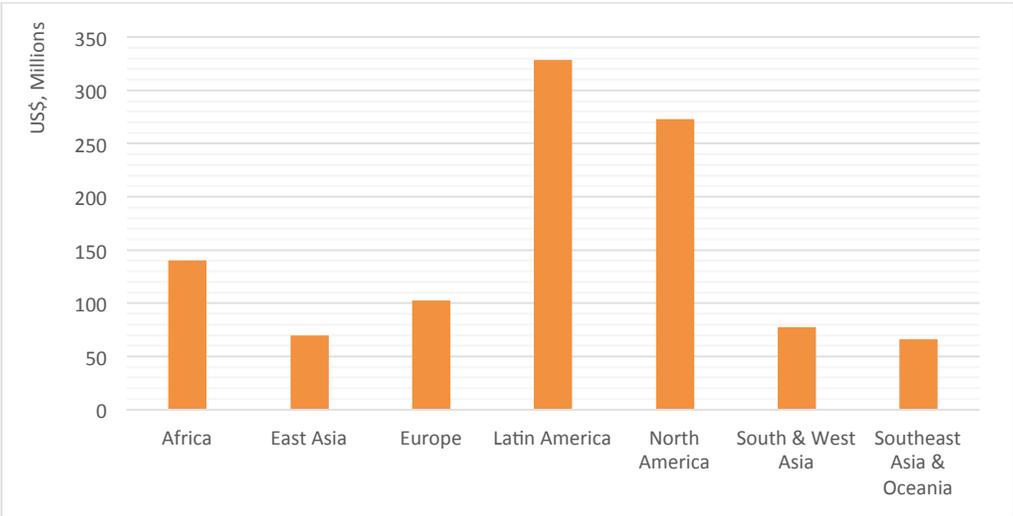
Source - CAM 3.0, CDP 2016 questionnaire results (C40 cities only)

What is the investment opportunity across C40 cities?

Although C40 cities have disclosed cost data for roughly 15% of the sustainable infrastructure projects in development, the total value of these projects comes to US\$15.5 billion, highlighting the sheer scale of opportunity. **Figure 8** shows where this reported investment is distributed globally and thus the immediate opportunity for collaboration with investors.

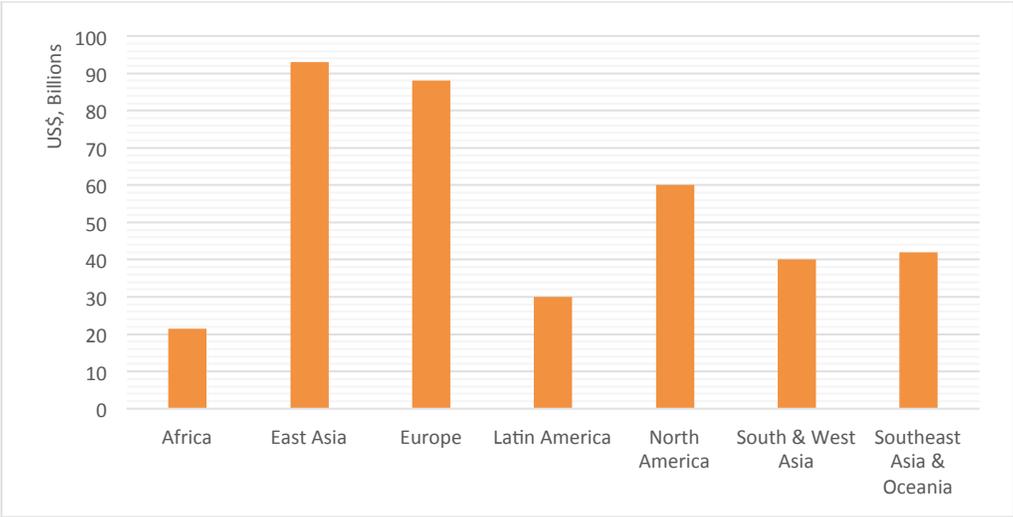
More importantly, **Figure 9** shows the regional investment required to 2020 for C40 cities as outlined in *Deadline 2020* – illustrating the investment gap – in billions – and thus the scope for collaboration between cities and investors to fund significant action today.

Figure 8: Current investment in new projects across regions



Source – CAM 3.0, CDP 2016 questionnaire results (C40 cities only)

Figure 9: Investment required across regions to 2020 for a 1.5 degree scenario



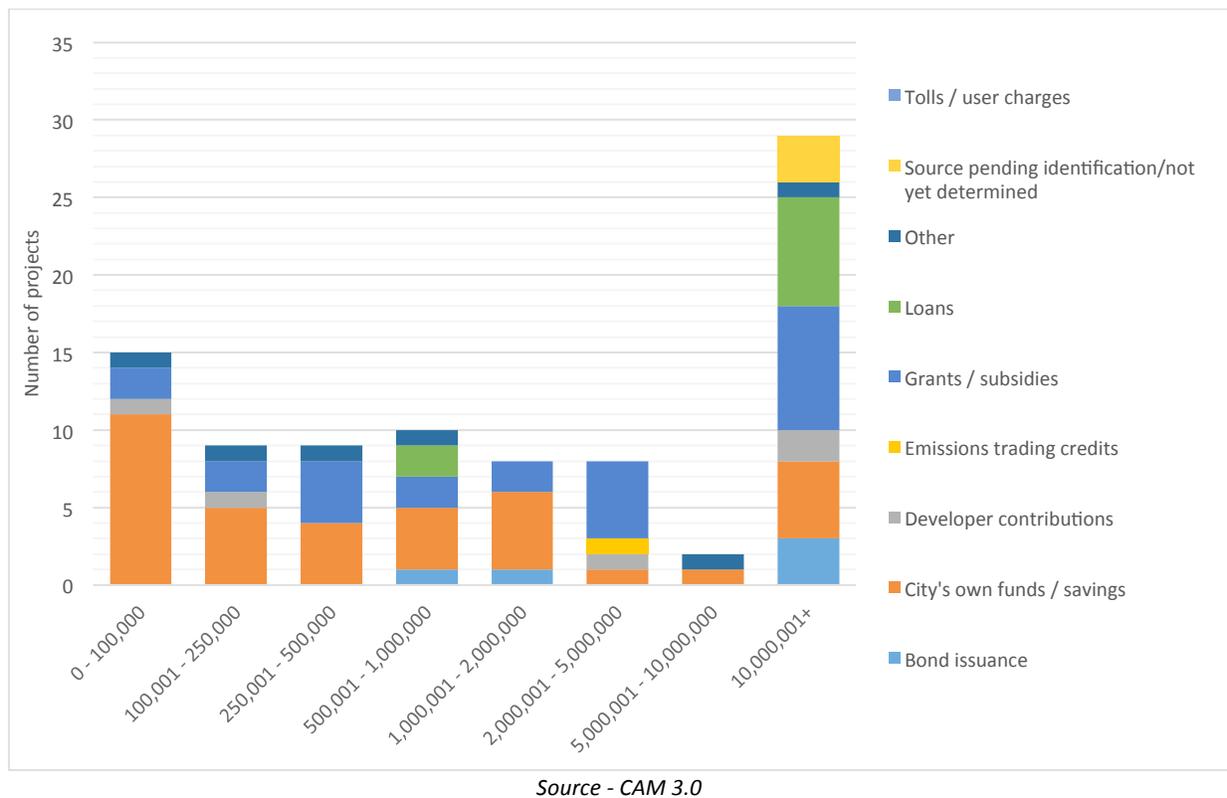
Source – Deadline 2020

How are C40 cities financing sustainable infrastructure projects?

As seen in previous chapters, sustainable infrastructure projects can range in size from costing less than US\$100,000 to over US\$10 million. C40 cities have reported cost data for roughly 15% of projects in development, and even this fraction has amounted to a total value of US\$15.5 billion, demonstrating the sheer scale of opportunity for investment and collaboration between cities and the private sector.

Figure 10 shows how C40 cities have reported financing their sustainable infrastructure projects. Lower-cost projects are mostly being funded using cities' own budgets or savings, and the proportion of city-funded projects decreases as project costs increase – for higher-cost actions, cities are using alternative mechanisms, such as initial grants, subsidies and loans.

Figure 8: Financing mechanisms of new infrastructure projects, by total capital cost (US\$)



Although the data shows that investment in sustainable infrastructure is possible even in cities with modest city budgets, the magnitude of investment required in order to get on the trajectory required to meet the ambition of the Paris Agreement can only be delivered through collaboration with business and investors^{8 9}. The public sector is unable to fully finance low carbon infrastructure across C40 cities, but it has a key role in creating enabling conditions to secure the required private sector investment.

⁸ <https://www.cdp.net/en/research/global-reports/global-cities-report-2016>

⁹ www.c40.org/researches/deadline-2020

Conclusion

In summary, the concluding findings of the analysis of low-carbon infrastructure projects across C40 cities are as follows:

1. The immediate size and scale for collaboration between C40 cities and investors is tremendous

C40 cities have disclosed capital costs for roughly 15% of the sustainable infrastructure projects currently being developed¹⁰. Even this amounts to a planned investment of US\$15.5 billion – implying a much greater amount for the whole number of projects and demonstrating the sheer scale of immediate opportunity for collaboration with the private sector. There are over 3000 low-carbon infrastructure projects currently being planned across C40 cities worldwide – an average of 20-40 per C40 city – and over 700 in the Buildings sector.

2. However, the investment opportunity to deliver a climate safe future is much greater

It is estimated that up to 2050, C40 cities will need to invest over US\$1 trillion on new climate action and in renewing and expanding infrastructure – with US\$375 billion of this needed over the next four years alone in order to get on the trajectory required to meet the ambition of the Paris Agreement¹¹. This is 25 times the amount of investment in sustainable infrastructure that C40 cities have disclosed for over the next few years.

3. The investment required can only be delivered through collaboration between cities and investors

The public sector is unable to fully finance the scale of low carbon infrastructure across C40 cities required for a 1.5 degree scenario, but it has a key role in creating enabling conditions to secure the required private sector investment – such as grants, subsidies and loans – particularly for higher cost, more ambitious projects. Cities will need to leverage their networks, stakeholders, and partnerships, and collaborate to drive change and also to manage significant pipelines of investment and employ innovative financing mechanisms.

4. Cities must improve project development information in order to accelerate climate action

To ensure sufficient finance flows to these vital sustainable infrastructure projects and enable the market shift needed, capacity building within cities and investors is urgently required. The first step in increasing interface between cities and financial institutions is for cities to improve project development information and disseminate and communicate climate change-related projects to the finance industry – for instance, through CDP's annual disclosure platform. The accompanying beta pipeline spreadsheet intends to drive this information improvement process by highlighting both the lack of project data but also the investment potential across C40 cities.

¹⁰ CAM 3.0 data and responses to CDP's 2016 questionnaire

¹¹ www.c40.org/researches/deadline-2020

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Appendix

The analysis of sustainable infrastructure projects is based on self-reported data from the following C40 cities:

Accra	Guangzhou	Paris
Addis Ababa	Hanoi	Philadelphia
Amman	Heidelberg	Portland
Amsterdam	Ho Chi Minh City	Quezon City
Athens	Hong Kong	Quito
Auckland	Houston	Rio de Janeiro
Austin	Istanbul	Rome
Bangalore	Jaipur	Rotterdam
Bangkok	Jakarta	Salvador
Barcelona	Johannesburg	San Francisco
Basel	Karachi	Santiago de Chile
Beijing	Kolkata	São Paulo
Berlin	Lagos	Seattle
Bogotá	Lima	Seoul
Buenos Aires	London	Shanghai
Cairo	Los Angeles	Shenzhen
Cape Town	Madrid	Singapore
Caracas	Melbourne	Stockholm
Changwon	Mexico City	Sydney
Chicago	Milan	Tokyo
Copenhagen	Moscow	Toronto
Curitiba	Mumbai	Tshwane
Dar es Salaam	Nairobi	Vancouver
Delhi	Nanjing	Venice
Dhaka	New Orleans	Warsaw
Dubai	New York City	Washington, DC
Durban	Oslo	Wuhan
		Yokohama