

ANALYSIS

The demand for financing climate projects in cities

An analysis of projects from the C40 Cities Finance
Facility's application phase and from CDP disclosure

SEPTEMBER 2018



About the C40 Cities Finance Facility

The C40 Cities Finance Facility (CFF) facilitates access to finance for climate change mitigation and resilience projects in urban areas by providing technical assistance to develop cities' sustainability priorities into bankable investment proposals. The CFF aims to deliver project preparation and capacity development, and to widely share knowledge and establish partnerships between cities and financiers. Funded by the German Federal Ministry for Economic Cooperation and Development, the Government of the United Kingdom and the United States Agency for International Development, the initiative is implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH together with the C40 Cities Climate Leadership Group. Bogotá, Mexico City and Durban are the first cities to receive technical assistance.

Funding partners:



Implementing agencies:



About the CDP Matchmaker

CDP, formerly Carbon Disclosure Project, is a non-profit organization that runs the global disclosure system for investors, companies, cities, states and regions to measure and manage their environmental impacts. Over 570 cities worldwide reported environmental data to CDP in 2017 to track progress, benchmark their performance, and access insights and analysis. Of these, 362 global cities reported more than 1,000 projects worth over US\$52 billion, that are seeking private investment to mitigate and adapt to climate change. In order to accelerate financing into urban climate projects globally, CDP, with support from Climate-KIC, developed Matchmaker, which catalyses investment in cities by connecting investors with a pipeline of green projects in cities.

Funding partner:



About the Global Covenant of Mayors

The Global Covenant of Mayors for Climate and Energy (GCoM) is the largest global coalition of cities and local governments voluntarily committed to actively combatting climate change and transitioning to a low-carbon and climate resilient economy. Led by UN Secretary-General's Special Envoy for Climate Action, Michael R. Bloomberg, and European Commission Vice President, Maroš Šefčovič, in partnership with local, regional and global city networks, the Global Covenant has thousands of city signatories across 6 continents and more than 120 countries, representing over 700 million people or nearly 10% of the global population. By 2030, Global Covenant cities and local governments could collectively reduce 1.3 billion tons of CO2 emissions per year from business-as-usual – equal to the emissions of 276 million cars taken off the road. In addition to the C40 Cities Climate Leadership Group, members of the GCoM include ICLEI – Local Governments for Sustainability, United Cities and Local Governments (UCLG), UN Habitat, European Commission, European Union Committee of the Regions, Climate Alliance, Council of European Municipalities and Regions (CEMR), Eurocities, Energy Cities and European Federation of Agencies and Regions for Energy and the Environment (FEDARENE).

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Executive Summary

There is substantial demand for financing and for project preparation of climate-related projects in cities across the world. This report draws upon 106 applications for support received by the CFF in 2018 and 1,037 projects submitted to CDP in the 2017 CDP Cities Questionnaire to show what climate-related projects in cities look like and what kinds of technical assistance they require, with a focus on cities in emerging economies.

Based on an analysis of the projects, the report includes four main conclusions:

- **There is substantial demand for project preparation support.** This report identifies 1,143 climate-related projects in 381 cities across the world. However, even more projects are needed to fulfil the ambitions of the Paris Agreement. Cities and financiers should work together and in partnership with other organisations to increase the number of climate projects that are planned, developed, financed, and implemented.
- **Projects are at all levels of project preparation.** There are projects at different levels of technical and financial development, with almost one-third of projects at the preliminary stage or undergoing scoping. Cities require support throughout the project development process, including in the early stages of project development, and in accessing financing.



1,143 projects



381 cities

US\$57.89bn

in capital investment required

- **Project preparation support must be tailored to each climate-related project.**

Climate projects vary by sectors, regions, required capital investment, levels of project development, type of support needed, and challenges to implementation. Cities, organisations working in the field of project preparation, and financiers should tailor their approaches to project preparation to ensure flexibility, contextualisation, and capacity development.

- **For projects to maximise their potential impact, there needs to be better project-level measurement of climate and co-benefits.**

Climate benefits and co-benefits are often complementary: the former can be an important additional benefit to any urban project and cities can make the case for climate projects by promoting them as measures to achieve other priorities. Financiers and organisations working in the field of project preparation can help cities to collect and use standardised data on climate benefits and co-benefits at the project level.

2. Introduction

Cities play a significant role in addressing climate change. Cities are currently responsible for more than 70% of global energy-related carbon emissions (UN-Habitat, 2011), and they are home to just over half of the global population. This proportion is likely to increase in a rapidly urbanising world. To limit warming to 1.5°C, the overarching aim of the Paris Agreement, and to achieve the UN Sustainable Development Goals, cities in developing countries cannot follow the same carbon-intensive pathway adopted by cities in the past.

Due to the unprecedented pace of population growth, cities must develop infrastructure at similarly unprecedented rates to deliver vital services to residents, such as transport, energy, and water. The Paris Agreement has created a fast-growing market for solutions and investments in low-carbon and resilient infrastructure, and most of these investments happen in cities and regions of all sizes (IFC, 2017). Just in C40 cities, over US\$1 trillion in investment on climate-related projects is needed by 2050 to reduce temperature rise to 1.5°C (C40 Cities & Arup, 2016). To deliver these investments, cities face the universal challenge of accessing finance: only 1 in 5 C40 cities are able to borrow from their national government, and only 1 in 4 can issue municipal bonds (C40, 2016: 41). These and other sources must be made more accessible, since the need for investment in infrastructure is far greater than what is available through traditional public sources: leveraging external capital such as development finance and the private sector is essential (G20, 2014: 9). Infrastructure projects require significant resources just to be prepared to a high standard and attract investment from financiers. However, funding for project preparation in developing countries is generally insufficient, which increases the risk that the project will not achieve its objectives (G20, 2014).

To bridge these gaps in project preparation funding and access to finance, several initiatives, often referred to as project preparation facilities (PPFs), have been established to support the development of infrastructure projects. PPFs are initiatives focusing on project preparation, across different stages of the process and regions, and which are characterised by distinct institutional arrangements and funding (G20, 2014: 1). A number of PPFs dedicated to supporting cities in preparing projects have emerged in recent years, spurred by the need to promote sustainable urban development and address capacity gaps in municipal governments.

One such initiative, launched just days before the signing of the Paris Agreement, is the C40 Cities Finance Facility (CFF). The CFF supports cities in developing countries to prepare and deliver sustainable, low carbon climate mitigation and adaptation infrastructure projects: it does so through business case development, financial structuring and financing option assessments and, when required, technical analysis and design support. Delivery of technical assistance is based on needs and demands identified jointly between the city and the CFF.

Cities also report their projects seeking financing to CDP. CDP serves as the global environmental disclosure system for companies, cities, states and regions. It launched the Matchmaker platform in 2017 with the support of Climate-KIC to better position cities to attract financing for their climate-related projects. The service bridges the communication gap between cities with infrastructure projects that need financing and members of the financial community who seek climate-related investment opportunities. Cities with climate-related projects seeking financing are identified through their responses to the CDP Cities Questionnaire. By identifying project leads at multiple stages of development, CDP presents a pipeline of climate projects to investors, promotes project disclosure, and supports project preparation facilities.

Also in 2017, the Global Covenant of Mayors for Climate and Energy (GCoM) launched the One Planet Charter, a joint initiative by ICLEI – Local Governments for Sustainability and the C40 Cities Climate Leadership Group to accelerate the implementation of the Paris Agreement in cities and local governments across the world. Through the One Planet Charter, cities can commit to specific climate action that drives investments, sustainable public procurement, and policy decisions in five sectors: renewable energy, energy efficiency, electric vehicles, zero emission buildings and zero waste. The Charter highlights cities' commitment to increase demand for sustainable and resilient infrastructure, products and services, while also recognising the importance of working closely with national governments and business sectors to mobilise global climate action.

Despite the emergence of numerous initiatives supporting cities with project preparation (ICLEI, 2016; CCFLA, 2018), there has been limited discussion over what these types of projects are and over what kind of technical assistance cities need. A previous publication by C40 and CDP (2017a) identified a pipeline of sustainable infrastructure projects in C40 cities worth at minimum US\$15.5bn. This report expands upon that analysis by evaluating the global pipeline of climate-related projects and identifying a pipeline of projects worth US\$57.89bn.

The data used to inform this report is drawn from 106 applications for support received by the CFF in 2018 and from 1,037 projects submitted to CDP in 2017 in the 2017 CDP Cities Questionnaire. Specifically, it aims to answer the following questions:

- What are the common characteristics of climate-related projects for which cities seek project preparation and financing support?
- What are the sectors and geographical spread of these projects?
- What is the scale of capital investment required for these projects?
- What are the climate benefits and co-benefits of these projects?
- What kind of support are cities asking for to proceed to implementation?
- What challenges to project implementation do cities currently face?

First, the report outlines the methodology employed to assess the projects in both databases. Second, the projects' characteristics are outlined as answers to the aforementioned questions. Third, the main findings are outlined, leading to specific recommendations for stakeholders.

This report evaluates the global pipeline of climate-related projects in cities, highlighting their common characteristics

3. Methodology

a. The CFF application phase

The CFF supports cities in developing countries to prepare and deliver sustainable, low carbon climate mitigation and adaptation infrastructure projects. It held a call for cities to submit their projects from February to April 2018: to apply, cities had to complete a short questionnaire about their proposed project – see Appendix 2. Infrastructure projects in the areas of energy, transport, and adaptation were sought, and a sample of potential projects was included as part of the application phase for cities' reference.

The CFF's funding is restricted to countries eligible for Official Development Assistance (ODA), as defined by the Organisation for Economic Cooperation and Development – see page 9 for a map of eligible countries. Therefore, to qualify for CFF assistance, cities had to be located in ODA-recipient countries: 34 C40 cities from Africa, Latin America, South and West Asia, East, Southeast Asia and Oceania, and Europe – as per C40's own regional structure – were invited to apply¹. Intermediary cities who are not members of C40 were also able to apply. Cities in Colombia and Mexico were specifically invited to apply with projects that could be part of thematic clusters around cycling infrastructure in Bogotá or zero-emission buses in Mexico City, two of the projects from the CFF's first call for applications in 2016. Although all applications to the CFF are referred to as 'CFF projects' in the report, this does not mean that they will be supported by the CFF: the selection process is competitive, and successful cities undergo a thorough evaluation before the commencement of support in 2019².

The CFF received a total of 110 applications from 42 cities in ODA-recipient countries. Four projects were considered ineligible since they were not deemed to have any climate benefits. Eligible projects include 64 projects from 24 cities who are members of C40 and 42 projects from 18 intermediary cities who are not members of C40. Within the latter, 18 projects are from Colombian and Mexican non-C40 cities and could be part of thematic clusters around cycling in Bogotá or zero-emission buses in Mexico City. All 42 projects from intermediary cities are excluded from the sectoral, sub-sectoral, and regional breakdowns to avoid bias caused by induced project demand in Colombia and Mexico.

¹ C40 cities in China were not invited to apply to the CFF due to funding restrictions. The CDP database includes three projects from 2 Chinese cities.

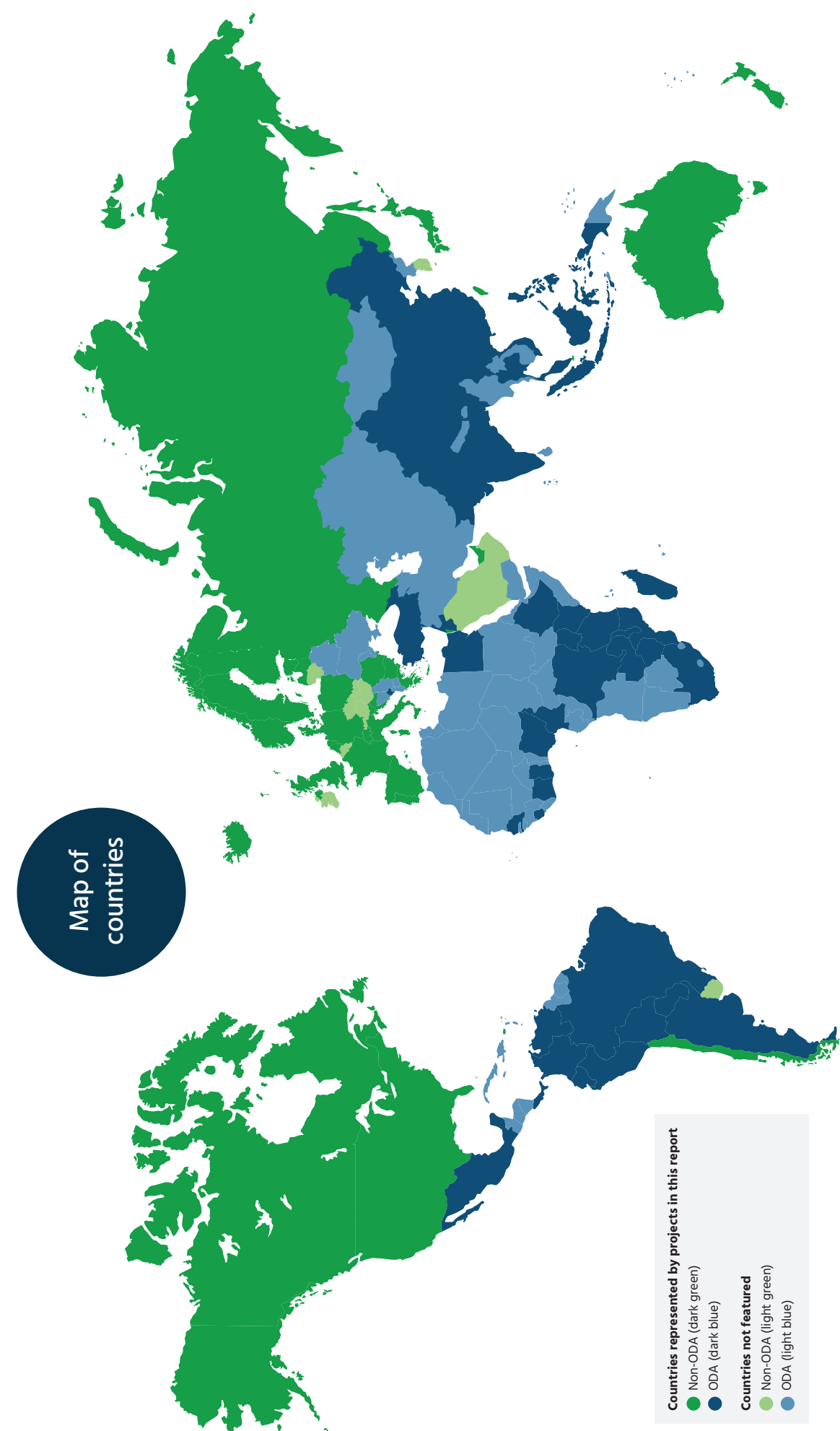
² A report on the criteria for selection and on the process of due diligence will be published in 2019.

b. The CDP Cities Questionnaire

Cities which responded to the 2017 CDP Cities Questionnaire were asked to report any climate-related projects for which they were seeking financing. Projects included renewable energy, energy efficiency, retrofits, transportation, waste and water management projects, etc. Cities provided details about the project's sector, stage of development, status of financing, and capital investment cost - see Appendix 3.

In 2017, 1,045 projects were reported from 362 cities - see Appendix 1 for the GCoM breakdown with respect to the One Planet Charter and the Global Climate Action Summit. The CDP database includes projects from all countries, regardless of their level of economic development or size. 8 projects were found to be overlapping between the CFF and CDP and were thus excluded from the latter sample to avoid double-counting. CDP reclassified projects from their original sectors and regions to align with the sectors and regions used by the CFF. Therefore, this report looks at 1,037 CDP projects, with a particular focus on 518 projects from 172 cities in ODA-recipient countries (defined hereafter as 'ODA cities') to facilitate a joint analysis with CFF projects. This distinction is retained because of significant differences between cities in ODA- and non-ODA recipient countries in sectoral, sub-sectoral, regional and scale of capital investment breakdowns. Of the 172 cities in ODA-recipient countries, 85 are GCoM signatories (49%). A brief breakdown of 519 projects from 188 cities located in non-ODA recipient countries (defined hereafter as 'non-ODA cities') is provided in Box 2, Box 3, and Box 4. 149 non-ODA cities (79%) are GCoM signatories.

Box 1: Data limitations: This report aims to ensure that its findings are representative of the current overall picture and that they can answer the question of what projects cities are aiming to implement to address climate change. However, both sets of data are self-reported and not verified. The quality of the data is also mixed: for example, not all cities provided accurate estimates of the level of capital investment required for projects. In the case of climate benefits, additional internal analysis by the CFF supplemented the limited information provided by cities to produce more accurate estimates, which is, in any case, self-reported and not verified. Scale of capital investment was reported in US Dollars, but the exchange rate used varies and, in some cases, is unknown. Answers to the application questions which were deemed unreliable were removed from the sample. Finally, the two samples are the result of distinct processes. The CFF prepares a limited number of projects selected after thorough due diligence and according to its own evaluation criteria. CDP is a reporting platform and accepts projects of all sizes and across all sectors and regions.



4. Data

This report looks at 1,143 climate-related projects in cities across the world, including 106 projects submitted during the CFF application phase and 1,037 in CDP's database. Comparisons are provided between the CFF projects and 518 CDP projects in ODA cities for sectors and regions.

1. What sector do cities' climate-related projects fall under?

- Projects in the Energy & Buildings and Transportation sectors represent the largest share of climate-related projects in cities. Waste projects also represent a significant proportion, while there are few Adaptation projects.
- Distributed Energy and Renewable Grid projects represent the majority of projects within the Energy & Buildings sector.
- Within the Transportation sector, Mass Public Transit projects constitute almost half of all projects, followed by Zero Emissions Vehicles and Walking & Cycling projects.
- Waste projects constitute 24% of all projects in ODA cities, and the large majority are in the Waste Management & Operations sub-sector.

Sectors are categorised as: Energy & Buildings, Transportation, Adaptation, Waste and Other – which includes projects that did not match any of the four previous categories such as park upgrades and biodiversity interventions, and projects which straddle multiple sectors. The sectors used in this analysis overlap with many of the One Planet Charter climate action commitment areas in renewable energy, energy efficiency, electric vehicles, and efforts for zero emission buildings and zero waste. All applications are categorised by sector based on a multi-tier system – see Appendix 4 for the full matrix.

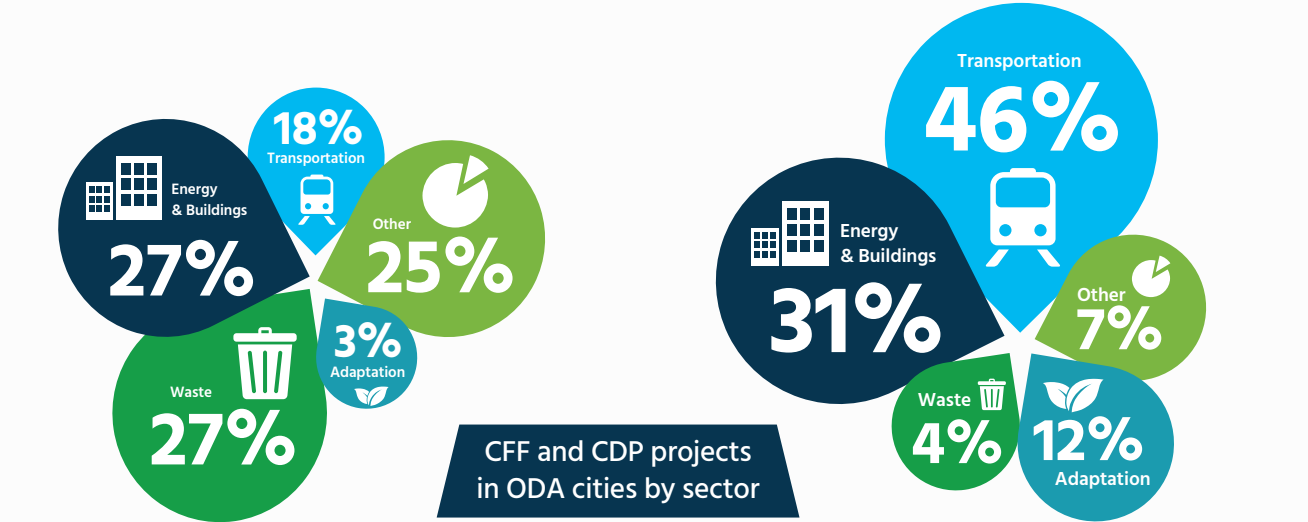


Figure 2: Comparison of CFF projects in C40 cities and CDP projects in ODA cities by sector. Includes 68 CFF projects and 515 CDP projects, respectively.

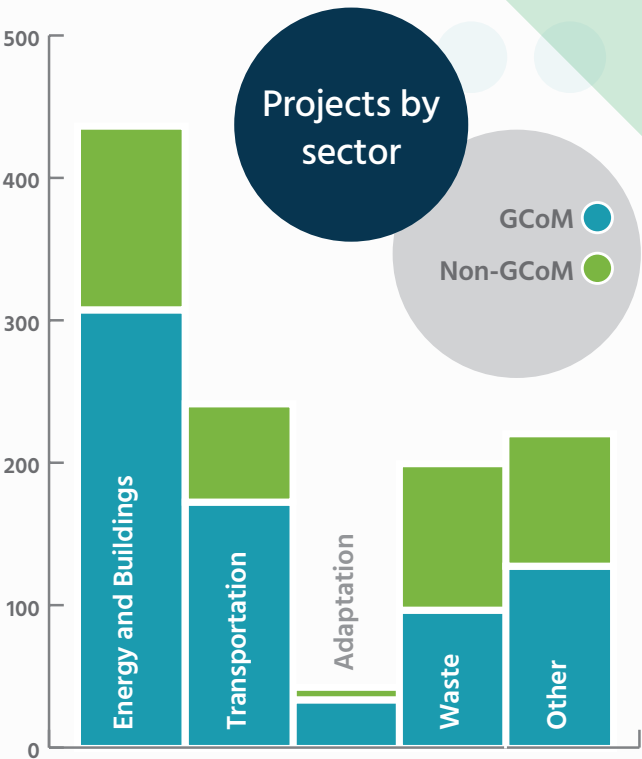
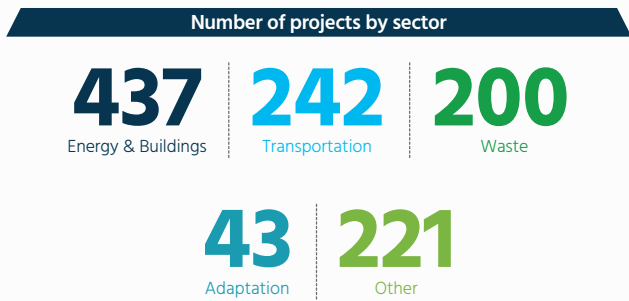


Figure 1: Projects by sector. Includes 106 CFF projects and 1,037 CDP projects.



Overall, out of 1,143 projects, the two samples include 437 projects in the Energy & Buildings sector, 242 in the Transportation sector, 200 in the Waste sector and 43 in the Adaptation sector – 221 projects could not be categorised under any of the aforementioned sectors and are listed as ‘other’ (Figure 1). Overall, 740 projects (65%) are from cities that have committed to the Global Covenant of Mayors for Climate and Energy.

With respect to the CFF applications, 24 C40 cities applied with 31 projects in Transportation, 21 in Energy & Buildings, 8 in Adaptation, and 3 in Waste – 5 projects are categorised as ‘other’ (Figure 2). Across applications from C40 Cities, the Transportation sector includes the single largest share of projects (46%). Energy and Buildings projects represent 31% of all projects. There are 6 cross-sectoral integrated projects: in two instances, cities applied with both an electric bus project and a solar panel installation to power electric buses, and one adaptation project includes a significant energy generation component. Moreover, projects are categorised based on the one most relevant sector, even when they inherently require a more integrated approach: for example, any electric bus project includes features such as charging infrastructure and bus depot refurbishment which come under the Energy & Buildings and Transportation sector.

With respect to CDP projects, ODA cities submitted 138 projects in Energy & Buildings, 96 in Transportation, 15 in Adaptation and 136 in Waste (Figure 2). Energy & Buildings projects represent 27% of all projects, a percentage comparable to the CFF sample, but Transportation projects constitute only 19% of all projects, less than half of what was received by the CFF. Waste projects account for almost the same percentage as Energy & Buildings projects in the CDP database for ODA cities, again in contrast to the CFF’s application process. There are 130 projects in ODA cities categorised as ‘other’: this includes projects that are cross-sectoral, projects that do not align with the sectors used in this analysis, and projects that did not provide sufficient information to be categorised.

Energy & Buildings projects in ODA cities by sub-sector

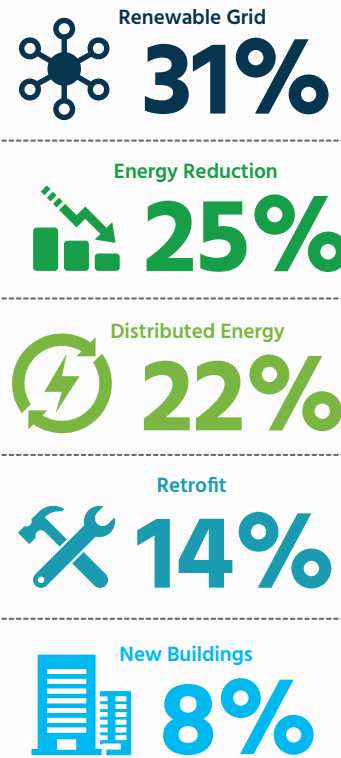


Figure 3: Energy & Buildings projects in ODA cities by sub-sector. Includes 21 CFF projects and 106 CDP projects.

Energy & Buildings

Energy & Buildings projects constitute 27% of all projects in ODA cities. The sub-sectoral breakdown for all projects (Figure 3) shows that Renewable Grid (31%) and Distributed Energy (22%) and projects constitute more than half of all projects. The former category includes small-scale energy generation projects such as rooftop PV, which provide energy for individual buildings and reduce reliance on the grid, while the latter groups includes larger-scale energy generation projects such as solar farms. Energy Reduction initiatives, defined here as primarily outdoor lighting projects, represent 25% of all projects. Retrofits, which include energy efficiency projects in existing buildings, represent 14% of all projects, while New Buildings projects represent the remaining 8%.

³ Only projects from C40 cities are included in the sectoral and sub-sectoral breakdowns to avoid bias caused by induced project demand in Colombia and Mexico. The same applies for Figure 3, Figure 4, and Figure 8.

⁴ The CFF call for applications made clear that only projects in the areas of ‘energy’, ‘transport’, and ‘adaptation’ were eligible, and therefore the waste sector is likely under-represented.

Transportation

Transportation projects constitute the third-largest share of all projects in ODA cities (22%). The breakdown at the sub-sectoral level (Figure 4) shows that traditional Mass Public Transit projects constitute the lion's share of projects in the Transportation sector (47%). 25% of all projects received are Zero Emission Vehicles projects, especially buses. Projects around 'Walking and Cycling' represent 21% of the overall share, while 'Reducing Vehicle Miles' projects – such as low-emission zones and parking management programmes – constitute 7% of all projects.

This breakdown is almost equal in both the CFF and CDP sample. Mass Public Transit projects such as Bus Rapid Transit systems, heavy rail lines, ferries and even cable cars remain at the top of municipal governments' wish lists. Moreover, ODA cities are pursuing ambitious plans to adopt zero emission vehicles, such as municipal bus fleets. Zero-emission bus projects are expected to increase as remaining concerns over technological uncertainty, high upfront costs, limited market maturity and reliability of charging infrastructure are addressed (BNEF, 2018). Notably, neither sample includes Zero Emission Vehicles projects in China, where bus fleets are being electrified at much higher rates than anywhere else (BNEF, 2018). Further analysis is needed to determine whether these are one-off projects or they have been developed in conjunction with broader zero-emission mobility strategy and/or energy strategy.

Transportation projects in ODA cities by sub-sector

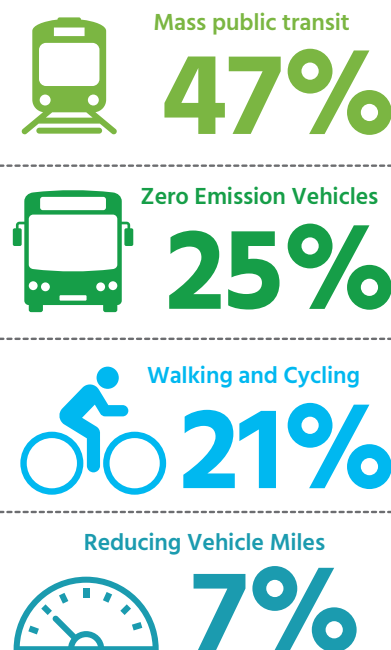


Figure 4: Transportation projects in ODA cities by sub-sector. Includes 31 CFF projects and 37 CDP projects.

Waste projects in ODA cities by sub-sector

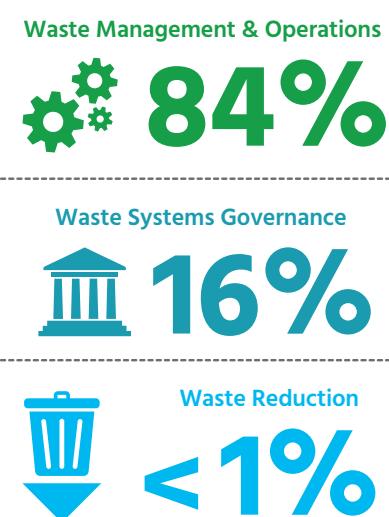


Figure 5: Waste projects in ODA cities by sub-sector. Includes 5 CFF projects and 138 CDP projects.

Waste

Waste projects constitute 24% of all projects in ODA cities. The sub-sectoral breakdown (Figure 5) shows that, of these projects, 84% are in Waste Management and Operations: this includes, for example, waste collection, transportation, logistics, recycling, treatment, and composting projects. The remaining projects are in Waste Systems Governance (16%) and Waste Reduction (<1%); the former category includes circular economy development, integrated waste management planning, public awareness campaigns, and other types of projects. The CFF did not encourage waste projects in the call for applications, but the data suggests that there is a lot of demand for project preparation and financing assistance in this sector.

Adaptation

Finally, there are an extremely limited number of Adaptation projects in both samples (7% of CFF applications, and only 3% of both ODA and non-ODA cities' submissions to CDP); due to the small sample, these projects are not categorised by sub-sector. The limited number may be due to difficulties in conceptualising Adaptation projects, particularly around the identification and measurement of benefits related to climate change adaptation (UNEP DTU Partnership, 2016); it may also be due to how projects are categorised in this report: for example, 6 CFF projects involving park upgrades and biodiversity interventions were not considered as Adaptation projects due to unclear adaptation benefits. More research is needed to understand what Adaptation projects in cities look like.

Box 2: CDP projects in non-ODA cities by sector and sub-sector

The sectoral breakdown for non-ODA cities shows that Energy & Buildings projects are the largest sector (52% of all projects), a much bigger proportion than for ODA cities (27%) – see Figure 2 and Figure 6. Transportation (18%) and Waste (11%) follow, with Adaptation projects representing only 3% of all projects. Waste projects are significantly lower in non-ODA cities than in ODA cities (11% vs 27%). At the sub-sectoral level, within the Energy & Buildings sector (Figure 6), Renewable Grid (24%) and Distributed Energy (21%) also represent close to half of all projects, but Retrofits projects are 31% of the overall share – as opposed to 12% in ODA cities. This is likely because retrofits are a higher priority in already built-up cities where the growth in building stock is lower. Within the Transportation sector (Figure 6), Walking & Cycling (29%) and Reducing Vehicle Miles (3%) projects represent a comparable share to projects in ODA cities. However, the relationship is reversed for Zero Emission Vehicles projects (46% vs. 25% in non-ODA and ODA cities, respectively), and Mass Public Transit projects (22% vs 47%).

There are twice as many Energy & Buildings projects in non-ODA cities as there are in ODA cities

Projects in non-ODA cities by sector and by sub-sector (Energy & Buildings, Transportation)

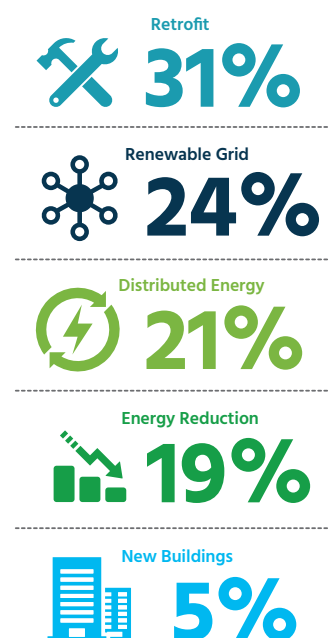
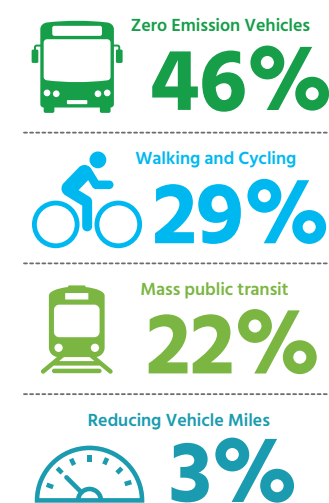
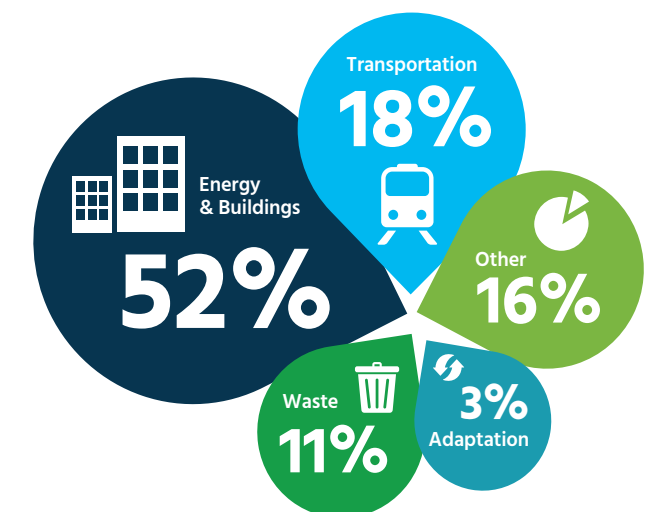
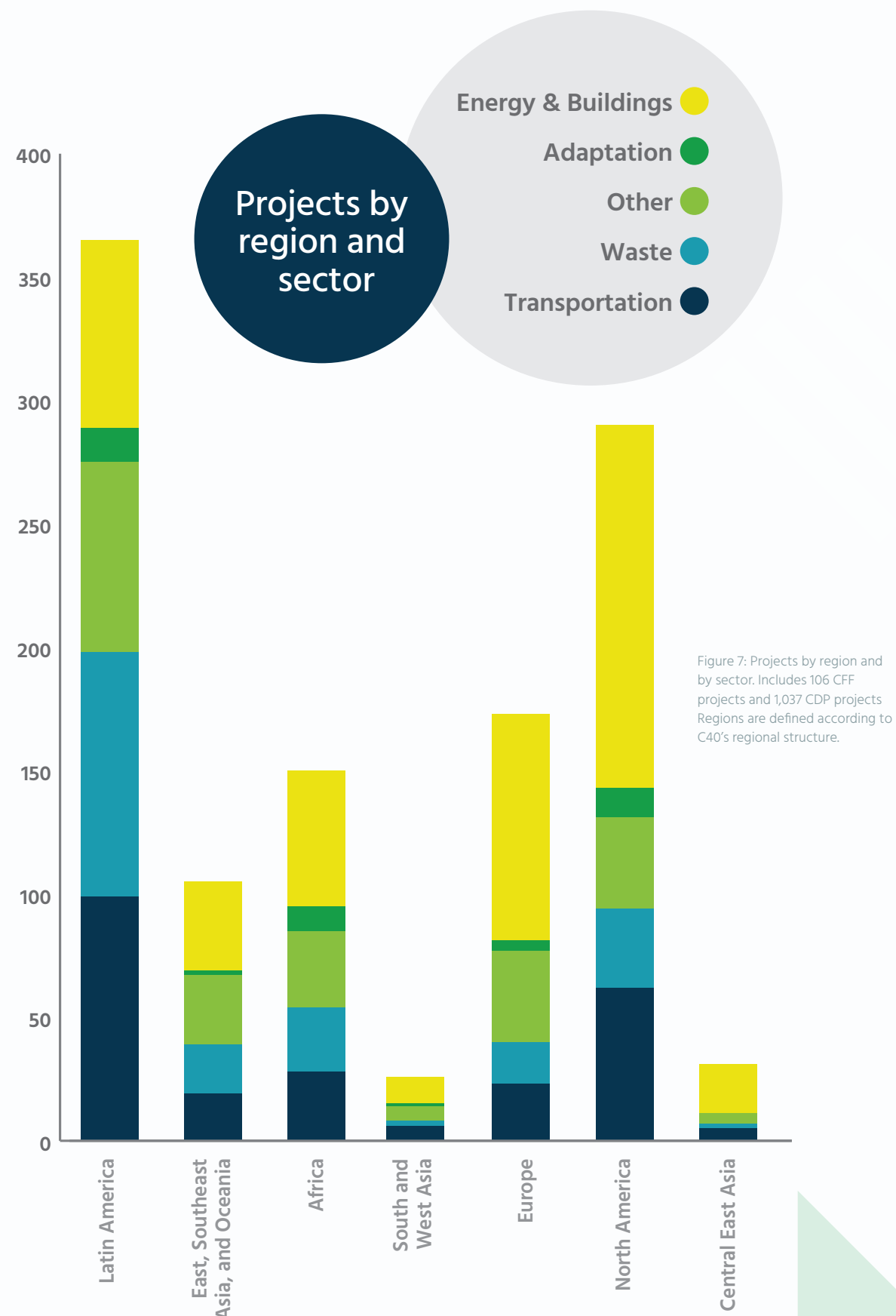


Figure 6: CDP projects in non-ODA cities by sector (middle), CDP Energy & Buildings projects in non-ODA cities by sub-sector (left), and CDP Transportation projects in non-ODA cities by sub-sector (right). Includes 519, 192, and 63 CDP projects respectively.

2. Where are cities' climate-related projects located?



- Overall, cities in Latin America and North America reported the most projects to the CFF and CDP (32% and 25% respectively), compared to other regions.
- ODA cities in Latin America (34% and 59% of all projects in the CFF applications and CDP database, respectively) and Africa (41% and 23%) were the most likely to submit their projects.

The regional perspective ⁵ is shown in Figure 7. The two samples contain 365 projects from Latin America (32%), 290 projects from North America (25%), 173 projects from Europe (15%), 150 projects from Africa (13%), 105 projects from East, Southeast Asia & Oceania (9%), 31 projects from Central East Asia (3%), and 26 projects from South and West Asia (2%). Figure 7 also includes a sectoral breakdown for each region. See Appendix 1 for a full list of countries in each region.

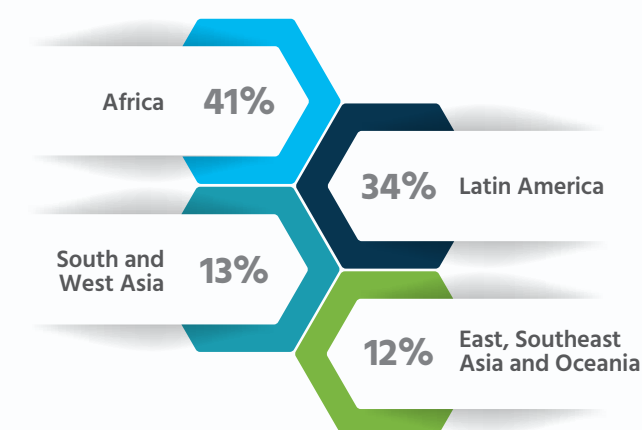
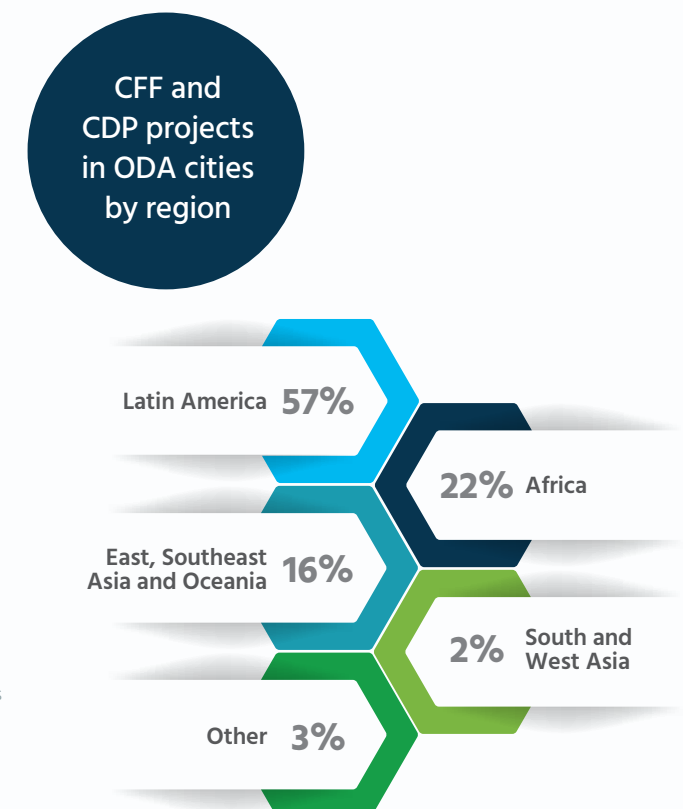


Figure 8: Comparison of CFF projects in C40 cities and CDP projects in ODA cities by region. Includes 64 CFF and 518 CDP projects respectively.

⁵ Regions are defined according to C40's regional structure. See c40.org/cities.

⁶ Only projects from C40 Cities are included in the regional breakdown to avoid biases caused by induced project demand in Colombia and Mexico. See also Figure 2, Figure 3, and Figure 4.

The regional breakdowns of CFF applications and CDP projects in ODA cities are quite different (Figure 8). With respect to CFF applications from C40 Cities ⁶, out of the four C40 regions in which cities were eligible to apply, cities in Africa (41%) and Latin America (34%) submitted the largest number of projects, followed by South and West Asia (13%) and East, Southeast Asia and Oceania (12%). This difference can be mostly explained by the variance in cities invited to apply to the CFF (12 in Africa and Latin America, with 9 in South and West Asia and only 6 in East, Southeast Asia and Oceania). In the CDP database for ODA cities, Latin America submitted the biggest share of projects (57%), much greater than cities in Africa (22%), East, Southeast Asia and Oceania (16%), South and West Asia (2%), and Central East Asia and Europe, listed as 'other' (3%). This is due in part to the larger number of cities that reported to CDP from those regions in 2017. Other factors that may explain this contrast are the distinct political structures and differences in municipal powers that characterise each region: while African and Latin American C40 cities generally have high levels of control over urban assets and functions, cities in the two Asian regions have lower control and must pursue different ways to implement projects (C40 Cities & Arup, 2015: 54-55).



3. What is the scale of capital investment of projects?

- The total capital investment across all climate-related projects submitted to the CFF and CDP is US\$57.89bn. Projects in ODA cities account for US\$30.15bn of that.
- Projects requiring technical assistance are across different scales of capital investment. There is both a large number of small projects (45% are below US\$10m) and a considerable amount of large projects (20% are above US\$100m).

The CFF application process asked cities to estimate the capital investment costs of each proposed project. Capital investment costs for 64 applications to the CFF are converted from each domestic currency into US dollars for comparison purposes⁷. There are 16 projects for which capital investment costs were estimated at US\$1m and below: these have been excluded, since cities frequently provided expected technical assistance costs instead of capital investment requirements for the project⁸. The CDP Cities Questionnaire also asked cities to input the total cost of their project. The breakdown in this section excludes 214 CDP projects whose scale of capital investment was below US\$1m, which were removed from the sample to facilitate comparison with the CFF applications.

ODA cities
\$27.7bn

Non-ODA cities
\$30.15 bn

Figure 9: Total estimated capital investment for CFF and CDP projects in non-ODA cities and ODA cities.

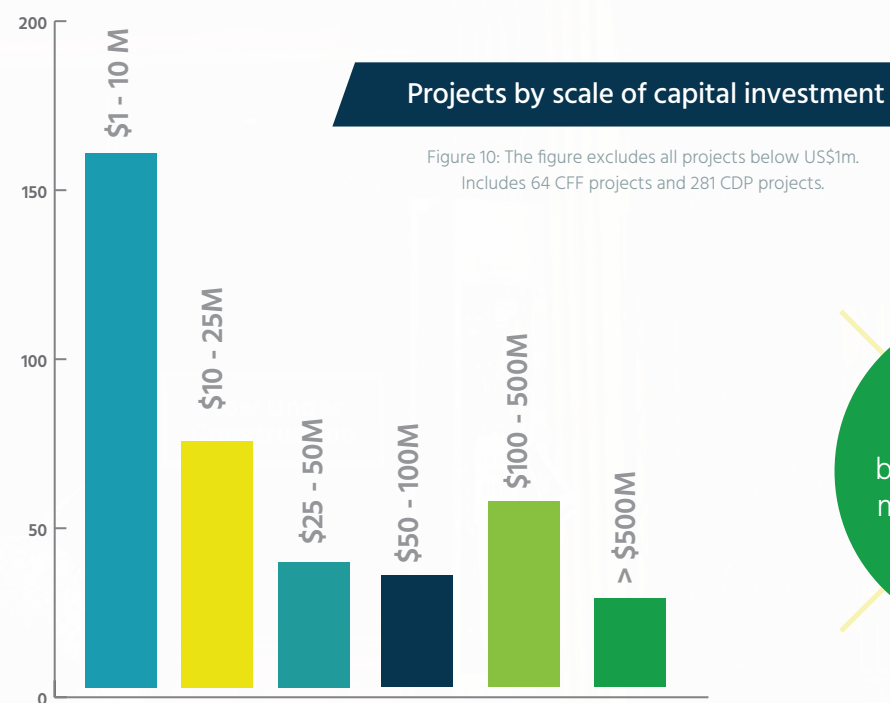


Figure 10: The figure excludes all projects below US\$1m. Includes 64 CFF projects and 281 CDP projects.

There are both many small projects (45% are below US\$10m) and many large projects (20% are above US\$100m)

⁷ The exchange rate used was that of June 13th, 2018.

⁸ This assumption was corroborated by an external review of each of these projects' investment components. Only projects which were prioritised for the CFF's due diligence process (see Section 3a) were asked for more detailed figures.

The total capital investment across all climate-related projects is US\$57.89bn – US\$30.15bn in ODA cities and US\$27.74bn in non-ODA cities (Figure 9). Figure 10 shows the breakdown of projects in ODA cities by scale of capital investment. The largest proportion overall is represented by projects worth between US\$1-10m (155, or 45% of the total), followed by projects worth between US\$10-25m (67, or 19%), and by those worth between US\$100-500m (49, or 14%). Most projects submitted to the CFF fall either under the US\$1-10m (35%) or the US\$100-500m categories (30%), for a total capital investment across all projects of US\$5.95bn. The majority of CDP projects from ODA cities fall under the US\$1-10m category (50%), while 16% of projects are between US\$10-25m, 9% are between \$25-50m, and 13% are between US\$100-500m. The total capital investment across all CDP projects in ODA cities is US\$24.2 bn. Finally, the median capital investment for C40 Cities' projects is US\$19.7m and the median capital investment for CDP projects in ODA cities is US\$7m.

This breakdown suggests two findings, namely that there is both a large number of small projects (below US\$10m) and a considerable amount of large projects (above US\$100m). The former finding, that 45% of climate-related projects in cities require less than US\$10m in capital investment, suggests that there may be an opportunity for ODA cities to bundle projects together to take advantage of economies of scale, when possible. However, more analysis is needed into when and how this process can happen, whether this would increase a project's financial attractiveness, and whether any bundling is worth the corresponding increase in a project's overall complexity and risk. The finding that 20% of projects overall and 35% in the CFF sample are greater than US\$100m, reflects a pressing need for large-scale infrastructure in cities which have experienced, and/or are still experiencing, high rates of population growth.

Scale of capital investment by sector

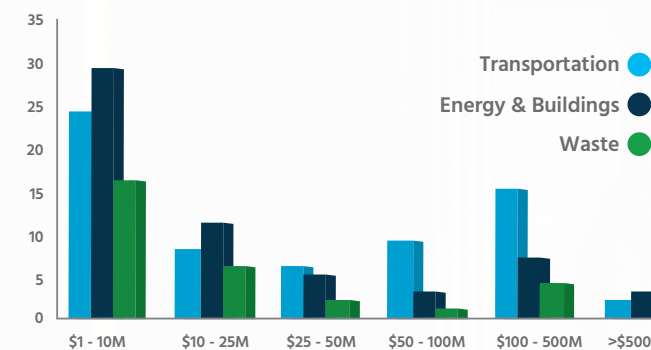


Figure 11: Projects in ODA cities by scale of capital investment and by sector. This includes 49 CFF projects and 102 CDP projects. It includes 58 projects in Energy & Buildings, 64 in Transportation, and 29 in Waste.

Scale of capital investment by region

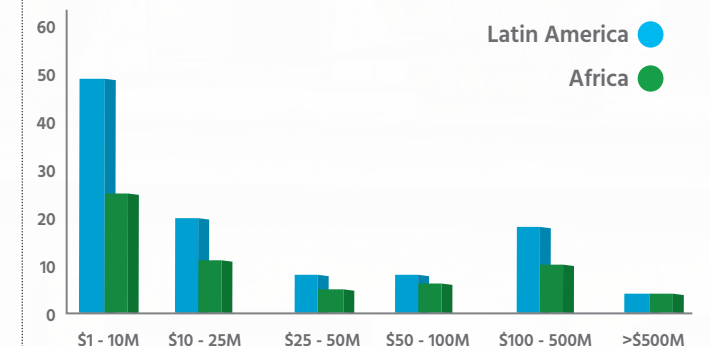


Figure 12: Projects in ODA cities by scale of capital investment and by region. This includes 55 CFF projects and 113 CDP projects. It includes 107 projects in Latin America, 61 in Africa, 15 in East, Southeast Asia and Oceania, and 6 projects in South and West Asia.

To provide further insight, CFF and CDP projects in ODA cities are categorised by scale of capital investment and both by sector and by region. The sectoral breakdown as seen in Figure 11 shows significant differences between Energy & Buildings and Transportation. Although Energy & Buildings projects are also situated across all levels of capital investment – 5% are greater than US\$500m – 69% of projects are worth less than US\$25m. This is likely due to the lower capital requirements of sample projects involving small-scale PV installations or single-building retrofits. Transportation projects range across all categories of capital investment, from cheaper walking and cycling infrastructure to more expensive heavy rail systems and zero-emission buses, but 43% of all Transportation projects are above US\$50m. Waste projects are smaller than both, with 76% of projects smaller than US\$25m and only 17% above US\$50m. Projects across all sectors are most likely to be smaller than US\$10m.

A regional point of view (Figure 12) shows that there is almost no difference in the scale of capital investment between cities in Africa and Latin America: 23% of projects in the former region are greater than US\$100m, while 21% of projects in Latin America are of at least that scale. 41% and 46% of projects are smaller than US\$10m, respectively. Out of only 6 projects in South and West Asia, half are greater than US\$100m.

Box 3: CDP projects in non-ODA cities by scale of capital investment: 84 projects were below US\$1m. Of the remaining subset, projects between US\$1-10m represent 45% of all projects (as opposed to 50% in ODA cities), followed by projects between US\$10-25m (22% vs 16%). 17% of projects (instead of 18%) are greater than US\$100m. The median capital investment for projects in non-ODA cities is US\$10m, as opposed to US\$7m in ODA cities.

4. What are the climate benefits and co-benefits of cities' climate-related projects?

- Projects' median emissions reduction is 23,338 tCO₂e per annum in Transportation and 14,451 tCO₂e per annum for Energy & Buildings projects – as much as taking between 3,000 and 5,000 cars off the road.
- Improvements in air quality, the positive public health impact of safe transport infrastructure, and the potential for financial savings associated with Energy & Buildings projects are the most important policy drivers in cities for climate-related projects.
- Climate benefits can be an important additional benefit to justify ambitious infrastructure projects. Conversely, cities can make the case for climate projects by promoting them as measures to achieve their non-climate priorities.

Neither the CFF application phase nor the CDP Cities Questionnaire asked specifically about neither climate benefits nor co-benefits, but many cities included them in their answers to justify each project. Benefits associated with projects submitted to CDP are not analysed in this section due to the qualitative and incomplete nature of the project information submitted by some cities. Climate benefits are self-reported by cities, and are not verified. Some emissions reductions figures initially submitted by cities to the CFF have been supplemented with more accurate estimates based on both publicly available databases and additional documents from cities.

Out of 15 projects across both sectors, the CFF projects' median emissions reduction is 23,338 tCO₂e p.a. (per annum) in Transportation and 14,451 tCO₂e (p.a.) for Energy & Buildings projects – equivalent to taking between 3,000 and 5,000 cars off the road⁹ (Figure 13). Submitted bus fleet electrification projects range from 4,617 tCO₂e (p.a.) to 900,000 tCO₂e (p.a.) – depending on the number of new buses and on the composition of the existing fleet that is replaced. Energy & Buildings projects have a median emissions potential of 16,023 tCO₂e (p.a.) with, at the one end, street lighting retrofits (3,924 tCO₂e p.a.) and, at the other end, large-scale solar installations (47,142 tCO₂e p.a.). Different project lifespans do not allow for direct comparison between the two sectors; despite any low-hanging fruits in one or both sectors, the hard work of achieving emissions reductions across the board is likely to require a multi-sectoral approach (C40 Cities & Arup, 2016; C40 Cities & McKinsey, 2017).

Median quantity of CO₂e mitigated by projects by sector

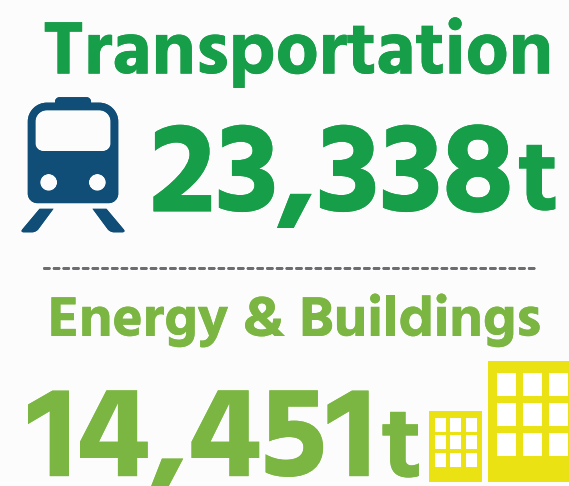


Figure 13 : CFF projects by median tCO₂e emissions reduction per annum in the Energy & Buildings and Transportation sector. Includes 15 CFF projects.

Co-benefits are categorised according to the methodology developed in the Urban Climate Action Impacts Framework (C40 Cities & Ramboll, 2018)¹⁰. The C40 Framework provides a guide on how to map and evaluate the broader impacts of climate actions, using a taxonomy built around the three themes of social, economic, and environmental impacts. These themes are further divided into three levels of impact groups, impacts, and specific impacts. Co-benefits are self-declared by cities, and impact is not measured on the ground. Up to three co-benefits per project are identified; only 75 out of 106 projects (71%) included sufficient information for this categorisation.

Almost a third of CFF applications (31%) identified environmental benefits, such as lower air or water pollution – outside of climate change benefits, i.e. reduced GHG emissions and vulnerability – as the key impact group of their proposed project (Figure 14). 24% of co-benefits can be categorised under the 'Wealth and Economy' impact group, followed by 16% under 'Quality of Life and Urban Wellbeing', and 14% each under 'Culture' and 'Health'.

Impact groups

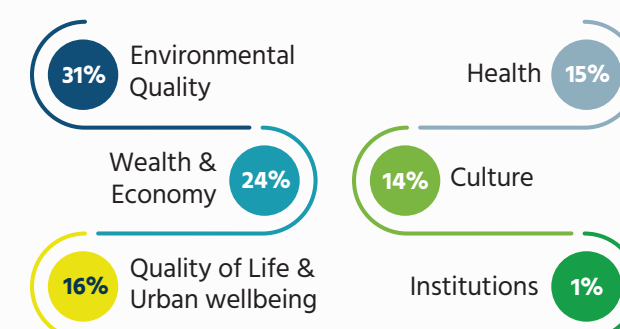
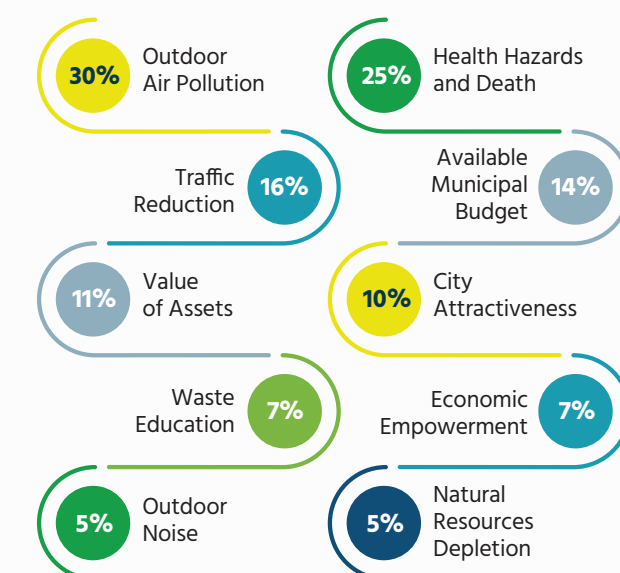
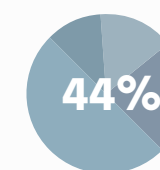


Figure 14: CFF projects by impact group. Includes 75 CFF projects.

Co-benefits



Outdoor Air Pollution for Transportation projects



Available Municipal Budget for Energy & Buildings projects

Figure 15: CFF projects by co-benefits. Includes 64 CFF projects.

In terms of specific impacts, the single most-cited co-benefit of a climate-related project is an improvement in outdoor air quality, followed by a reduction in health hazards and death – often in relation to road safety – and faster, more convenient commuting (Figure 15). The second most cited co-benefit overall is an improvement in health outcomes, through the replacement of dirtier forms of energy such as diesel and coal. A further 7% of projects list 'Economic Empowerment' co-benefits, which include measures that promote economic development in low-income areas, address inequality, and aim to reduce tariffs and improve quality of essential services such as water and electricity.

The data confirms the salience of air quality and the public health impact of unsafe transport infrastructure. First, the ambition to improve outdoor air quality is affirmed as a rationale for urban public policy, especially when justifying Transportation projects such as zero-emissions buses. Second, projects such as pedestrian corridors, and other interventions that promote walking and cycling, are explicitly seen as public health measures – given their impact on road safety and active lifestyles. These types of projects are increasingly justified in relation to city-wide plans to reduce road deaths and injuries, which often focus on pedestrians and cyclists as the most vulnerable users (e.g. Vision Zero). The data also points to the financial potential of Energy & Buildings projects as an important policy driver: the most prominent co-benefit associated with Energy & Buildings projects, as identified by cities, was an increase in available municipal budget, through a reduced reliance on the grid and/or lower energy consumption.

The core aim of the CFF is to facilitate access to finance for climate change mitigation and resilience infrastructure projects, not just any type of urban project. However, this data shows how frequently cities mention specific co-benefits to justify and promote their project (71% of projects), compared to how few mention climate benefits (14% of projects). Other issues, such as air pollution, congestion, or public health, are generally mentioned as the main rationale for most projects, but climate benefits can often be an important additional benefit that can provide a further justification for ambitious projects. Conversely, cities can make the case for climate-related projects by promoting them as measures to achieve their non-climate priorities.

Moreover, measuring said benefits can be useful when evaluating one's city's progress toward the achievement of the Sustainable Development Goals. Setting goals and monitoring and evaluating impact is a key action that cities can take to localise SDGs in their own jurisdiction (ODI, 2016; SDSN, 2016). Measurement should go along with standardisation, and efforts to standardise how both climate benefits and co-benefits are evaluated are underway (Egler, 2016)¹¹.

⁹ The comparison is based on the EPA's Greenhouse Gas Equivalencies Calculator: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>.

¹⁰ See the Framework for the full Taxonomy (C40 Cities & Ramboll, 2018: 28-32).

¹¹ One of the existing standards is Sure® - The Standard for Sustainable and Resilient Infrastructure.

5. What kind of support are cities asking for to implement their climate-related projects? What challenges to project implementation do cities currently face?

- There are projects at all levels of preparation and support is needed across the board, including at the earliest stages of project development: almost a third of both CFF and CDP projects are at a preliminary stage or undergoing scoping.
- Almost 75% of projects asked for CFF support with respect to financing, followed by the need for technical studies (58%), assistance with a project's implementation and operation (44%), and the provision of capacity development (33%).
- The most commonly cited challenge to implementation to the CFF (30% of all projects) was gaps in technical knowledge. However, the majority of barriers are city-specific. Cities describe issues such as institutional coordination (26%), stakeholder engagement (23%), regulatory issues (18%), public opposition (16%), electoral politics and lack of political will (14%) as key challenges.

In the CFF application questionnaire, cities were asked to state the level of preparation of their proposed project, based on whether it was under preliminary consideration, whether a pilot project had been implemented, or whether technical and financial studies had (a) not started, (b) were in progress, or (c) had been completed. Less than 1 in 4 projects (21%) has finalised all technical studies, and only 1 in 6 projects (16%) has finalised all technical and financial studies and is in a position to search for a financing source to make the project a reality (Figure 16). Almost a third of all projects are still at a preliminary stage. 1 in 5 applications (19%) involves the scaling up of an already implemented pilot initiative, a type of project which, if already proven successful, is especially suited to replication across the city. The CFF made it clear, during the application phase, that only projects that had concluded a pre-feasibility study or a pilot project were eligible for support. However, projects submitted were at all stages of development.

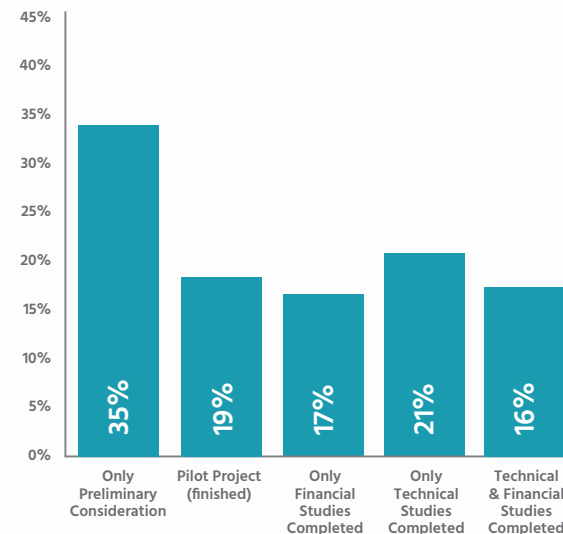


Figure 16: CFF projects by level of project preparation and by sector. Includes 89 CFF projects.

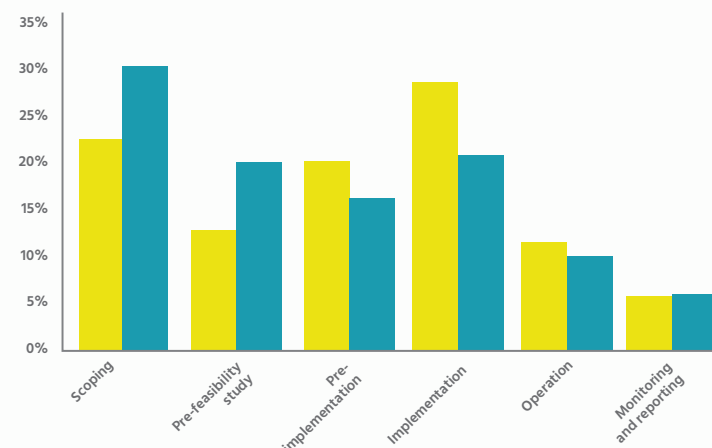


Figure 17: CDP projects by level of project preparation and by sector. Includes 339 CDP projects.

The various stages of project development are also seen in the CDP database, which accepts projects at all levels of preparation. The CDP Cities Questionnaire asks cities to define if their project is in one of six phases: 'scoping', 'pre-feasibility study', 'pre-implementation', 'implementation', 'operation' and 'monitoring and reporting' (see Appendix 3). The two sets of options used by the CFF and CDP are not directly comparable, and therefore the two datasets are kept separate here to preserve the original meaning used by cities. In ODA cities that reported to CDP, 32% of projects are still undergoing scoping, and 20% of projects are at the pre-feasibility stage (Figure 17). One third of projects (33%) are under implementation or at a more advanced stage of project development. There are projects at all levels of preparation.

Almost a third of projects submitted to both CFF and CDP are in a preliminary or scoping stage. Early stages of project preparation often receive insufficient funding because of higher uncertainty, in itself due to a higher risk of failure (G20, 2014; ICA, 2012). These risks can be mitigated by working with project preparation facilities and through grants earmarked for early-stage project preparation (CCFLA, 2018). However, the data shows that there remains a gap between the level of preparation of climate-related projects in cities and the resources available to support their development, particularly in earlier stages where there is higher uncertainty.

Box 4: CDP projects in non-ODA cities by level of project preparation: In non-ODA cities, 1 in 4 (24%) projects is undergoing scoping, and 1 in 8 (13%) is at the pre-feasibility stage (Figure 17). 43% of projects are under implementation or at a more advanced stage of project development such as operation or monitoring and development.

Types of support requested



Figure 18: CFF projects by most requested types of support. Includes 74 CFF projects.

To help the CFF to structure its support to each project, cities were asked to provide an indication of the type of assistance required to advance the project to implementation. Answers are categorised according to 8 common themes, namely 'financing studies', 'partnerships', 'legal studies', 'implementation and operation', 'pre-feasibility and feasibility studies', 'technical studies', 'project scoping/definition', and 'capacity development' – see Appendix 5 for the full breakdown. As shown in Figure 18, 74% of projects ask for support with respect to financing, in the form of the development of business cases, options analyses of different financing instruments, and public-private partnerships models¹². 58% of projects require a variety of specific technical studies, such as mobility analysis, co-benefits identification, impact assessments, etc. 44% of projects are seeking support with a project's implementation and operation, for example through the creation of appropriate governance structures, procurement advice, and risk management tools. Finally, 33% of cities ask for capacity development, recognising that current skills and resources available in their city are insufficient to advance their climate-related projects.

¹² The CFF, as part of the application process, explicitly recommended cities to submit projects at an advanced stage of development and in need of financing support.

Challenges to implementation

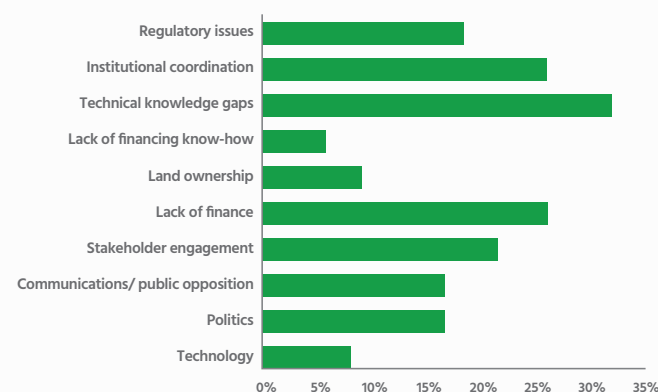


Figure 19: CFF projects by challenges to implementation. Includes 82 CFF projects.

To understand what is preventing the implementation of climate change projects in cities, responses to the question on the barriers and challenges to implementation, included in the CFF application questionnaire, are analysed. Challenges are categorised according to common themes, including 'institutional coordination', 'stakeholder engagement', 'regulatory issues', etc. – see Appendix 6 for the full breakdown. 30% of cities mention gaps in technical knowledge as a key obstacle in delivering climate change projects (Figure 19). 27% of cities claim that 'lack of finance' was one of the challenges, with a further 5% of applications explicitly mentioning a lack of know-how around financing. This is in contrast to 74% of projects asking for support with financing studies (Figure 18), likely due to induced demand: the CFF made clear during the pre-application phase that the provision of said financing studies was its focus of technical assistance. Uncertainty over technology is a challenge in 9% of cases.

However, the majority of barriers are contextual: cities describe city-specific issues such as institutional coordination (26%), stakeholder engagement (23%), regulatory issues (18%), public opposition (16%), electoral politics and lack of political will (14%) as key challenges. For example, the procurement of private operators for public bike-sharing systems, and corresponding service-level agreements, are tightly regulated processes defined by national laws. In the case of solar farms, other levels of government are often involved, and defining an appropriate legal structure is highly dependent on national regulations and practices. Barriers around stakeholder engagement in the transportation sector include fragmentation of services and resulting lack of coordination between actors. This suggests that many barriers to project development can only be addressed through the involvement of stakeholders from a wide range of organisations. Comprehensive stakeholder mapping, thorough consultation, and a deep understanding of the national and city-specific context, particularly in the earliest stages, can help avoid or de-escalate conflicts around infrastructure projects (IADB, 2017).

5. Findings

The two sets of projects, one of 106 applications submitted as part of the CFF application phase and the other including 1,037 projects submitted by cities to CDP, offer a comprehensive overview of urban priorities around climate change, despite their differences in terms of applicants, project detail, and sometimes definitions.

381 cities, 240 of which are GCoM signatories, submitted projects to the CFF and CDP. The projects are closely aligned to sectoral commitments made under the One Planet Charter. The data presented in the previous section provides a multifaceted picture of some of the common characteristics of climate-related projects for which cities are seeking support. Our analysis suggests four general conclusions, namely:

1. There is a substantial demand for project preparation support.

There is a large number of climate-related projects in cities and these cities are asking for project preparation support to advance these projects to implementation. This report looks at 1,143 climate-related projects that require technical assistance and/or are seeking financing, 624 of which are located in ODA cities. There are projects in the Energy & Buildings, Transportation, and Waste sector, across all subsectors – although there are few Adaptation projects (<4%). Projects are primarily located in Latin America, North America, Europe, Africa and East, Southeast Asia and Oceania. Projects requiring technical assistance are across different scales of capital investment, with 45% of projects below US\$10m and 20% of projects greater than US\$100m.

2. There are projects at all levels of project preparation.

Projects are at different levels of technical and financial development. Almost a third of both CFF and CDP projects are at a preliminary stage or undergoing scoping. Less than 1 in 4 applications to the CFF (21%) has finalised all technical studies, and only 1 in 6 applications (16%) has finalised all technical and financial studies. In the CDP database, 20% of projects from ODA cities and 13% of projects from non-ODA cities are at the pre-feasibility stage, 16% and 20% in the pre-implementation phase, and 22% and 30% are undergoing implementation. Cities are asking for assistance at all stages of the project preparation process and therefore all stages should continue to be supported, from creating a pipeline of proposals, to supporting a project's governance and risk management, until the stage at which these proposals can seek financing. Although the CFF and CDP, through its Matchmaker platform, focus on facilitating access to finance, more than a third of climate-related projects in cities are still under preliminary consideration and would benefit from early-stage technical assistance such as options analyses, consensus building, and pre-feasibility studies.

3. Project preparation support must be tailored to each climate-related project.

Climate-related projects come in numerous shapes and sizes, which suggests that support to every project must be tailored and contextualised. There are considerable and important differences between projects, based on sectoral and regional characteristics and in terms of the scale of capital investment. A US\$5m project in the Energy & Buildings sector requires a different technical assistance package to a US\$100m Transportation project. Projects from municipalities with significant powers of ownership and operation over urban assets, must be assessed differently than submissions from cities that are constrained in their action by strict regional and national regulations. The analysis in Section 4.5 of the type of support requested to the CFF shows that cities require support with respect to financing (74% of projects), technical studies (58%), implementation and operation (44%), and capacity development (33%). However, the majority of challenges hindering project implementation are city-specific. For example, some cities are limited in their procurement of zero-emission buses because national regulations forbid the purchase of buses manufactured outside the country. The issue of air pollution cannot be addressed without more flexible and coordinated policy-making that either allows for exceptions or targets the establishment of manufacturing plants for zero-emission buses in a country. Challenges around institutional coordination and stakeholder engagement can only be addressed through partnerships and collaboration with all levels of government as well as with local organisations. Robust relationships with all stakeholders are necessary to ensure the successful delivery of technical assistance. The common characteristics of climate-related projects in need of support shouldn't mask the need to tailor technical assistance to each separate project and city.

4. For projects to maximise their potential impact, there needs to be better project-level measurement of climate benefits and co-benefits.

A high standard of project preparation requires both climate benefits and co-benefits to be estimated accurately. The report shows that climate benefits can complement other benefits of projects which primarily address, for example, air quality or road safety. Out of all applications to the CFF, median emissions reduction is 23,338 tCO₂e per annum in Transportation and 14,451 tCO₂e per annum for Energy & Buildings projects – as much as taking between 3,000 and 5,000 cars off the road. Almost a third of applications (30%) identified environmental benefits, such as lower air or water pollution, as key project benefits. The positive public health impact of safe transport infrastructure and the potential for financial savings associated with Energy & Buildings projects are also important drivers in cities for climate-related projects. Climate benefits can be an important benefit to justify ambitious infrastructure projects and, conversely, cities can make the case for climate projects by promoting them as measures to achieve their non-climate priorities. However, to be fully realised, cities should create cross-departmental teams that can address multiple issues at once and thus deliver both climate benefits and co-benefits. Most projects, if not all, can be planned to maximise their potential impact.

6. Recommendations

Based on the data and the conclusions outlined in the previous section, we make the following recommendations:

1. The existing demand should be both boosted and met.

Cities and financiers ought to increase their efforts to plan, develop and implement climate-related projects. There are already a large number of such projects in cities, across sectors, regions, and scale of capital investment. However, even more are needed to fulfill the ambitions of the Paris Agreement. Cities should work to develop comprehensive project pipelines, ideally linked to comprehensive integrated urban development plans, and, when required, partner with other organisations to turn these projects into investment opportunities. Financiers can help unlock innovative solutions and economies of scale by increasing both their capacity to assess and evaluate climate-related projects in cities and their investment in such projects: both measures can help increase capital investment flows to cities. Closer collaboration with cities may also help to increase capital investment flows: financiers should also promote a greater understanding of their evaluation criteria and processes that can help focus attention on the most promising sources of financing for a project, since different climate-related projects will likely attract different financiers.

2. More resources for project preparation are needed, particularly in the early stages. Organisations working in the field of project preparation should be adequately funded to be able to support cities throughout the project preparation process. This report shows that there are projects across the project development cycle, which suggests that resources are needed throughout the cycle to support cities in developing project pipelines and accessing finance. This includes the earliest stages of project scoping and preliminary consideration, for which funding is often harder to mobilise.

3. All support from organisations working in the field of project preparation must be tailored and contextualised.

When feasible, cities and organisations working in the field of project preparation should aim to prepare climate-related projects with a broad range of financing options in mind rather than provide support with a specific source selected from the start, since it allows for greater flexibility. Cities' climate-related projects differ significantly, and there is a need for all stakeholders to tailor their approaches to each and every national context, local capacity, project characteristic, and challenges to implementation. Financiers also need to make clearer what financing instruments apply to each type of project and also tailor their offering more closely to on cities' needs and context. Financiers may even consider creating altogether new instruments dedicated to climate-related projects in cities, and further explore ways of aggregating projects to reach specific minimum investment thresholds. Importantly, all stakeholders must ensure that the skills and knowledge delivered are retained by the city to enable consistent future delivery of a pipeline of projects.

4. Accurate project-level measurement of climate benefits and co-benefits can help projects achieve maximum impact.

Financiers and organisations working in the field of project preparation can encourage cities to collect and use climate data when planning all types of projects. They should also build on efforts to standardise how these benefits are accounted for to ensure that projects can be compared. Climate benefits can be an important additional benefit for other urban projects and cities can make the case for climate-related projects by promoting them as measures to achieve their non-climate priorities. As sustainability becomes increasingly important for financiers when assessing projects, standardisation and accuracy are crucial to ensure benefits and impacts are accounted for in a comparable and transparent manner.

This report shines a light on cities' demand for project-specific technical assistance and financing, outlining key project characteristics and adding insight to the issue of project preparation. A detailed understanding of climate-related infrastructure projects can promote more tailored technical assistance packages to bridge the gaps between cities, organisations working in the field of project preparation and financiers. This understanding may also help to ensure that any technical assistance has a lasting and transformative impact in the cities that receive it and beyond, by including capacity development and knowledge sharing throughout the delivery of support. Finally, this report's scope does not cover the role of national governments, which can play a key part in encouraging even more climate-related projects in cities than those analysed here. National governments should support the development and implementation of these projects in cities as they can become a useful ally to meet the targets and take advantage of the opportunities created by the Paris Agreement.

All stakeholders should continue to document and share best practices about project preparation and financing, and this objective is embodied in the Joint Declaration of Intent signed at the 9th World Urban Forum in Kuala Lumpur in 2018 (CFF, 2018). Active and increased participation in existing platforms for collaborative learning, such as the Cities Climate Finance Leadership Alliance, can help identify current knowledge gaps. As a starting point, more information is needed on what type of financing instruments cities are prioritising to implement climate-related projects, what instruments financiers are making available for each type of climate-related project, and on what climate-related projects look like within each sector. The CFF, CDP and GCoM, through this report, are contributing to the body of knowledge on cities, climate change and finance, and it is hoped that other organisations will follow suit and disseminate their own findings about climate-related projects in cities.

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Appendices

Appendix 1 – GCoM & CDP Matchmaker Mapping

233 GCoM Cities disclosed 666 projects through CDP's annual questionnaire in 2017.

We mapped the GCoM cities' projects that were disclosed to CDP against the One Planet Charter Sectors and the GCAS themes.

GCoM cities' projects mapped against One Planet Charter Sectors

One Planet Charter Sectors	Number of projects disclosed by GCoM Cities	Cost of projects (USD)	Number of GCoM cities disclosing
Renewable energy	112	2,290,800,378	97
Energy efficiency	124	3,920,089,612	89
Electric vehicles	28	5,304,747,867	24
Efforts for zero emission buildings	9	5,791,656	7
Zero waste	42	583,956,870	36
Other*	351	37,435,828,893	170
TOTAL	666	49,541,215,276	233

*"Other" includes projects that do not fall into One Planet Chart Sectors and include non-EV transportation (walkways, biking, CNG, etc.), greenspace, and water management projects, among other types of projects.

GCAS themes	Number of projects disclosed by GCoM Cities	Cost of projects (USD)	Number of GCoM cities disclosing
High ambition action plans	n/a*	n/a*	n/a*
Towards 100% renewable energy	123	5,769,805,473	103
Towards zero emission transport	88	9,201,362,844	59
Zero emission buildings	196	13,468,468,989	126
Zero waste	50	118,899,000	40
Other**	209	20,982,678,970	120
TOTAL	666	49,541,215,276	233

*Action plans are not included in the Matchmaker dataset of projects

**"Other" includes projects that do not fall into GCAS themes and include non-EV transportation (walkways, biking, CNG, etc.), greenspace, and water management projects, among other types of projects.

Appendix 2 – Stage 1 Application form – English

- Project Description and Context – Please provide a description of the proposed infrastructure project.
- How would you like the CFF to support you in this project? – Please provide a brief outline of any technical and financial assistance sought.
- Are there other ongoing or concluded projects that are relevant for this project? – Please note any relevant projects below.
- Is the project included in the city's masterplan? – Please choose one option from below.
 - Yes, the project is included within the city's masterplan
 - The project is anticipated to be within the city's masterplan soon
 - No, the project is not within the city's masterplan
 - The city does not have a masterplan
- Is the project included in the city's climate change action plan or strategy? – Please choose one option from below.
 - Yes, the project is included within the city's action plan or strategy
 - The project is anticipated to be within the city's action plan or strategy soon.
 - No, the project is not within the city's action plan or strategy.
 - The city does not have an action plan or strategy.
- Anticipated capital investment costs – Please provide the project's estimated cost of the project and the relevant currency.
- At what stage is the project currently? – Please choose the relevant options from below.
 - Preliminary Consideration
 - Pilot Stage
 - Technical studies – Not started
 - Technical studies – In progress
 - Technical studies – Completed
 - Financial studies – Not started
 - Financial studies – In progress
 - Financial studies – Completed
- What are the challenges that the project is currently facing or that may arise during the projects implementation? – Please include details of all the challenges that may arise during the implementation of the project.
- Please upload any relevant documentation about the project
- Please include a link to any relevant documentation about the project

Appendix 3 – 2017 CDP Cities Questionnaire – Question 5.2

- List any climate change-related projects for which you hope to attract private sector financing and provide any details on the estimated overall costs and status of the project. If your city does not have any relevant projects, please select None under Project Area.
 - Buildings/energy efficiency/retrofit
 - Outdoor Lighting
 - Renewable Energy
 - Transportation
 - Waste Management
 - Waste Recycling
 - Water Management
 - Other
 - None
- Status of Project
 - Scoping
 - Pre-feasibility study
 - Pre-implementation
 - Implementation
 - Operation
 - Monitoring and reporting
- Status of Financing
 - Project not financed and seeking partial financing
 - Project not financed and seeking full financing
 - Project partially financed and seeking partial financing
 - Other
- Project Description
- Total Cost of Project (US\$)
- Total Investment Cost Needed (US\$)

Appendix 4 – Sector Categorisation

Transportation and Urban Planning	Zero Emissions Vehicles	Buses Taxis Municipal Vehicles Private Vehicles Car share Freight EV infrastructure
	Reducing Vehicle Miles	Road Pricing Public parking (provision/charges) Residential/Commercial parking guidelines Permits and Restrictions Taxation Car clubs/ car share TNCs Freight logistics
	Walking and Cycling	Cycle Hire Schemes Cycle Parking Cycle lanes/infrastructure Pedestrian only streets Pedestrian Crossings Travel planning
	Mass public transit	Buses Bus Rapid Transit Light Rapid Transit Metro systems Heavy Rail Fares and Ticketing Interchange Safety and Security
	Land Use Planning	Land use plans and policies Transit-Oriented Development
Waste	Waste Management and Operations	Waste Collection Waste Transport & Logistics Waste Recycling Waste Treatment Waste Disposal Food Waste
	Waste Systems Governance	Integrated Waste Management Planning Sustainable Materials Management Circular Economy Waste Financing Communication and Public Awareness Waste GHG Accounting
	Waste Reduction	Minimisation and Avoidance Repair & Reuse Material Restrictions Extended Producer Responsibility Market shift & Sustainable Procurement
Buildings and energy	New Buildings Retrofits Renewable Grid Distributed Energy Energy Reduction	
Adaptation / Climate Hazards	Extreme precipitation	Rain storm Monsoon Heavy snow
	Storm and wind Extreme cold temperatures Extreme hot temperatures Drought Flood and sea level rise	

Appendix 5 – Categorisation of types of support requested

Capacity Development	Implementation and operation	Technical Studies	Financing studies
Specialist Advice Infrastructure Finance Training Institutional Capacity Plan Lack of knowledge Capacity Building Sharing ideas of best practice	Project Implementation Operational Study Operations Training Procurement Governance Models Evaluation & Management Options Organisational Structuring Operations plan Risk Management Procurement Assistance	Technical Studies Socio-Economic Study Economic Study Technology Study Impact Assessment Mobility study Identifying Co-benefits Waste Disposal Study Demand Study Commercial Study	Finance Study Finance structuring and financing option assessment Financial Modelling Creation of PPP Model Funding Options Economic Modelling Business Case Development Project Packaging

Project scoping/definition	Pre-feasibility and feasibility studies	Legal studies	Stakeholder Engagement
Project Scoping/Definition Project Structuring	Feasibility Study Project Design Technical Feasibility Study Pre-feasibility study	Legal Assessment	Collaborative Partnerships Stakeholder Engagement Communication Strategy

Appendix 6 – Categorisation of challenges to implementation

Regulatory issues:	Institutional coordination	Technical knowledge gaps	Limited financing know-how	Land ownership
Licensing	Plurality of responsibility	Lack of technical staff/ Ground-staff	Uncertain capital investment costs	Land ownership/ Expropriations
Unsupportive regulatory environment	Disagreement/Lack of buy-in between government/ public institutions	Lack of expertise/ knowledge	Developing appropriate business models	
Legal uncertainty/issues	Lack of enforcement	Inaccurate/Lack of data	Lack of economically feasible options	
Need for authorisation beyond the city	Poor organisational structure	Lack of/Changes in demand	Determining optimal financing structure	
A need to change city legislation	Administrative delays	Unknown impacts of new policies		
Existing procurement legislation	Project Delays/Cancellation	Measuring the impact of policies		

Lack of finance	Stakeholder engagement	Communications/public opposition	Politics	Technology
Lack of finance	Poor relationship with/Lack of qualified concessionaires/suppliers	Public opposition/Poor public participation	Elections	Risks of reliability/ incompatibility/uncertainty in new technology
	Commercial stakeholder opposition/engagement Negotiations with Trade Unions	Lack of communication strategy	Lack of political will	Selecting appropriate/ Rapid changes in technologies





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