

CARBON DISCLOSURE PROJECT

# Measurement for Management

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## CDP Cities 2012 Global Report

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Including special report on C40 Cities

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**C40**  
**CITIES**  
CLIMATE LEADERSHIP GROUP

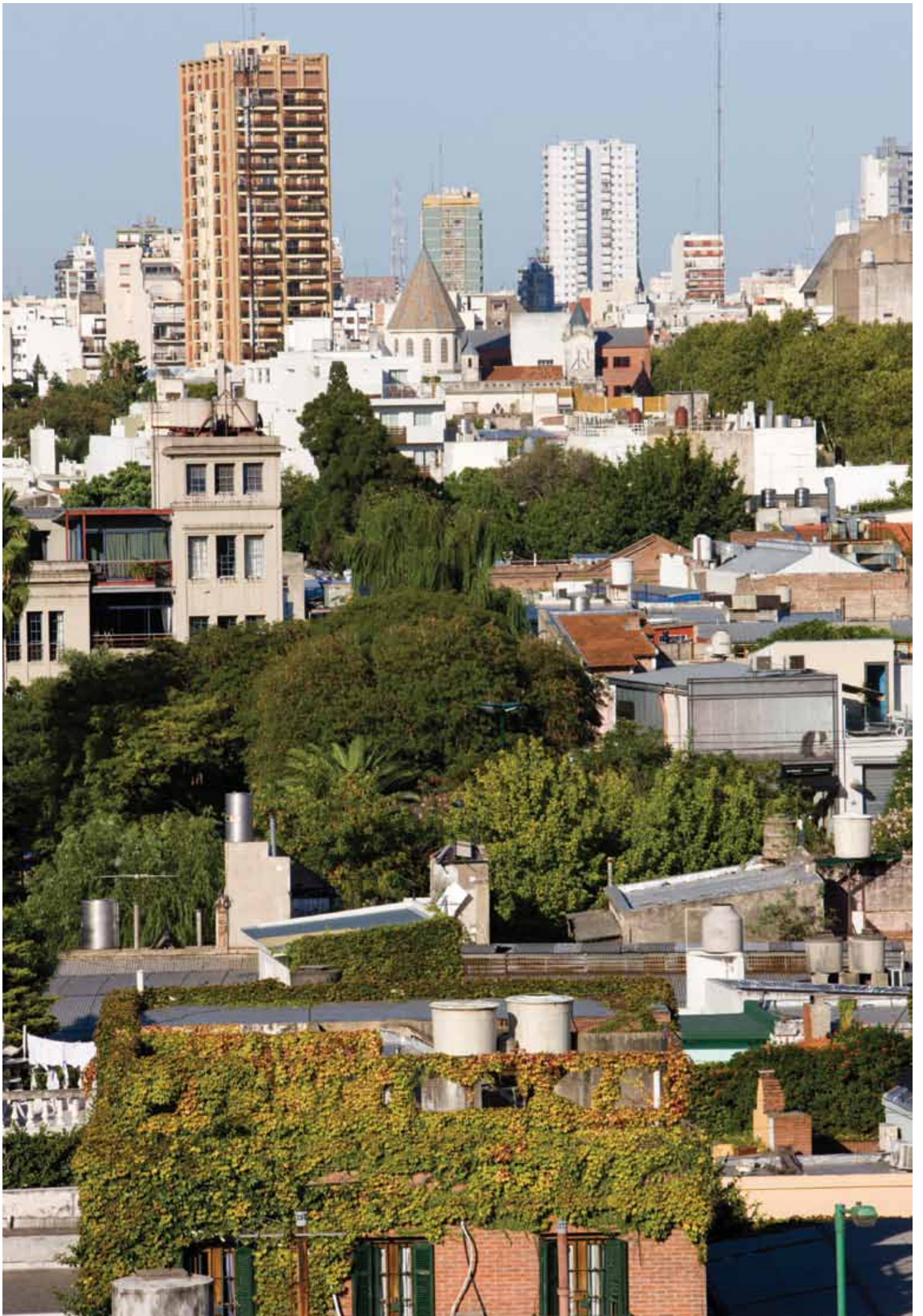
Report analysis and  
information design for  
Carbon Disclosure Project by

**AECOM**



**An enormous task lies before us; we need all of the city's inhabitants to become aware of the responsibility that each of them has in stopping climate change. We are convinced that the government must preach through example and firm commitment while leading the city along this process."**





# Foreword

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## **Michael R. Bloomberg** **Mayor of New York City** **Chair of C40 Cities**



As Mayor of New York and Chair of C40, I have seen firsthand the impact that local leaders can have in the fight against climate change. When it comes to confronting a challenge of this magnitude, nations have long talked about comprehensive approaches, but it has been up to cities to act. After all, cities are most directly responsible for our residents' health and well-being. We are also the level of government closest to the majority of the world's people, which means that when we work together, we have the opportunity to effect change on a global scale.

I've always believed that if you can't measure it, you can't manage it. That truism serves governments and businesses well every day, and it underlines the purpose of the Carbon Disclosure Project. CDP has been a leader in climate change reporting in the private sector for a decade, and during the past two years, it has helped C40 meet a critically important objective: holding ourselves accountable for meeting the emissions reduction targets we set individually and as an organization.

So far, the results have been very encouraging. With C40 cities leading the way, the number of cities reporting to CDP has increased dramatically during the second year of our partnership. In addition, the quality of the data is better, allowing for a more thorough analysis and a better understanding of what constitutes effective climate change action. This is tremendous progress, and we stand to benefit even further if international organizations standardize the carbon-reporting process among all the world's cities. In this spirit, we will continue to call on cities to report to CDP, as well as make the data they submit accessible to the public and to their fellow governments.

Cities are demonstrating that they have the will, the knowledge, and the capacity to set the agenda for climate change action. As these cities become more sustainable, our entire world will reap the rewards. This report represents another exciting step in our collaboration, and I invite you to learn more about the action that cities are taking across the world in climate change measurement and management.

# Foreword

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**Paul Dickinson**  
**Executive Chairman**  
**CDP**



At CDP, we have found that annual reporting drives standardization. When we first began requesting climate change data from companies, there was little commonality in the way that companies measured their greenhouse gas (GHG) emissions. Over the last decade, however, two things happened. First, the World Resources Institute and the World Business Council for Sustainable Development launched the Greenhouse Gas Protocol—prescribing, for the first time, a clear, actionable method for companies to account for GHG emissions. Second, more and more companies began reporting publicly to CDP every year, making available better best practice examples, clearer sector-specific data, and allowing companies to see how their peers were measuring their emissions. The combination of a sound methodology and transparent data about how companies were accounting for their emissions led to increasing standardization of approach. Today, approximately 70% of reporting Global 500 companies use the same greenhouse gas accounting methodology, without the enactment of a single government regulation.

We are beginning to see a similar progression for city governments. In November 2011, for the second year in a row, CDP invited a group of the world's largest cities to report on their climate change related activities using CDP's online reporting platform. Seventy-three cities answered CDP's invitation this year, making public information about their greenhouse gas emissions, how they measure them, and their efforts to adapt to this serious problem. And, just a few weeks before publication of this report, C40 and ICLEI, in close collaboration with the World Resources Institute and the Joint Work Programme of the Cities Alliance, launched the Global Protocol for Community-scale Greenhouse Gas Emissions. The table is now set for a rapid move toward increasing standardization of city climate change data.

This report represents another successful year for CDP's partnership with the C40 Cities Climate Leadership Group. Two years ago, CDP and C40 partnered to extend CDP's platform to the C40, allowing member cities to track, report, and benchmark their climate change activities. Forty-five of the 73 cities profiled in this report are C40 member cities. CDP salutes the inspiring leadership of the C40 and Mayor Bloomberg in bringing the enormous power and capability of the world's great cities to focus on the supreme challenge of climate change.

We are also proud to partner with AECOM this year for the first time. AECOM, a world-leading design, engineering, environmental and infrastructure consultancy, performed the data analysis contained in these pages and on the web. AECOM's experience working with city governments and the company's commitment to analysis and design has allowed us to peer deeply into the reported data and extract the most actionable results.

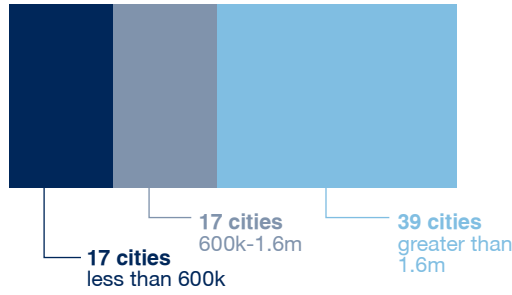
See the interactive version of the map—  
including more detail on emissions and other  
reported information from cities—at  
[www.cdproject.net](http://www.cdproject.net)

# CDP Cities 2012

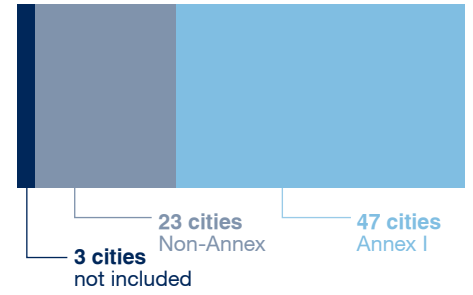


**244,476,700**  
total population

Cities by population



Cities by UNFCCC status



## 73 responding cities:

\* Cities that report privately







**Annual climate change reporting is catching on among cities. CDP hosts disclosure from 73 cities and local governments this year—up from 48 last year—from all corners of the globe, including every continent except Antarctica. Participants range in size from the city of Tokyo, population 13 million, to the village of Kadiovacik in Turkey, population 216, and include over 75% of the membership of the C40, a group of mega-cities dedicated to climate change leadership. The breadth of responses demonstrates that local governments in every region of the world, regardless of their size, can participate in annual climate change reporting.**

Here are the key findings:

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## Measurement

**Cities report emissions totalling 977,659,014 tonnes of CO<sub>2</sub>e.** This number represents an increase of 43% from levels reported last year, resulting from the larger number of cities reporting this year. At nearly 1 billion tonnes of CO<sub>2</sub>e, reporting cities account for emissions that are roughly equal in size to the emissions of Canada and Brazil combined. ....Pg 12

**Larger, denser cities, on the whole, demonstrate smaller per capita greenhouse gas emissions (GHG).** Per capita GHG emissions vary widely from city to city, but our analysis—based on emissions inventories from 51 cities—supports the understanding that larger, denser cities tend to be more emissions-efficient. ....Pg 14

**City governments anticipate economic opportunities from climate change.** 82% of responding cities say climate change presents economic opportunities. Green jobs and development of new business industries top the list of anticipated economic opportunities, with over half of responding cities expecting more green jobs or new business opportunities resulting from climate change. ....Pg 20

**Climate change risks to cities are here and now.** Despite an increase in the number of cities reporting to CDP this year, the percentage of cities reporting themselves at risk from climate change remained the same compared to last year, with 89% of cities identifying physical risks from climate change. The timescale of many of these risks is immediate—39% of all risks are classified as “current”, compared to just 14% of risks classified as “long-term”. ....Pg 24

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## Management

**City governments with emissions reduction targets report three times as many emissions reduction activities as cities without targets.** This finding suggests that setting reduction targets provides a strong catalyst for taking action to reduce greenhouse gas emissions. ....Pg 36

**Municipal governments report that they are primarily funding climate change actions themselves.** 64% of reported emissions reduction activities are financed through general municipal funds, compared to 7% supported by grants or specific subsidies. The private sector accounts for 14% of financing, while development banks finance less than 1% of total emissions reduction activities. ....Pg 38

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## Special Report on C40 Cities

Many of the cities reporting to CDP this year are member or affiliate cities of the C40 Cities Climate Leadership Group. In November 2011—for the second year in a row—C40 Chair and New York City Mayor Michael R. Bloomberg invited the 58 C40 cities (40 participating cities and 18 affiliate cities)<sup>1</sup> to report their climate change-related data to CDP. Forty-five C40 cities answered Mayor Bloomberg’s call; the results are included in this section.

**C40 cities show an improved commitment to annual disclosure this year.** Forty-five C40 cities report on their climate change activities this year, up from 42 cities last year. ....Pg 51

**Energy and transportation top the list of reported emissions reduction initiatives for C40 cities.** 80% of C40 cities disclose actions in the energy sector, while 73% disclose actions related to transportation. All told, C40 cities report 489 total actions designed to reduce emissions. ....Pg 53

**Fifteen C40 cities report updated city-wide emissions inventories, demonstrating world-class leadership in annual assessment of their greenhouse gas emissions.** Eight of those cities report reductions in emissions from last year. ....Pg 72

<sup>1</sup> Reflects the number of members/affiliates as of November 2011.

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## What's Next for Cities?

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More than 25 city governments mention the word “innovation” in their responses to CDP this year. This section looks at what’s ahead for cities when it comes to climate change, utilizing CDP responses as well as interviews with city government staff members around the world.

**Putting data to work for your city.** New research from The Climate Group and others shows the data explosion that is happening in cities—and how city governments are partnering with their citizens to put the data to work. .... **Pg 79**

**Four city innovations to watch in 2012.** St. Louis, Greater Manchester, Miami, and Warsaw highlight the next big things in their cities. .... **Pg 80**

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## Special Features

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<b>The Global Protocol for Community-scale Greenhouse Gas Emissions.</b> ....	<b>Pg 14</b>
<b>Green Jobs: Special Focus on North America</b> .....	<b>Pg 20</b>
<b>Water</b> .....	<b>Pg 30</b>
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**Can cities use real estate strategies to deal with climate change threats?** Dan Probst of Jones Lang LaSalle shares tips. .... **Pg 45**

**What are the next big technologies for cities?** Emma Stewart from Autodesk and Simon Giles of Accenture explain the next big technologies that can help cities address environmental issues. .... **Pg 78**

**Can a city government be innovative?** Michael Armstrong of the City of Portland, Oregon shares his views. .... **Pg 79**

**Necessity is the mother of invention.** Rodrigo Rosa of the Prefeitura do Rio de Janeiro explains the thinking behind the new Rio Operations Center. .... **Pg 79**

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## Expert Insight

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## A Note on the Text

All data in the report is based on answers from city governments to the questions contained in the 2012 CDP Cities questionnaire, except where otherwise noted.

In some places, we have divided cities by their development levels using United Nations indicators. Cities located in countries that are Annex 1 countries under the United Nations Framework Convention on Climate Change (UNFCCC) are considered developed countries. Cities in countries that are non-Annex 1 countries under the UNFCCC are considered developing countries.

Analysis on 73 cities is included in the first part of the report. Analysis specifically on the member cities of the C40 is included in the Special Report on C40 Cities.

# Meas- ure- ment

Emissions & Risk

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**“What gets measured gets managed”** is a mantra often associated with the business world. But as Mayor Michael R. Bloomberg points out, this mantra is just as true for the business of local government. The first step for many cities in tackling climate change is to take the time to measure key indicators so they know where to start taking action. We focus here on two broad areas of measurement: greenhouse gas emissions and climate change risk.

City governments often take responsibility for two different GHG inventories: emissions resulting from municipal operations (also known as city government operational emissions), and those relating to activities across the community as a whole (also known as city-wide emissions). CDP offers cities the opportunity to report both city government operation emissions and/or city-wide emissions. The figures and findings in this section are based on the information that cities have reported to CDP in 2012.

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**Fig. 1** Number of participating cities that reported city-wide emissions, by region.



## Measuring Emissions

City-wide emissions measurement is catching on in cities. Fifty-one out of the 73 cities that report to CDP this year (70%) disclose city-wide emissions inventories. This number represents a small increase from last year's report, in which 31 out of 48 cities (65%) reported city-wide inventories. At least one city from every region of the world reports an emissions inventory, with North America and Europe showing the highest percentages of cities. The increase from 2011 to 2012 demonstrates that measurement and reporting of city-wide emissions is a growing trend among city governments.

Cities report city-wide greenhouse gas emissions totalling 977,659,014 tonnes, roughly equivalent to the total emissions from Canada and Brazil combined. This number represents a 43% growth from last year's total reported emissions, reflecting the larger numbers of cities disclosing this year. By contrast, Global 500 companies reported about 4 billion tonnes of CO<sub>2</sub>e (Scope 1+2) through CDP in 2011, and total world emissions stand at around 30 billion tonnes CO<sub>2</sub>e.

Methodologies for measuring city-wide emissions remain varied, allowing significant room for improvement and alignment. This year, our analysis shows that 13 cities (the largest single group) are adapting the Intergovernmental Panel on Climate Change's (IPCC) methodology for national governments to fit the requirements of their city's community emissions. Seven cities measured their emissions using the draft edition of the *Global Protocol for Community-scale Greenhouse Gas Emissions*, despite the fact that a final version had not yet been released publicly, suggesting that cities are keenly awaiting an improved—and common—emissions measurement standard.

### Up close

#### Should you use a consultant to help you measure your GHG emissions?

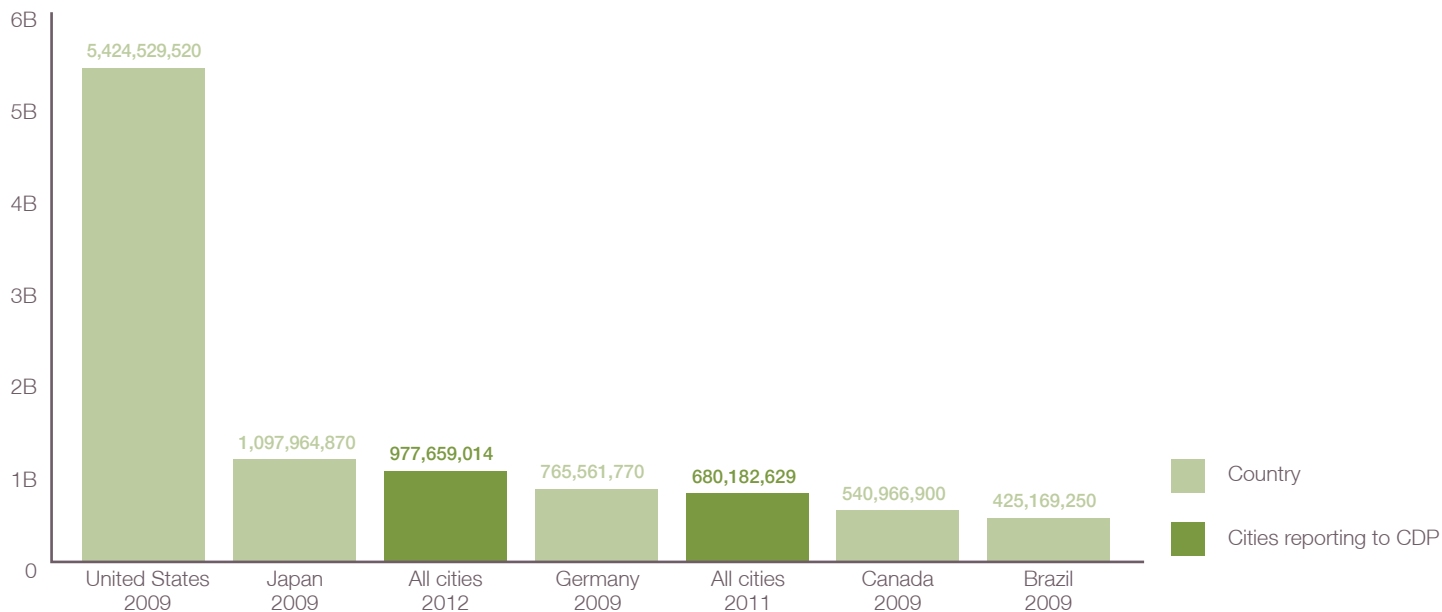
Cities employ different strategies to complete their GHG emissions inventories. Two experts share their views on what works for their cities.

**No.** New York City does not use a consultant to complete its GHG inventory, as we feel it is critical to develop the institutional knowledge and internal capacity achieved by completing this work in-house. This ensures accuracy and consistency in the application of accounting and reporting methodologies. **Jonathan Dickinson, Senior Policy Advisor, New York City**

**Yes.** Using an external consultancy to help a city complete its greenhouse gas inventory in general is recommended. In the first place, local governments may not always have a wide group of experts working in the Climate Change Team, so the interaction with experts of different disciplines complement knowledge and bring up new questions and ideas. In the same line, the consultant can help defining, organizing and managing variables necessary for the GHG emission report, especially those specific to each city, as for example Vehicle Kilometers Travelled (VKT). Secondly, the creation of tools which help simplify the loading of data and calculation of GHG emissions is always useful, especially in small Climate Change working teams. In the case of Buenos Aires City, a web platform was defined for the City in 2011, which is expected to make the process more efficient and less time consuming. In the mid term, it is also expected to streamline the data input allowing each entity to load its own data. **Inés Lockhart, Climate Change Department, Buenos Aires**

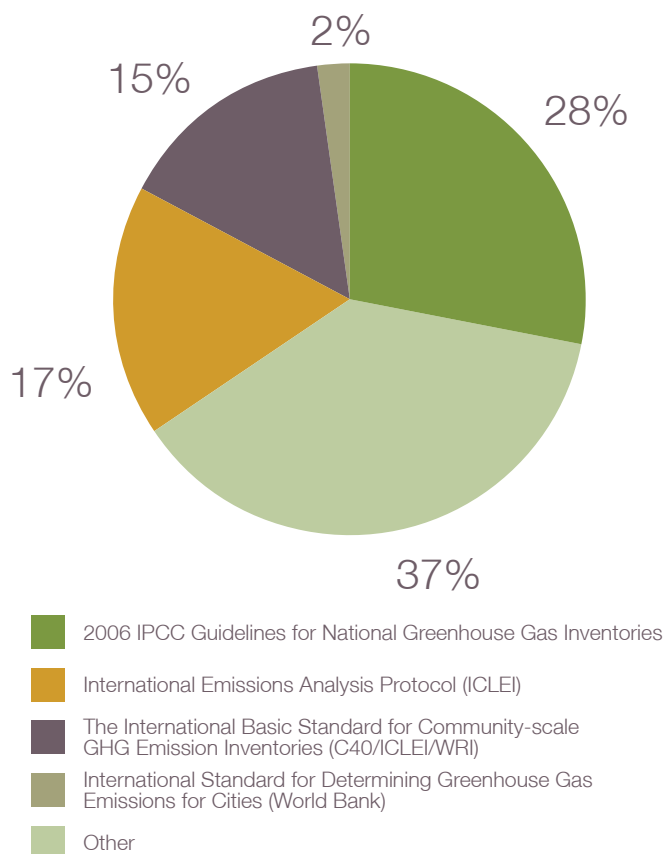
Based on interviews with city staff

**Fig. 2** Total city-wide emissions reported to CDP compared to countries (metric tonnes CO<sub>2</sub>e).

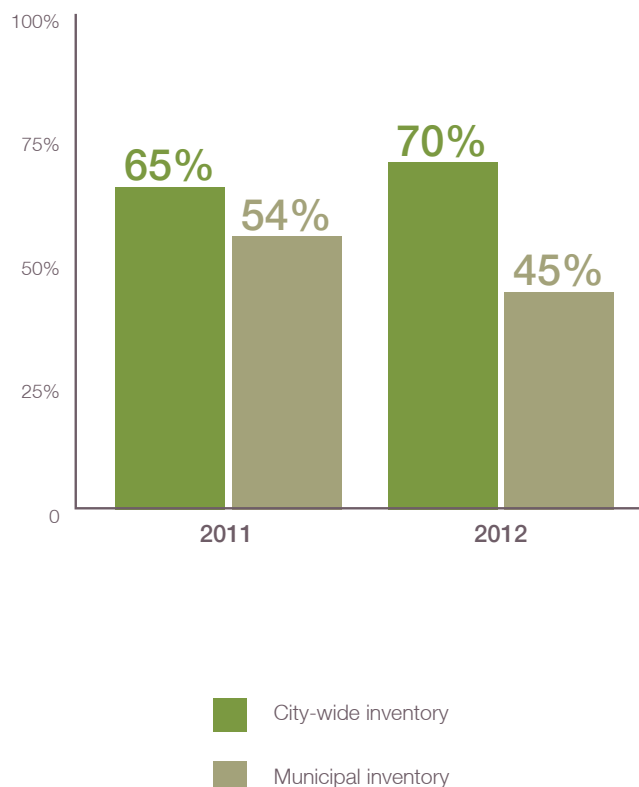


Source: U.S. Energy Information Administration. International Energy Statistics. <http://205.254.135.7/cfapps/ipdbproject/IEDIndex3.cfm?tid=90&pid=44&aid=8>

**Fig. 3** Primary methodology used to calculate city-wide emissions (% of responses).



**Fig. 4** Percent of cities reporting emissions inventories, by year.



## Up close

# The Global Protocol for Community-scale Greenhouse Gas Emissions (GPC)

On 14 May 2012, C40 and ICLEI (Local Governments for Sustainability) in collaboration with the World Resources Institute (WRI) and the Joint Work Programme of the Cities Alliance between the World Bank Group, UN-HABITAT and UNEP announced a key milestone in establishing a standard for emissions measurement and reporting across cities of all sizes and geographies. Together, these organizations launched a pilot version of the *Global Protocol for Community-scale Greenhouse Gas Emissions*—a tool that will provide a consistent and transparent system for cities to plan for and finance climate change action.

To date, cities have lacked a strong, clear methodology for measuring city-wide emissions. CDP's 2011 report showed significant variation in how greenhouse gas emissions are calculated by different cities. The launch of the GPC is an important step forward, as it will allow cities to measure emissions according to a robust, common methodology. It will also allow cities who have followed the GPC guidelines to compare their GHG emissions inventories with other cities, driving greater collaboration and increasing the level of funding available to cities.

**Seth Schultz, Director of Research, C40**

For more information contact  
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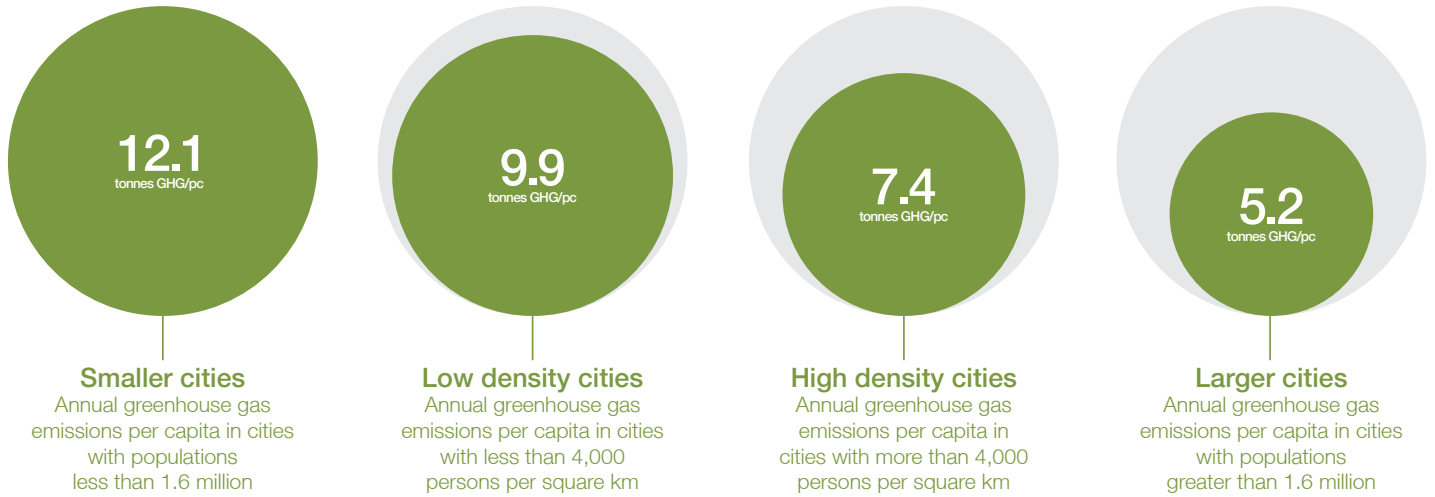
Larger, denser cities tend to be more economically efficient per tonne of greenhouse gas emitted. Per capita emissions in larger, denser cities tend to be lower than in smaller, less dense cities. Cities in the bottom half of density (less than 4,000 persons per sq. km) average 9.9 tonnes of GHG per capita emitted compared to 7.4 tonnes of GHG per capita emitted for cities with more than 4,000 persons per sq. km. This is due to a wide range of factors, including less reliance on cars, easier access to public transport, and other economies of scale. Our analysis shows that cities over 1.6 million inhabitants have the lowest emissions per capita, on average.

European cities are more economically efficient per tonne of GHG emitted than their North American counterparts. North America averages approximately \$5,300 of economic activity per tonne of GHG emitted, whereas Europe averages \$9,200 of economic activity per tonne of GHG emitted.

Measuring and tracking emissions can help cities save money and conserve resources. 29% of reporting cities identify improved efficiency of operations as an opportunity arising from climate change. By measuring emissions and assessing risks, cities are saving money. Las Vegas, for example, a city that has been reporting to CDP since 2008, has conducted a review of “1,343 vehicles, 592 water meter accounts, 3,333 electrical accounts, 125 waste removal accounts and more than 1,700,000 square feet of administrative and facility space across various departments,” helping the city to identify and address inefficiencies and save money.



**Fig. 5** Impacts of city population and density on greenhouse gas emissions per capita (metric tonnes of CO<sub>2</sub>e/population).



**Smaller cities sample:** Amsterdam, Austin, Changwon, Copenhagen, Dallas, Denver, Helsinki, Kadiovacik, Kaohsiung, Las Vegas, Miami, Milan, Philadelphia, Portland, Riga, Rotterdam, St. Louis, San Diego, San Francisco, Seattle, Stockholm, Sydney, Vancouver, and Washington.

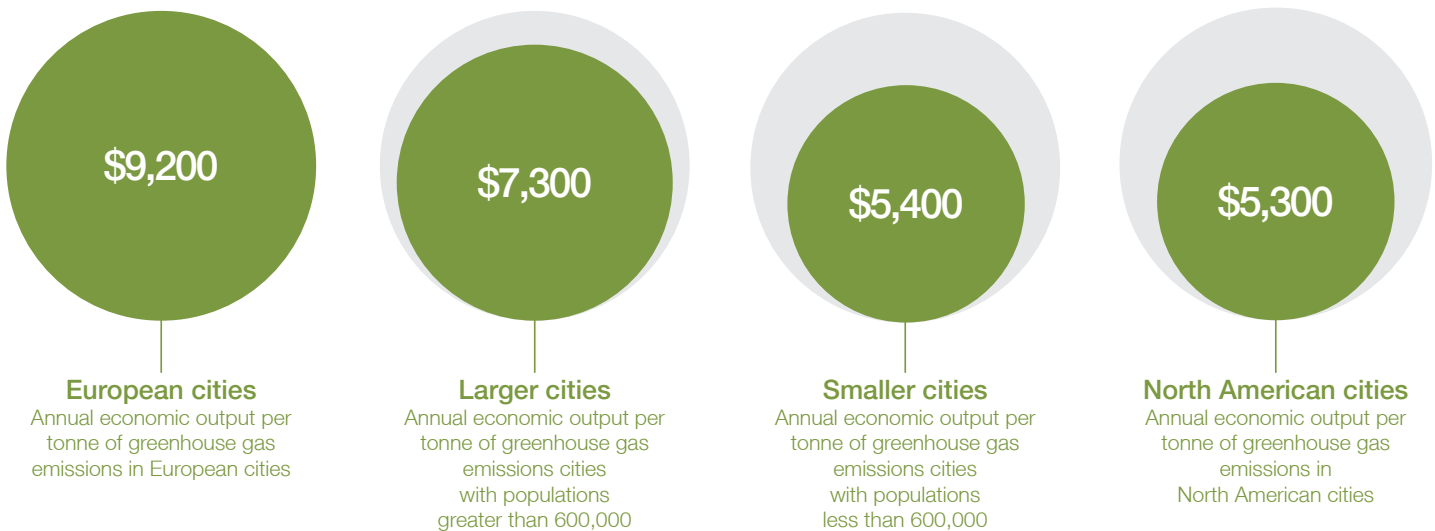
**Low density cities sample:** Amsterdam, Austin, Berlin, Changwon, Dallas, Denver, Durban, Hamburg, Helsinki, Houston, Istanbul, Kadiovacik, Las Vegas, Madrid, Portland, Riga, Rotterdam, San Diego, Seattle, St. Louis, Warsaw, and Washington.

**High density cities sample:** Barcelona, Bogotá, Buenos Aires, Chicago, Copenhagen, Curitiba, Hong Kong, Jakarta, Kaohsiung, London, Miami, Milan, Moscow, New York, Paris, Philadelphia, Rio de Janeiro, San Francisco, São Paulo, Seoul, Stockholm, Sydney, Taipei, Tokyo, Toronto, Vancouver, and Yokohama.

**Larger cities sample:** Barcelona, Berlin, Bogotá, Buenos Aires, Chicago, Curitiba, Durban, Hamburg, Hong Kong, Houston, Istanbul, Jakarta, London, Madrid, Moscow, New York, Paris, Rio de Janeiro, Rome, São Paulo, Seoul, Taipei, Tokyo, Toronto, Warsaw, and Yokohama.

For sources, see appendix, page 89.

**Fig. 6** Economic efficiency of greenhouse gas emissions (city GDP in \$USD/metric tonnes CO<sub>2</sub>e).



**European cities sample:** Amsterdam, Barcelona, Berlin, Copenhagen, Hamburg, Helsinki, Istanbul, London, Madrid, Milan, Moscow, Paris, Riga, Rome, Rotterdam, Stockholm, and Warsaw.

**Larger cities sample:** Amsterdam, Austin, Barcelona, Berlin, Bogotá, Buenos Aires, Changwon, Chicago, Curitiba, Dallas, Durban, Hamburg, Hong Kong, Houston, Istanbul, Jakarta, London, Moscow, New York, Paris, Philadelphia, Riga, Rio de Janeiro, Rome, Rotterdam, Madrid, Milan, San Diego, San Francisco, São Paulo, Seattle, Seoul, Stockholm, Taipei, Tokyo, Toronto, Vancouver, Warsaw, Washington, and Yokohama.

**Smaller cities sample:** Copenhagen, Denver, Helsinki, Las Vegas, Miami, Portland, and St. Louis.

**North American cities sample:** Austin, Chicago, Dallas, Denver, Houston, Las Vegas, Miami, New York, Philadelphia, Portland, San Diego, San Francisco, Seattle, St. Louis, Toronto, Vancouver and Washington.

For sources, see appendix, page 89.

## Inside Copenhagen's city-wide emissions inventory

### Total emissions:

2,515,250 metric tonnes CO<sub>2</sub>e

### Year reported:

01 Jan 2010 - 31 Dec 2010

### Breakdown

in metric tonnes CO<sub>2</sub>e

Power consumption	1,281,291
Heat consumption	611,830
Heating (individual heating solutions in the commercial sector and homes)	26,602
Heating (individual heating solutions and process heating in the industrial sector)	2,682
City gas for cooking	14,082
Road traffic	378,217
Train traffic (including electronic trains)	44,197
Air traffic	16,141
Ship traffic	44,640
Non-road industry transportation	62,880
Non-road transport garden/household	3,320
Process emissions from industry	205
Solvents	8,421
Land use	135
Landfills	700
Waste water	19,907

Copenhagen's method includes CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions in the inventory.

### Copenhagen Q&A

#### Please describe your methodology:

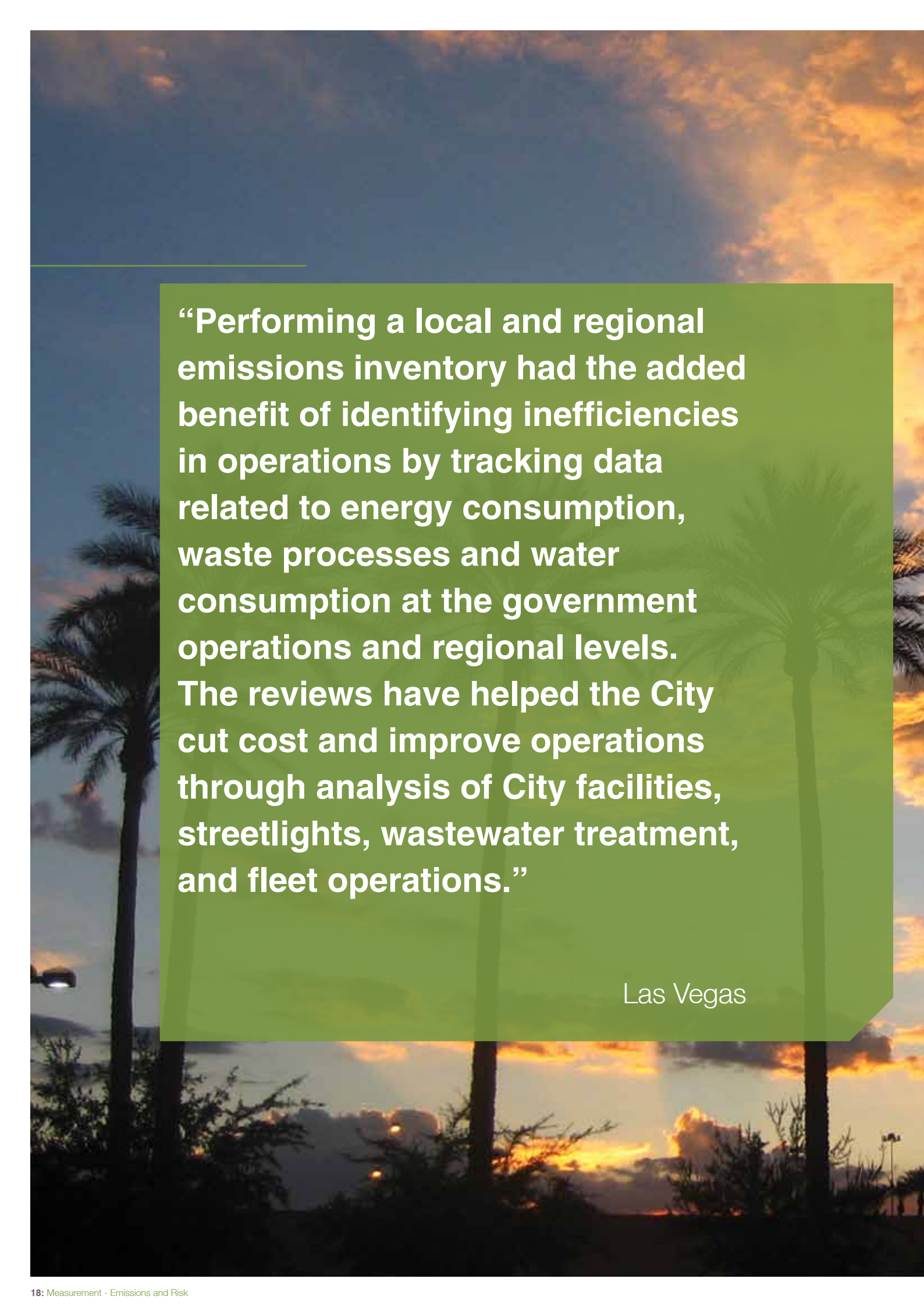
The methodology used provides an inventory of greenhouse gases, divided into sectors. The sectors are similar to those used for the official Danish emission inventory (IPCC sectors), and include: collective power and heating, Individual heating, mobile sources, transportation and machinery, industrial processes, solvents, agriculture, land use, and waste depositing and wastewater. The inventory is primarily based on Scope 2 data on heat and power consumption and Scope 1 data on road traffic.

#### How did you collect data for this inventory?

The energy companies provide data on the total consumption of heat (district heating), power and city gas within the geopolitical border of the municipality. Traffic volumes are modelled by the municipality on the basis of traffic counts. Power and fuel consumption from public train and metro is provided by the relevant companies. The consumption from the very limited number of individual heating solutions (less than 2%) is modelled on the basis of historical data. Emissions from landfills and wastewater handling are calculated on the basis of current and past production of waste and waste water.

An emission factor for power from the Danish power grid is provided by the company, which runs the Danish transmission system, Energinet.dk. An emission factor for district heating in the regional district heating system is provided by the local energy companies. Emission factors for different types of traffic are provided by the Danish Ministry of transport.



A sunset scene with palm trees and a green text box. The sky is filled with orange and yellow clouds, and the palm trees are silhouetted against the bright light. A green text box is overlaid on the scene, containing a quote in white text. The quote is: "Performing a local and regional emissions inventory had the added benefit of identifying inefficiencies in operations by tracking data related to energy consumption, waste processes and water consumption at the government operations and regional levels. The reviews have helped the City cut cost and improve operations through analysis of City facilities, streetlights, wastewater treatment, and fleet operations." The text box is positioned in the center of the image, and the quote is centered within it. The background image shows a sunset with palm trees and a streetlight.

**“Performing a local and regional emissions inventory had the added benefit of identifying inefficiencies in operations by tracking data related to energy consumption, waste processes and water consumption at the government operations and regional levels. The reviews have helped the City cut cost and improve operations through analysis of City facilities, streetlights, wastewater treatment, and fleet operations.”**

Las Vegas

## Caracas

“We do not yet have an emissions inventory for the entire metropolitan area of Caracas, and this hinders the possibility to establish an efficient GHG emission reduction target. Our goal is to complete the emissions inventory for the entire metropolitan area of Caracas this year, provided that funds to do it are available.”



## Greater Manchester

We are working to “...adopt a common methodology for measuring and reporting on carbon emissions to achieve a consistent and convergent approach to performance monitoring across Greater Manchester.”



## Denver

“Together with our university partners, we developed an in-house spreadsheet based system that only requires fuel, energy, and other consumption inputs. The required inputs are clearly marked so that continuity with future updates and new staff are considered. With the data, calculations/conversions, tables, and figures are updated automatically and can be used in our reports.”





## Up close

### Economic opportunity: Focus on green jobs in North American cities

The vast majority of city governments report that climate change presents economic opportunities for their cities. 82% of all reporting cities identify opportunities, like green jobs and development of new business industries in their cities. More cities identify economic opportunities than identify economic risks, showing that city governments have internalized the economic growth opportunities presented by the transition to a low-carbon economy. 55% of reporting city governments expect economic opportunities from climate change to come in the form of more jobs, and 53% of city governments are looking forward to the development of new business industries within their cities.

In the USA and Canada especially, city governments report high expectations for green job growth. Sixteen out of the 21 reporting North American cities mention green jobs as one of the potential benefits from the transition to a more resilient, low-carbon economy. Some examples of North American cities creating green jobs:

**Portland's** Clean Energy Works Oregon program has created a building energy retrofit program supported by \$25 million in funding. The program pays the up-front costs of building retrofits, with the loan repaid on energy bills over a 20-year period. In its first two years, the program provided pay checks to more than

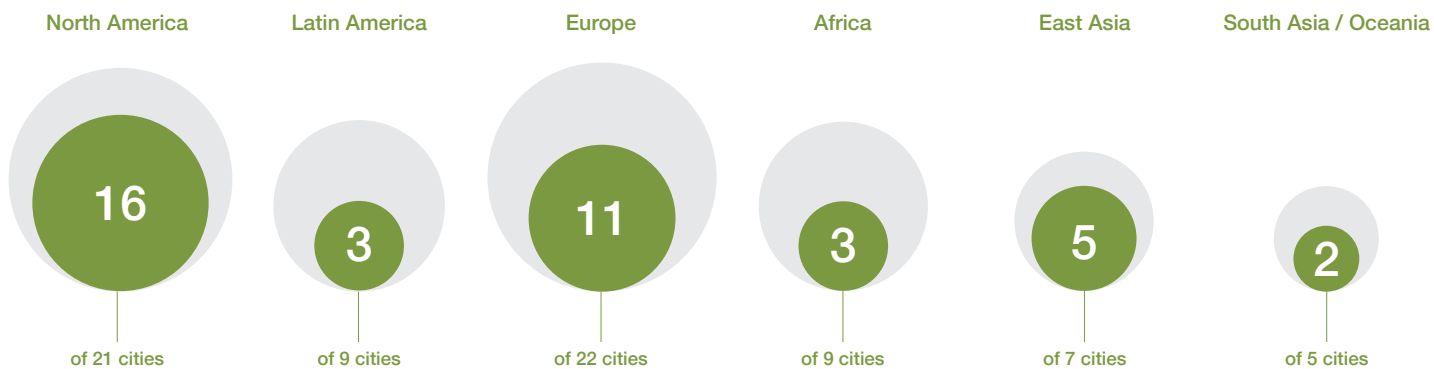
400 workers and delivered 1,200 home energy retrofits.

**St. Louis** is creating a *Set The PACE St. Louis* program to provide financing for energy efficiency improvements to privately owned property in the city. It is anticipated that this program will generate demand for energy audits and retrofits, and the associated jobs that go in to providing those services.

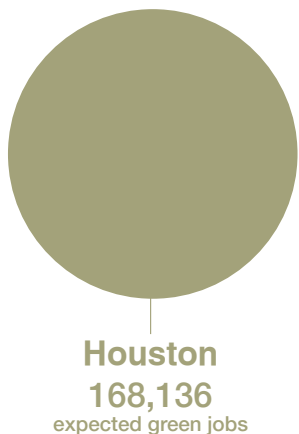
**Miami** recently launched Miami Green Lab ([www.miamigreenlab.org](http://www.miamigreenlab.org)), a community green resource and green job training center, providing a variety of education, training and certification programs.

**Vancouver's** "Greenest City Action Plan (GCAP)" aims to boost the number of 'green' jobs through strategies such as creation of trade, boosting the Green Capital brand to attract businesses to Vancouver, and partnering with the six close post-secondary institutions to create a unique program for students called the Campus City Collaborative (C3) program to work in GCAP projects.

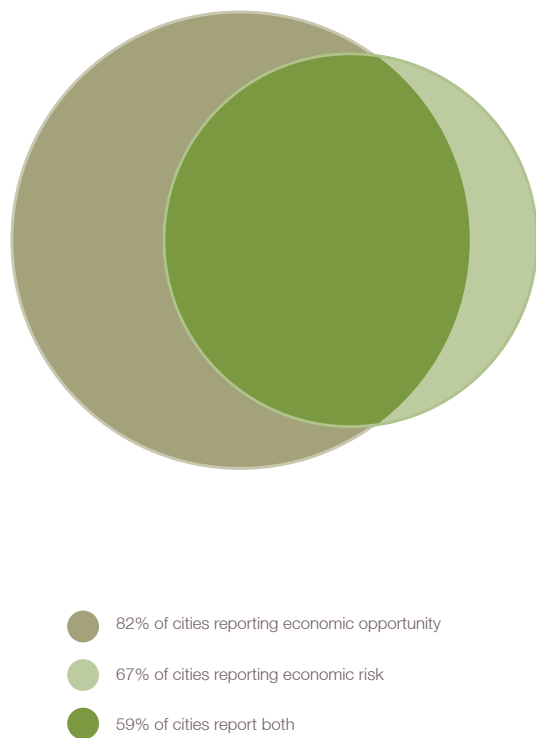
**Fig. 7** Number of cities reporting green jobs as an economic opportunity, by region.



**Fig. 8** Expected number of green jobs, by city.



**Fig. 9** Cities reporting economic opportunity vs. economic risk.









**“Delivering the [Mayor’s Climate Change] Strategy could deliver 200k new jobs. We are driving this forward through our range of climate change programmes. These are developing investment opportunities and business models that we expect to be replicated by private sector finance.”**

Greater London

### **Oristano**

“We think that paying attention to vulnerabilities such as food and water availability, health and education, and employment opportunities today will help cities to reap future benefits and impart greater confidence and economic dynamism to the urban population.”

### **Hamburg**

“Hamburg is successfully attracting headquarters of the wind energy industry.”

### **Dallas**

“More green jobs will continue to be created in the City of Dallas as reductions in carbon emissions occur. Many local colleges are initiating new programs to train workers in green jobs fields.”

## Measuring Risk

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Measurement should not just be limited to tracking greenhouse gas emissions. Risk assessments are another important aspect of climate change measurement. The cities reporting to CDP are demonstrating exemplary leadership in this area of measurement as well. Fifty-five out of the 73 reporting cities (75%) provide data on how they are conducting risk assessments for their cities. Overall, approaches to measuring climate risk tend to be highly individualized for each city—Bogotá and Caracas, for instance, conduct their own risk assessments in conjunction with local agencies. Cities like Abidjan, Chicago, and Washington DC have partnered or are in the process of collaborating with academic institutions to study their cities' climate change vulnerabilities. And Helsinki has integrated its climate change risk assessment into its normal planning process.

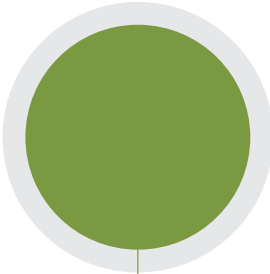
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Climate change already poses serious risks to cities. Forty-two cities (58%) report climate change effects that currently pose a risk to their cities. Cities report higher temperatures (warmer average temperatures, urban heat island, and heat waves) as the most common risk; the second most common risk is more frequent or intense rainfall. Cities classify the majority of these current risks as either serious or extremely serious.

Heat waves and increased temperatures threaten many cities—regardless of their average temperatures. Cities across all climate types identify heat waves and rising temperatures as a threat. Of the 13 cities with cool average temperatures (between 0° and 10°), 69% (nine cities) report heat waves and rising temperatures as risks. This group includes Stockholm, which reports that more frequent heat waves pose threats to human health and may cause more deaths over the medium-term. High percentages of cities in warmer climates also report facing risks from rising temperatures.

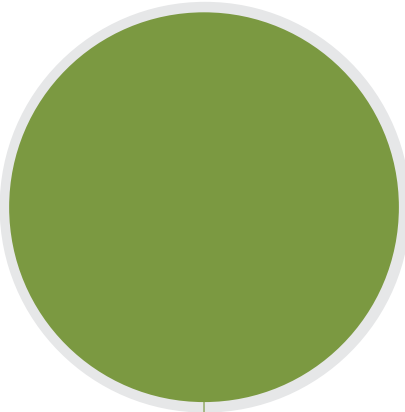
Fig. 10 Number of cities reporting temperature increase/heat waves as a physical risk, by average annual temperature.

Average annual temperature  
less than 10°C



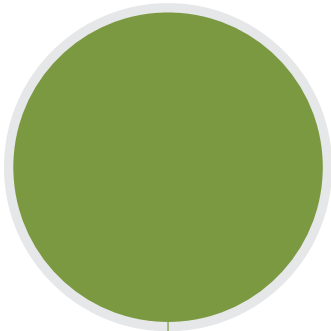
9  
of 13 cities

Average annual temperature  
between 10-20°C



27  
of 30 cities

Average annual temperature  
more than 20°C



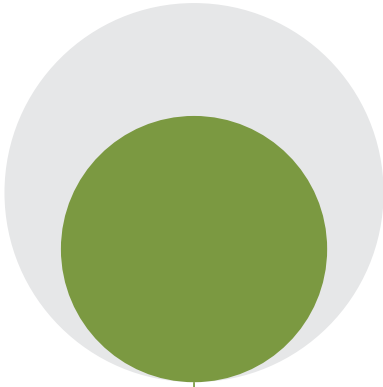
17  
of 19 cities



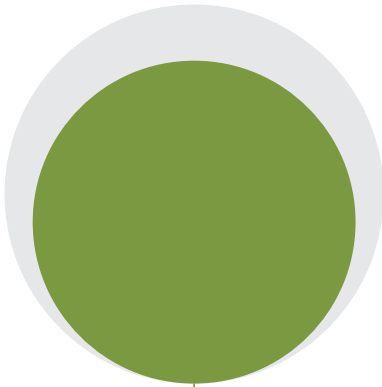
Fig. 11 Number of cities reporting risks, by type.



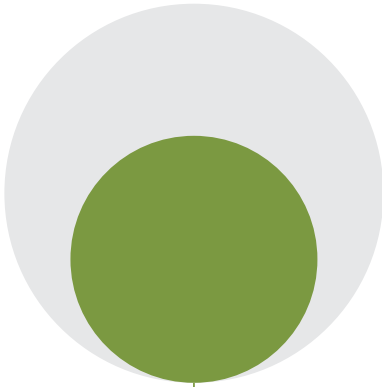
Of 73 cities surveyed:



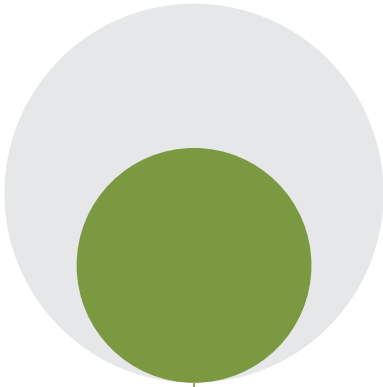
36 cities are reporting risks from drought.



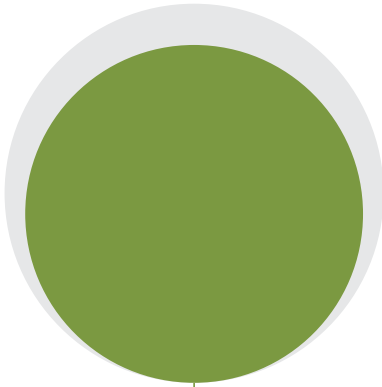
53 cities are reporting risks from frequent / intense rainfall.



31 cities are reporting risks from sea-level rise.



28 cities are reporting risks from storms / floods.



58 cities are reporting risks from temperature increase / heat waves.



**“For the city the physical impacts of climate change that occurred during 2011, such as floods, landslides, and disruption to infrastructure represented a direct impact on the quality of life of the urban population.”**

Bogotá

### **Abidjan**

“Sea level rise of 1 m might cause displacement of residents, disruption of transportation and wetland and human life loss. Approximately 1000 km of paved roads and bridges in the Abidjan area, and areas east of Abidjan will disappear with a rise in the sea of 0.5 m.”

### **Riga**

Riga’s risk assessment project “is unique for both Latvia and the Baltic States. The project was started in February 2010 and will be finished on November 30, 2012. Its total costs amount to €662,240, shared equally between the EU LIFE+ programme and Riga municipality.”

### **Addis Ababa**

“Climate change impact and vulnerability assessment has been done on the city using UNDP and IPCC climate change impact assessment guideline or methodology.”

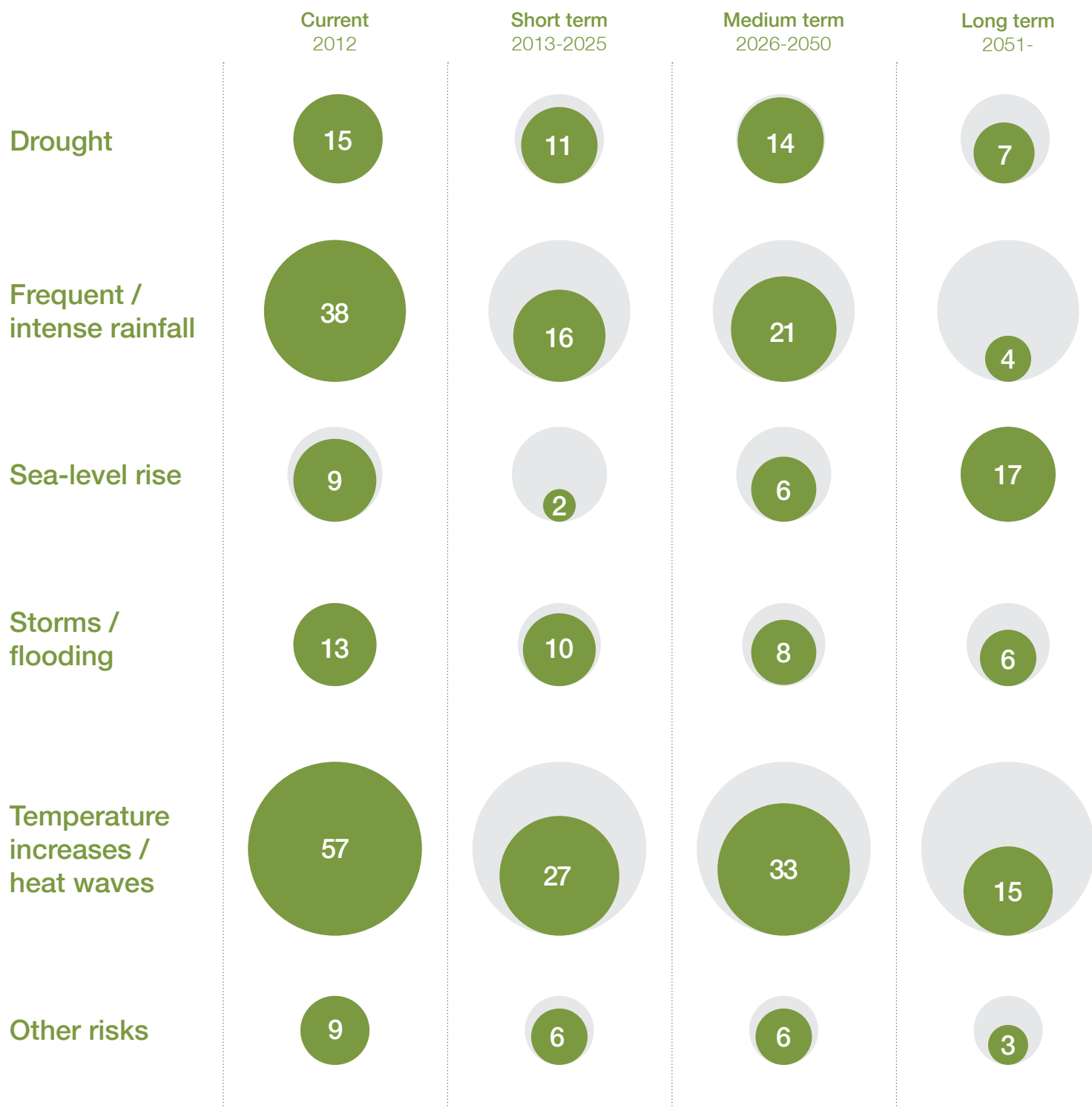
See the interactive version of these charts—  
including more detail on risks and other  
reported information from cities—at  
[www.cdproject.net](http://www.cdproject.net)

Fig. 12 Number of cities reporting risks, by region.



Note:  
The East Asia and South Asia/Oceania regions have been combined into "Asia/Oceania" for this figure.

Fig. 13 Number of risks reported by cities, by time scale.



## Up close

### Water

This year, for the first time, CDP invited all responding cities to report specifically on risks to their water supply and the actions they are taking to combat these risks. The response was overwhelming, with cities sharing stories of water supply risk, increasing stress from climate change, and myriad activities to conserve water and encourage others in their cities to do the same.

Over half of responding cities (61%) report that they foresee substantive risks to their water supply in the future. The two most common risks identified by cities are increased water stress/scarcity and declining water quality. However, declining water quality is a more immediate concern to cities—six cities report water quality as a current risk.

African and North American cities are the two regions most likely to report risks. 89% of African cities reporting to CDP face risks of some sort to their water supplies, while 66% of North American cities report risks. These regions also contain the highest percentages of cities reporting climate change risks from drought.

Location and natural geography are significant determinants of water supply risk. Cities that do not report anticipated risks to their water supply often cite natural geographic advantages, like access to major bodies of fresh water or abundant rainfall. St. Louis, for example, notes that its location at the confluence of two major river systems—the Mississippi and the Missouri—reduces the risk of a reduction in quantity of fresh water. Similarly, Toronto’s main

geographic feature—Lake Ontario—gives the city an advantage in terms of ongoing access to fresh water, thus reducing its water supply risk.

Cities are meeting these risks with a number of actions related to both increasing water supply and reducing water demand. The primary activity, however, is education and outreach. Cities report 23 actions related to conservation education, by far the most common method of risk reduction. For example, Addis Ababa and Lagos are both running outreach campaigns to make their citizens aware of the benefits of saving water.

CDP will continue to include questions relating specifically to water in future questionnaires. For more information on how C40 cities in particular are managing risks and opportunities related to water, see page 62.

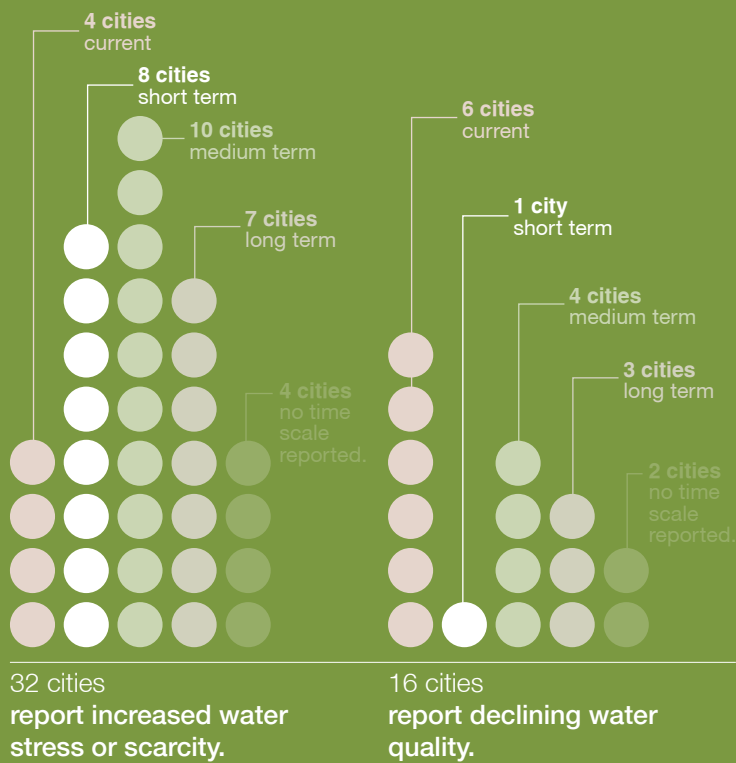
**Fig. 14** Risks to municipal water supply (% of responses).







**Fig. 15** Risks to municipal water supply, by time scale.



Note that one city reports risks related to increased water stress or scarcity in both the short term and long term.

## Up close

### Citizen engagement

Citizens play a starring role in city government responses to CDP this year. The cities reporting to CDP note 27 initiatives in 22 cities designed to raise awareness about climate change in their communities. These initiatives range from building climate change into school curriculums to Changwon's innovative carbon point system, which rewards citizens and businesses that are reducing their emissions. Some examples:

#### Changwon:

Changwon's Carbon Points system rewards points to households who use less electricity or water compared with same period in previous year. The points are given as much as they save electricity or water and have financial value.

#### Portland:

"The Portland Climate Action Now! (CAN!) public outreach campaign continues and includes a website ([www.portlandclimateaction.org](http://www.portlandclimateaction.org)), educational materials, a booth for event outreach, and class/workshop curriculum as part of the ReThink series and Master Recycler classes. The CAN! website received over 42,500 visits in the past year."

#### Ten cities to follow on Twitter

Some cities are using Twitter as a means of engaging their citizens in climate change activities. Here are ten cities you might like to follow on Twitter (opposite).

Fig. 16 Number of cities providing incentives for climate change issues, by type.



Fig. 17 Number of cities educating citizens on climate change issues.



Further details on how individual cities calculate greenhouse gas emissions inventories and perform risk assessments can be found on the CDP website at [www.cdproject.net](http://www.cdproject.net)

## 10 cities to follow on twitter

**@SustainableMelb** New blog post: Building an Outstanding Green Home: Free Online Seminar

Melbourne 9,480 followers

**@SydneyYourSay** Have your say on City's plans to reduce waste & GHGs before Exhibition for Interim Waste Strategy ends

Sydney 976 followers

**@ambientesp** Reduzir a pressão sobre recursos naturais é um objetivo claro da nossa Secretaria e um anseio da sociedade Flávio Miranda #ResíduosSólidos

São Paulo 9,938 followers

**@greenhoustontx** City of Houston uses wind energy, produced in West Texas, to power its city buildings, treatment plants, etc. Proud to lead on renewable NRG

Houston 1,680 followers

**@SFEnvironment** Congratulations to the first graduating class of our #greenjobsprogram, Environment Now!

San Francisco 1,938 followers

**@PlaNYC** If you know how to build an app, get signing on the City of New York's first Greener, Greater Hackathon in the summer!

New York 3,449 followers

**@ecocaracas** Hoy se celebra el Dia Mundial del reciclaje!!!

Caracas 3,209 followers

**@sustainstl** Join the LinkedIn Group "St. Louis Sustainable Business Network" & attend the first happy hour networking event

St. Louis 1,662 followers

**@greenestcity** A car wash is so 1990s - how about a bike wash instead? In support of VELOPALOOZA

Vancouver 1,938 followers

**@chicagoclimate** Want to spread the word on #energy #efficiency? Be a part of Energy Impact Illinois Impact Team!

Chicago 1,336 followers

Translation for São Paulo: 'Reducing the pressure on natural resources is a clear goal of our Department and society longs for it Flávio Miranda #SolidWaste'

Translation for Caracas: 'Today we celebrate the International Day of Recycling!!!'

# Man- age- ment

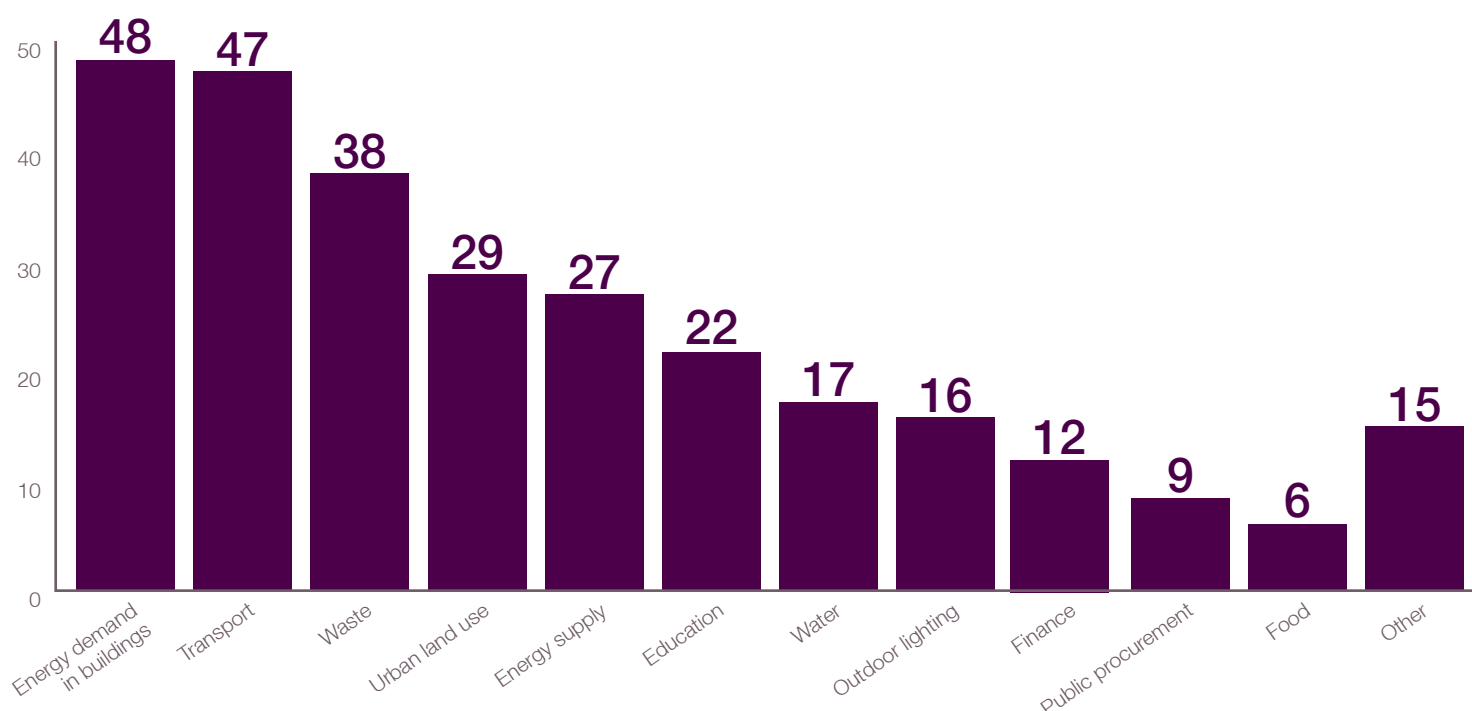
Emissions Reduction & Adaptation

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**The 73 cities that report to CDP this year** are taking action both to reduce their greenhouse gas emissions and to adapt to the effects of a changing climate. The task is not an easy one. Advocates within city governments must fight for the resources to address these issues, often over other pressing concerns—all during an historic period of global economic turbulence. Cities in some jurisdictions lack the funding or capacity to undertake climate change actions. Yet cities are reporting a wide breadth of creative actions, mostly funded out of their own budgets.

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**Fig. 18** Number of cities reporting city-wide reduction activities, by category.



## Managing Emissions Reductions

Cities are taking actions across every sector of their economies to reduce their emissions. 81% of all reporting cities (59) report that their cities are undertaking emissions reduction activities. From education programs to waste management, these cities report 630 total activities. Of these, reducing energy demand in buildings is the most frequently mentioned activity, with 48 cities reporting 133 actions in this area.

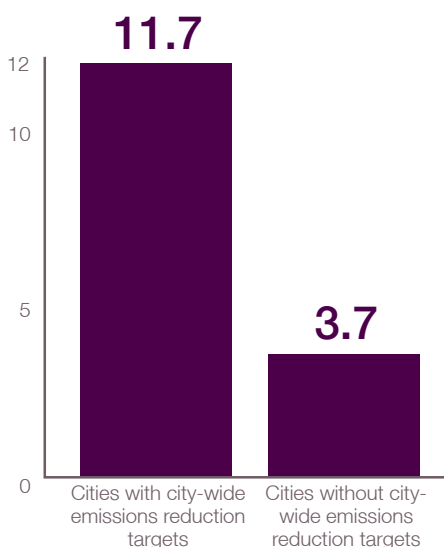
Emissions reduction activities are becoming mainstream practice in cities. 68% of the emissions reduction activities reported are already in place at either a significant or transformative scale. Another 23% of projects are being piloted. Furthermore, more than two-thirds of cities (71%) are incorporating emissions reduction into master planning.

Cities are relying on their own budgets to finance emissions reduction projects. Over half of all reported actions (64%) are funded out of general municipal budgets, compared to significantly smaller percentages for outside sources of funding. Melbourne, for instance, finances its efforts to encourage cycling, walking and public transit ridership through its municipal budget. Cities report activities like raising sales taxes to fund major infrastructure upgrades and levies on electricity bills to support energy efficiency projects. Despite significant efforts to increase outside financing options for cities from leading NGOs and multi-nationals, cities themselves are still financing the lion's share of reported emissions reduction activities.

However, where cities look outside their own budgets for funding, they tap a wide variety of outside sources. These sources of funding include state and regional government funding, national government grants, EU funding, grants from foundations, and national government agencies like BNDES, the Brazilian Development Bank. Poland's state-owned bank finances some of Warsaw's building retrofit programs, for instance. San Diego receives funding for a climate change educational outreach program from the California Public Utilities Commission, in partnership with the local utility. Actions related to reducing emissions from energy demand in buildings show the most utilization of outside funding sources. Private sector or outside sources finance 14% of the city-wide emissions reduction projects reported through CDP. Development banks finance just 1% of reported reduction activities.

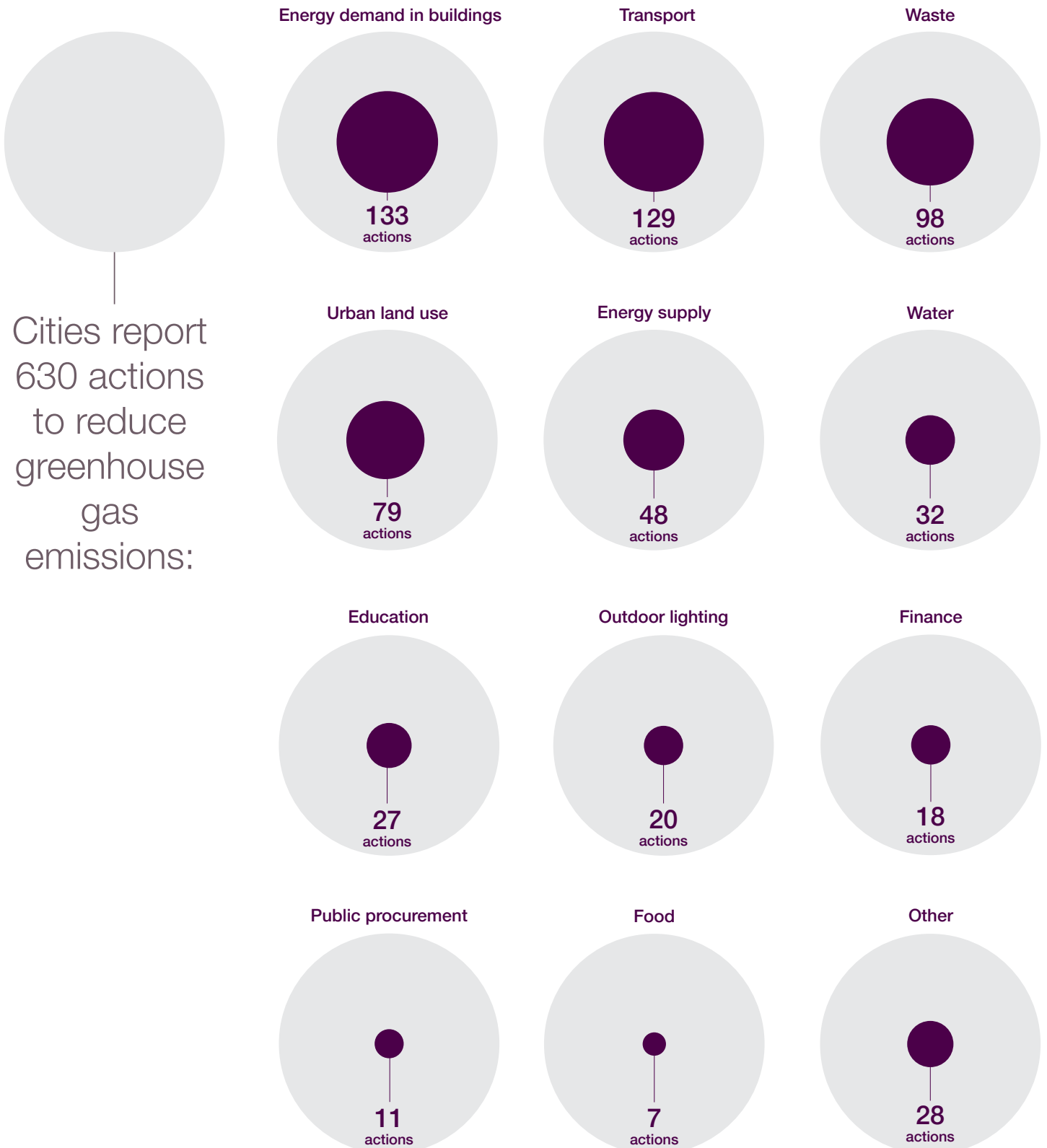
There is a strong relationship between cities that set emissions reduction targets and emissions reduction activities. Cities that set targets report three times as many reduction activities as cities without targets.

**Fig. 19** Average number of city-wide emissions reduction actions, by presence/ absence of reduction targets.



See the interactive version of this chart— including more detail on emissions reduction actions and other reported information from cities— at [www.cdproject.net](http://www.cdproject.net)

**Fig. 20** Number of actions to reduce city-wide GHG emissions, by category (# of actions).



## Up close

# How to engage and motivate private sector building owners?

Privately-held buildings can represent an enormous, hard-to-reach block of greenhouse gas emissions. Our expert panel gives tips on how to engage this group in GHG reduction.

**Lead by example:** the Government of Jakarta is taking the lead by retrofitting city buildings, schools, clinics and streetlights. Aisa Tobing, Government of Jakarta

**Showcase leadership.** Case studies are a powerful way to showcase leadership. Quantitative information such as technologies used, capital cost, payback in years, GHG emissions saved—as well as qualitative information—are useful to building owners and managers. Michele Leembruggen, Green Buildings Coordinator, City of Melbourne

**Challenge them!** DC has recently created two sector challenges designed to create friendly competition among leading economies and community sectors, like embassies and universities. Daniel Barry, Senior Climate Policy Analyst, Washington DC

**Make permitting processes easier for green buildings or renewable energy.** A recent study done for solar company SunRun showed that simpler solar permitting processes by municipalities could lead to installation of additional 132,000 systems in California, a 13% increase relative to market projections based on current permitting practices.<sup>1</sup> Alexander Quinn, Sustainable Economist, AECOM

Based on interviews

<sup>1</sup>: "Economic and Fiscal Impact of Residential Solar Permitting." AECOM, 2011. See <http://www.sunrunhome.com/solar-lease/cost-of-solar/local-permitting/>

Fig. 21 Methods of funding emissions reduction activities, by funding source (% of responses).

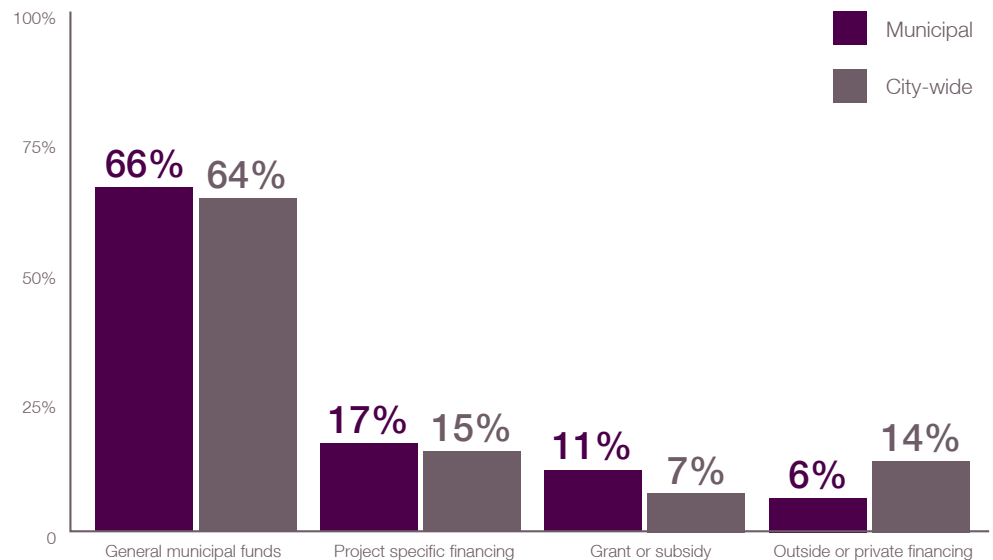


Fig. 22 Projects for which cities are seeking private financing.

## Rio de Janeiro

- Implementation of GHG Emissions Monitoring System
- Expansion of selected waste collection and reforestation actions
- Decarbonization of Mega Events
- Implementation of electric cars rental system, installations and necessary urban furnishing
- Expansion of bike-sharing system already deployed

## Portland

"In February 2012 the City released a Request for Proposals for Private-Sector Partnerships to Finance Community-Supported Solar Electric Systems on Public Facilities. The project will include leverage from the private sector coupled with a revenue stream from Oregon's Volumetric Incentive Rate for solar electricity generated at eight City of Portland and Portland Public School facilities. The total installed capacity for this pilot project will be up to 75 kW by the end of 2012."

## Karachi

"Traffic signal, LED lights, Solar Panel, Wind Energy Projects, treatment plants, landfill development."

## Durban

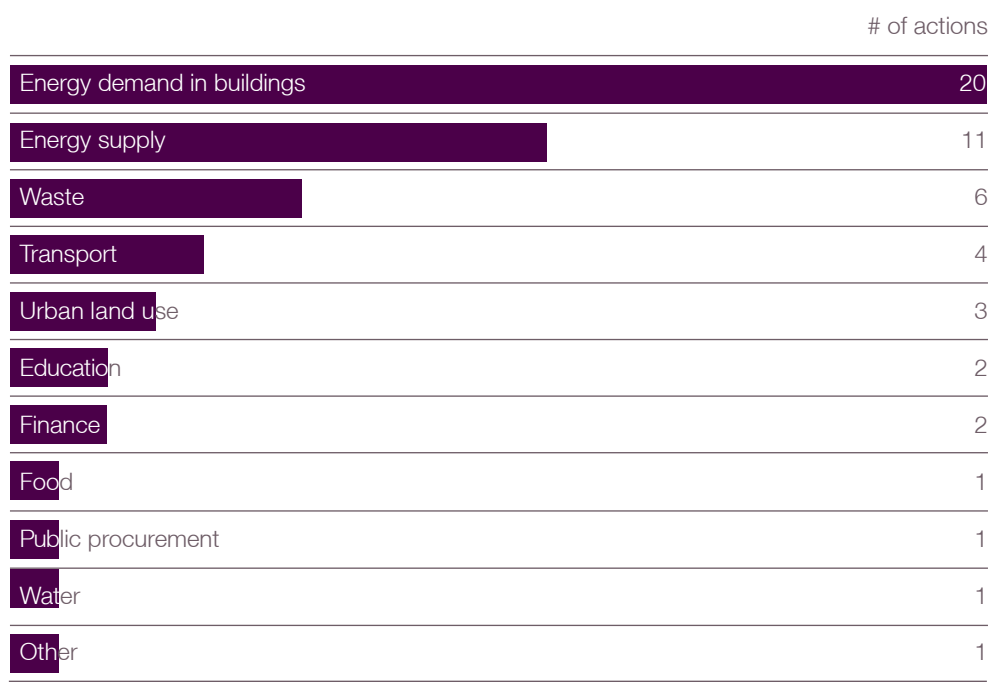
- Methane Recovery to Gas Electricity
- Hydro Electricity Power
- Further roll-out of residential solar water heaters

## Hong Kong

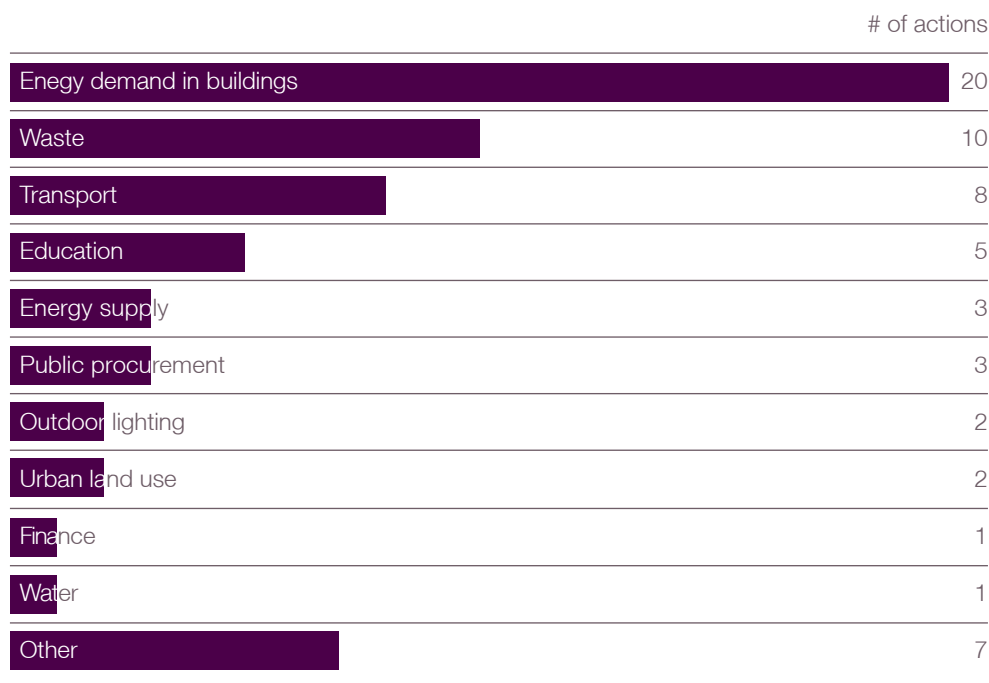
"On use of renewable energy, the two power companies in Hong Kong have been actively exploring the feasibility of solar energy and wind energy generation, including the development of commercial scale offshore wind farms in Hong Kong waters. We have also been encouraging the private sector to put in place charging facilities for use by Electric Vehicles."



**Fig. 23** City-wide emissions reduction actions that are financed from outside or private financing, by category (# of actions).



**Fig. 24** City-wide emissions reduction actions that utilize incentives and/or disincentives to affect behaviors, by category (# of actions).



## Up close

# How do you make your city attractive for property developers?

Cities often look for ways to make their cities attractive investment locales. Attracting high-quality private-sector development can help the city meet myriad environmental goals.

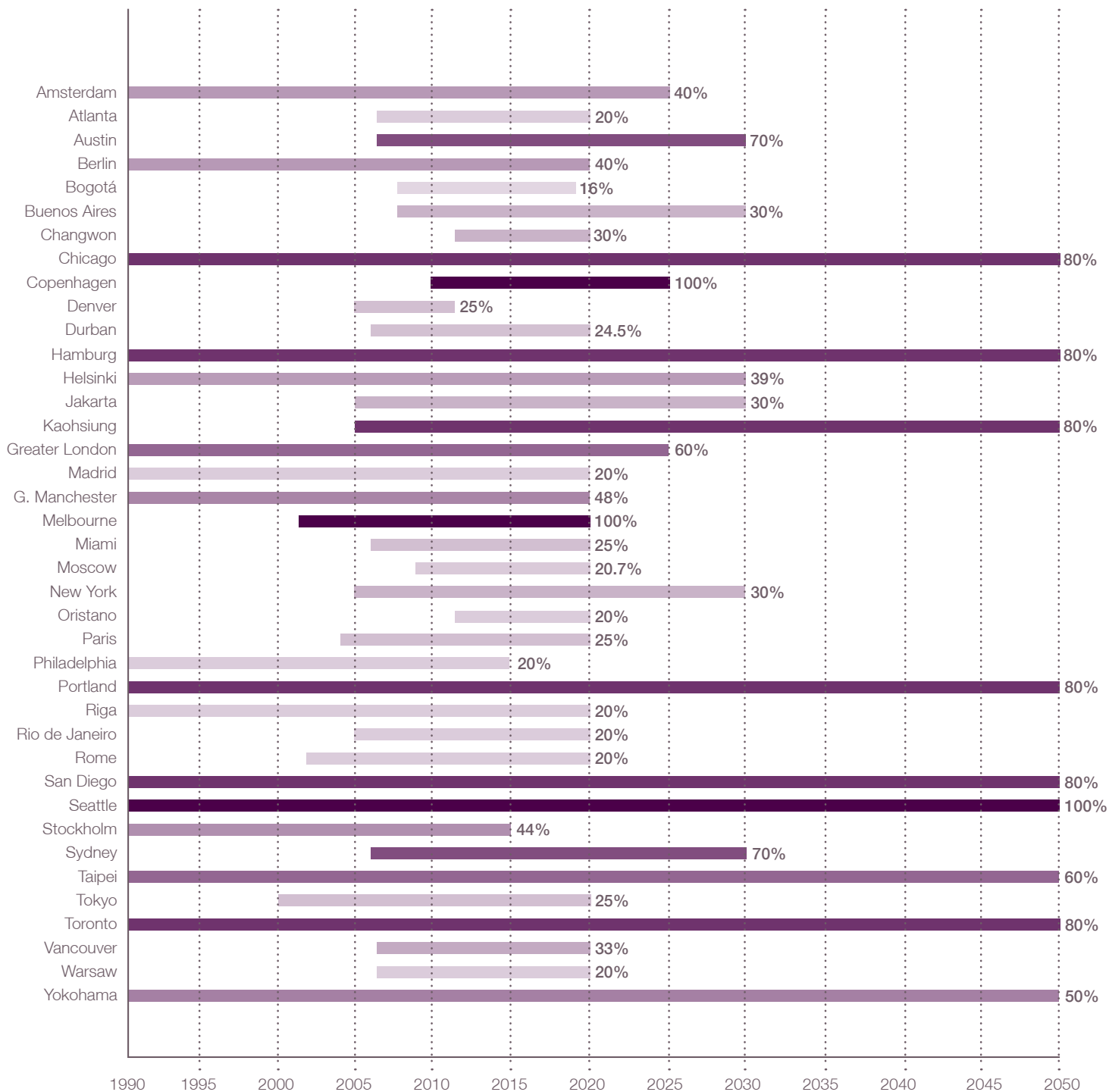
**Smooth, just and responsive regulatory environment:** the framework must be flexible enough to meet changing demands, yet steady enough for long range planning. Developers look for certainty and predictability in the regulatory environment, as well as expert topical knowledge and timeliness during the process. An innovative and responsive city government will provide multi-faceted support to its development community, but those facets center on one key tenet: allowing developers to complete their work in an expedient fashion.

**High-quality amenities are pivotal.** The city can nurture attractiveness by assuring that financial vehicles like community amenity contributions are well-spent on amenities that bring value to both community and developer.

Malcolm Shield, PhD, City of Vancouver with input from David Ramsle, Mark Hartman, and Tamsin Mills, City of Vancouver.

Based on interviews

**Fig. 25** City-wide emissions reductions targets, by city (% planned reduction).




**Range of reduction target**

10% 50% 100%

Shaded on scale by percent.

Note: Where cities report multiple targets, the longest term target is shown.



**“The Agency, together with the City of Buenos Aires Bank, grants credits with subsidized rates to SMEs (small and medium enterprises) working on environmental improvement projects. Moreover, within the framework of the incentives program, the Agency is working since 2008 in the granting of non-refundable contributions for SMEs working toward more sustainable production (29 have been granted since 2008 with a maximum of AR\$60,000 per project).”**

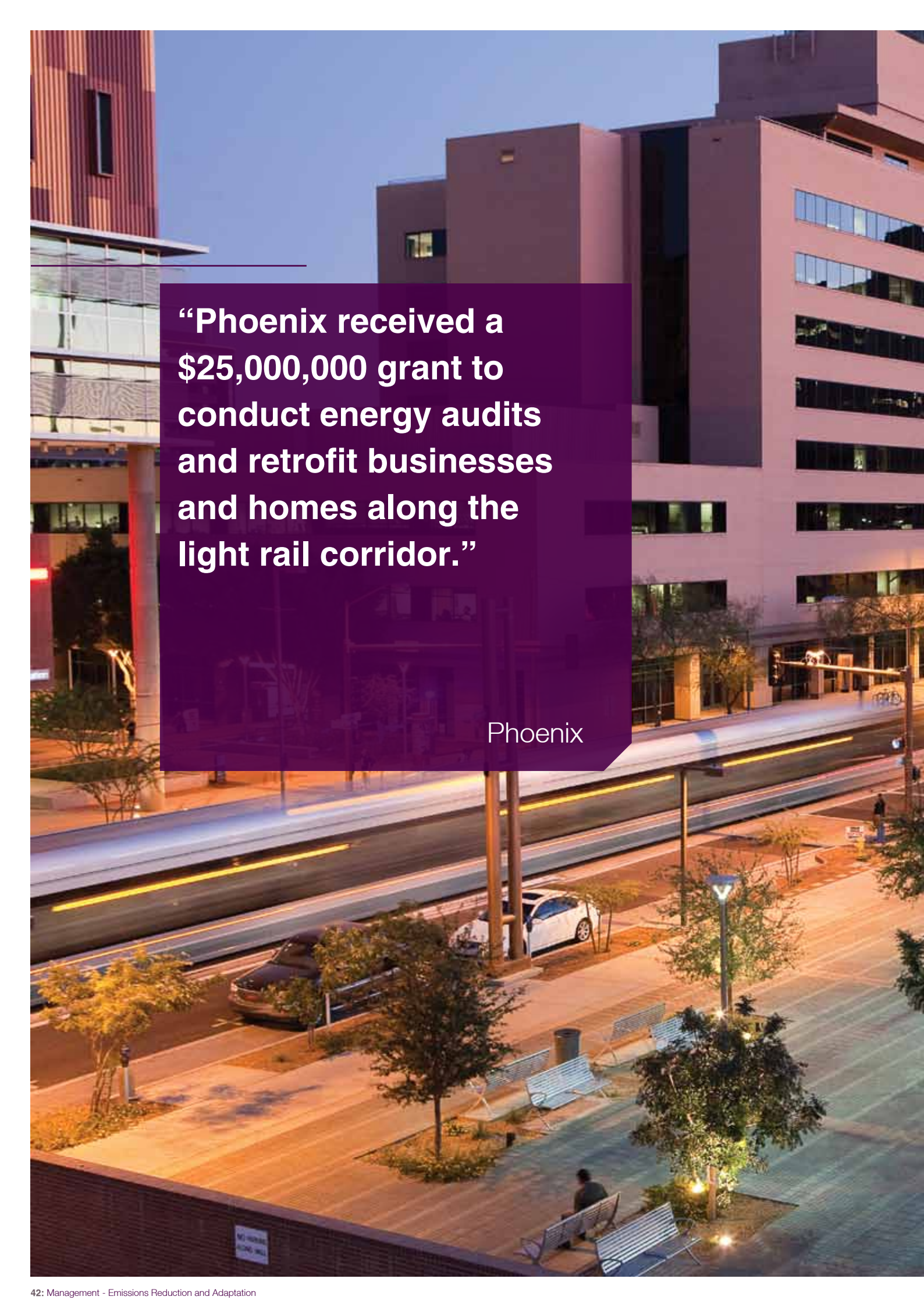
Buenos Aires

### **Kaohsiung**

“We put lots of efforts in the issue of wetland conservation to resolve the environmental issues caused by air pollution and CO<sub>2</sub> emission. The total area of wetlands in the city is greater than 50 million m<sup>2</sup>, and the Neweipi wetland built in 2005 is the one with the most abundant species.”

### **Houston**

“The City of Houston launched the Energy Efficiency Incentive Program allowing eligible commercial building owners to apply for funding to make energy efficiency improvements and reduce utility expenses and greenhouse gases. The City has committed approximately \$3 million for the program and will provide incentives to offset the up-front implementation costs.”



**“Phoenix received a \$25,000,000 grant to conduct energy audits and retrofit businesses and homes along the light rail corridor.”**

Phoenix



## Basel

“For over 20 years, the canton of Basel-Stadt has had a special source of financial revenue in the form of the incentive levy. Since 1984, an additional charge of about five percent has been made on all electricity bills in the canton. This money is put towards renovating buildings and promoting renewable energy sources for buildings which are located in the Canton Basel-Stadt.”



## Miami

“In 2009 the City of Miami in partnership with General Electric, Cisco Systems, Florida Power & Light and Silver Spring Networks launched a smart grid project developed to deploy smart meters on every home and most businesses in Miami-Dade County.”



## Greater London

“The Mayor has used EU funding to create the London Green Fund, a revolving fund which will finance decentralised energy and energy efficiency projects. £100 million available to support energy efficiency and supply projects in public sector buildings. See [www.leef.co.uk](http://www.leef.co.uk).”



## Managing Adaptation

Cities are undertaking a wide variety of initiatives aimed at reducing their risks from climate change. Creation of green space (including tree planting) is the most commonly cited individual adaptation to climate change activity, with 42% of cities reporting at least one action in this area. Storm water capture is the second most common individual action, with 41% of cities reporting installation of or improvements to a capture system.

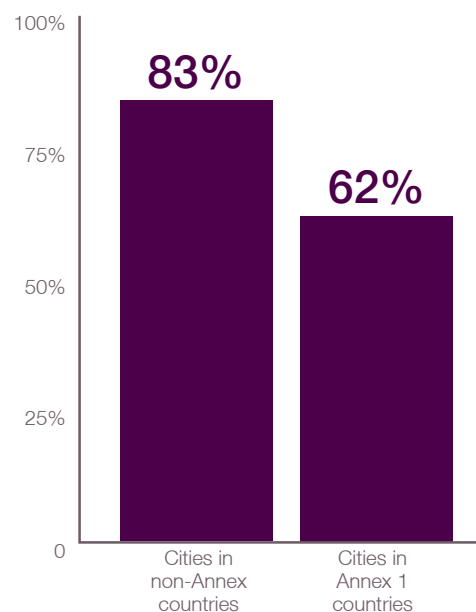
However, cities also report significant activity related to the built environment. 32 cities report initiatives in the built environment category—green roofs, white roofs, building resistance measures, and protecting land from development. Tokyo’s adaptation actions are impressive—the city reports 15 individual adaptation actions, from promoting green roofs and walls to combat urban heat island to outreach campaigns to educate citizens about the dangers of heat stroke and vector-borne diseases.

Cities in developing countries are more likely to report planning for climate change than cities in the developed world. 83% of cities in non-Annex countries report having a plan for increasing the city’s resilience to climate change, compared to 62% of cities in Annex 1 countries. African and East Asian cities are likely to have a resiliency plan, with nearly 90% of African cities and 100% of East Asian cities reporting a plan. North American cities lag slightly behind the rest of the regions—57% of North American cities have created a resiliency plan, compared to 75% of all non-North American cities.

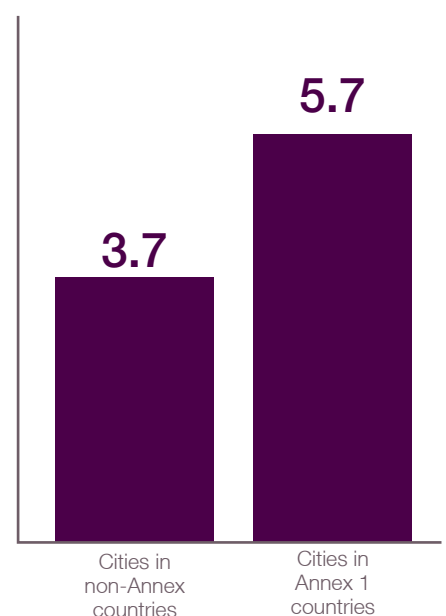
Developing cities outperform on resilience planning, but have not yet been able to convert the planning to action. Cities in developed nations report on average 5.7 adaptation actions per city, while cities in developing nations report around 3.7 actions per city.

Like emissions reduction actions, cities are primarily financing adaptation themselves. 77% of adaptation actions rely primarily on general municipal budgets, with public health and crisis management the most likely categories to be funded out of municipal budgets.

**Fig. 26** Cities with plans for increasing resilience to climate change, by UNFCCC status (% of cities).



**Fig. 27** Average number of adaptation actions, by UNFCCC status (# of actions).





## Up close

# Can cities use real estate strategies to deal with climate change threats?

Yes. Every major urban project under way today should include sustainability considerations and address climate change risks. Increasingly, environmental issues are part of the motivation for cities to act, but even where the main goal is to accommodate population growth or to renew an area in economic decline, sustainability is a key issue to be addressed in part through leading-edge real estate planning and development programs.

Cities need smart real estate planning and development to manage their fast-growing populations, alleviate stresses on resources and infrastructure, and combat the effects of climate change. This takes many forms. For instance, Boston on the East Coast of the United States is raising the foundations of a water treatment plant and other buildings that are close to sea level, in anticipation of rising sea levels. Other U.S. cities are creating 'eco-districts', neighborhoods with incentives and infrastructure to foster energy efficiency and sustainability.

Jones Lang LaSalle works with several cities worldwide to integrate land-use and real estate strategies with sustainability efforts around major projects, from global events such as the London Olympics to renewal programs such as the World Trade Center site in New York to transportation systems that allow urban residents to get around more efficiently.

**Dan Probst, Chairman of Energy and Sustainability Services, Jones Lang LaSalle**

Based on interviews

**Fig. 28** Planning and construction of built environment adaptation actions (# of actions).

	# of actions
Green roofs	19
Building resilience and resistance measures	16
Cooling systems for critical infrastructure	9
Restrict development in flood risk areas	7
White roofs	6
Shading in public spaces, markets	4
Retrofit of existing buildings	3
Protect land from development	2

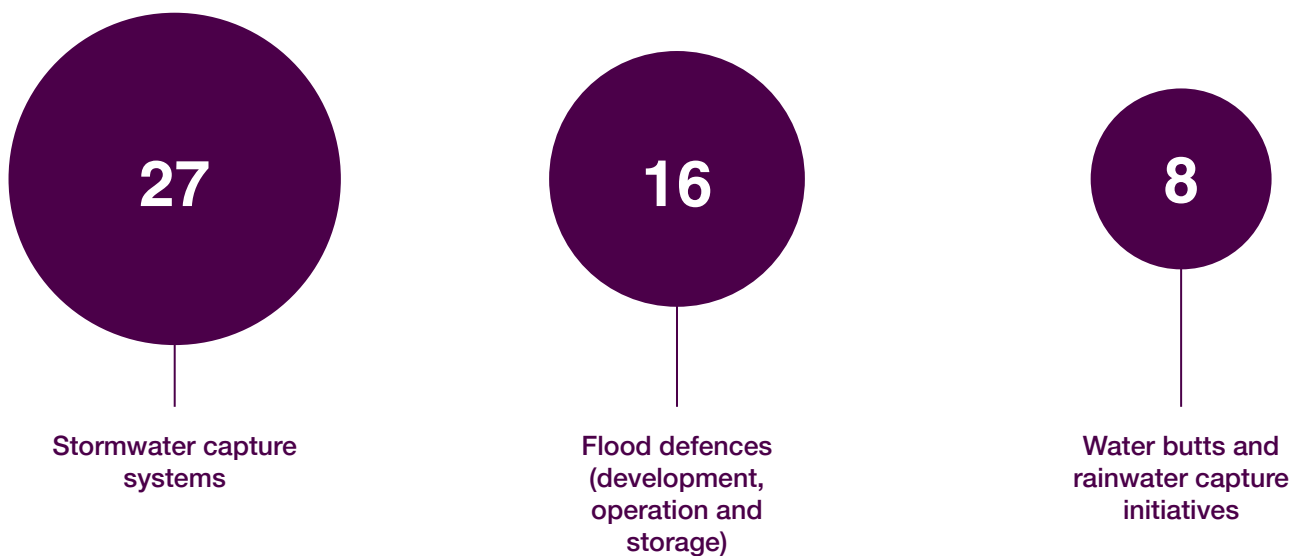
See the interactive version of this chart— including more detail on adaptation actions and other reported information from cities— at [www.cdproject.net](http://www.cdproject.net)

**Fig. 29** Three most popular adaptation actions reported by cities for each risk family (# of actions).

## How are cities adapting to risks from temperature increase / heat waves?



## How are cities adapting to risks from frequent / intense rainfall?





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## How are cities adapting to risks from drought?

12

Awareness campaigns or educational initiatives to reduce water use

6

Water supply diversification programs

4

Actions for additional reservoirs and wells for water storage

---

## How are cities adapting to risks from sea-level rise?

6

Flood defence system developments

4

Building resilience and resistance measures

3

Restrictions of development in flood risk areas

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## How are cities adapting to risks from storms / floods?

11

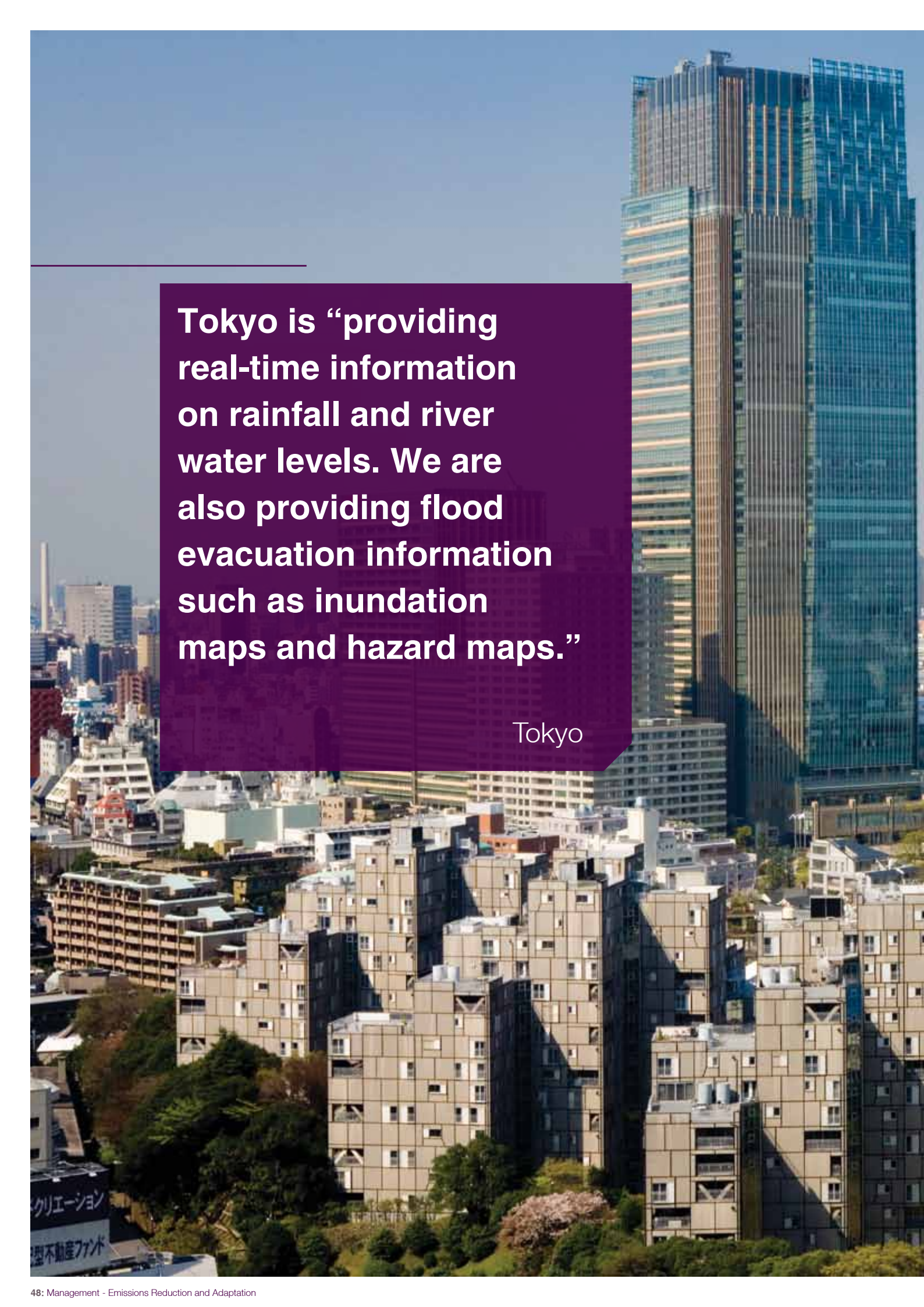
Crisis management programs, including warning and evacuation systems

8

Crisis planning and practice exercises

7

Flood defence development, operation and storage programs

An aerial photograph of a dense urban area in Tokyo. In the foreground, there are several multi-story apartment buildings with a grid-like facade. In the background, a tall, modern skyscraper with a blue glass facade stands out against the sky. The text is overlaid on a dark purple rectangular background in the center-left of the image.

**Tokyo is “providing real-time information on rainfall and river water levels. We are also providing flood evacuation information such as inundation maps and hazard maps.”**

Tokyo

## Durban

Durban's tree planting project "is about restoring natural indigenous forest to buffer adjacent indigent communities from climate change impacts, like flooding, whilst providing these communities with employment."



## Kaohsiung

"Kaohsiung is committing to the effective integrated drainage system management. The city plans to build 4 retention ponds within 5 years which are expected to store 1,000,000 tons of storm water."



## Caracas

"We have increased capacity and improved maintenance of stormwater drains in the city. Also, community awareness activities are organized by the Metropolitan Risk Committee."



# C40 Cities

Special Report

## Special Report on C40 Cities

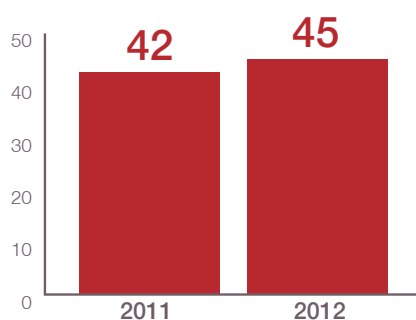
**For the second year, CDP and C40 collaborated** to invite the member cities of the C40 Cities Climate Leadership Group to report through CDP's system. C40 Chair and New York City Mayor Michael R. Bloomberg invited 58 C40 cities (40 participating cities and 18 affiliate cities)<sup>1</sup> to report their climate change-related data to CDP by responding to an online questionnaire.

The following section is a review of the self-reported actions from this year's questionnaire. CDP's annual process enables C40 to continue to expand upon its landmark benchmarking and research efforts to build and maintain a comprehensive inventory of city driven action on climate change and to track progress and impact over time. This year's results demonstrate continued leadership and significant improvement from C40 cities.<sup>2</sup>

**Fig. 31** Key metrics for C40 cities, 2011 vs. 2012.

	2011	2012
<b>C40 Cities reporting</b>	<b>42</b>	<b>45</b>
<b>C40 Cities reporting municipal emissions (%)</b>	<b>45%</b>	<b>42%</b>
<b>C40 Cities reporting city-wide emissions (%)</b>	<b>67%</b>	<b>78%</b>
<b>C40 Cities reporting city-wide reduction targets (%)</b>	<b>62%</b>	<b>71%</b>
<b>C40 Cities reporting Scope 3 emissions (%)</b>	<b>14%</b>	<b>29%</b>
<b>C40 Cities reporting verified emissions (%)</b>	<b>17%</b>	<b>24%</b>

**Fig. 30** Number of C40 Cities reporting to CDP, by year.



<sup>1</sup>: Reflects the number of members/affiliates as of November 2011. As of June 2012, 59 cities comprise C40 (40 participating cities and 19 affiliate cities).

<sup>2</sup>: Including "Climate Action in Mega-Cities," Arup, 2011. C40 commissioned Arup to undertake the first ever comprehensive analysis of climate action in mega-cities, which analyzes in detail climate actions across C40 member cities. See <http://live.c40cities.org/storage/ARUP%20REPORT%20%20Climate%20Action%20in%20Megacities.pdf>

## Trend Watch

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**A stronger commitment.** C40 cities show an improved commitment to annual disclosure this year. Forty-five C40 cities report on their climate change activities this year, up from 42 cities last year. 78% of all C40 cities now report via CDP. The composition of these cities has changed slightly, but overall C40 cities show a strong and increased commitment to transparent, annual public reporting on climate change.

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**Some new cities.** Rome, Stockholm, Istanbul, Madrid, Paris, and Barcelona report this year for the first time.

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**Better measurement.** Fifteen C40 cities report updated city-wide emissions inventories, demonstrating world-class leadership in annual assessment of their greenhouse gas emissions. Eight of those cities report reductions in emissions from last year. The cities reporting emissions reductions are all located in highly developed nations.

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**More measurement and reporting.** More C40 cities are measuring and reporting city-wide emissions inventories. Thirty-five cities (78% of reporting C40 cities) report emission inventories this year, up from 28 last year, a 16% increase.

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**More reduction targets.** More C40 cities are setting emissions reduction targets. Thirty-two C40 cities (71% of reporting C40 cities) now report an emissions reduction target, up from 27 last year. Cities including Bogotá and Changwon report targets this year for the first time. C40 cities as a whole also report targets at a higher rate than the average for all cities, which is 63%.

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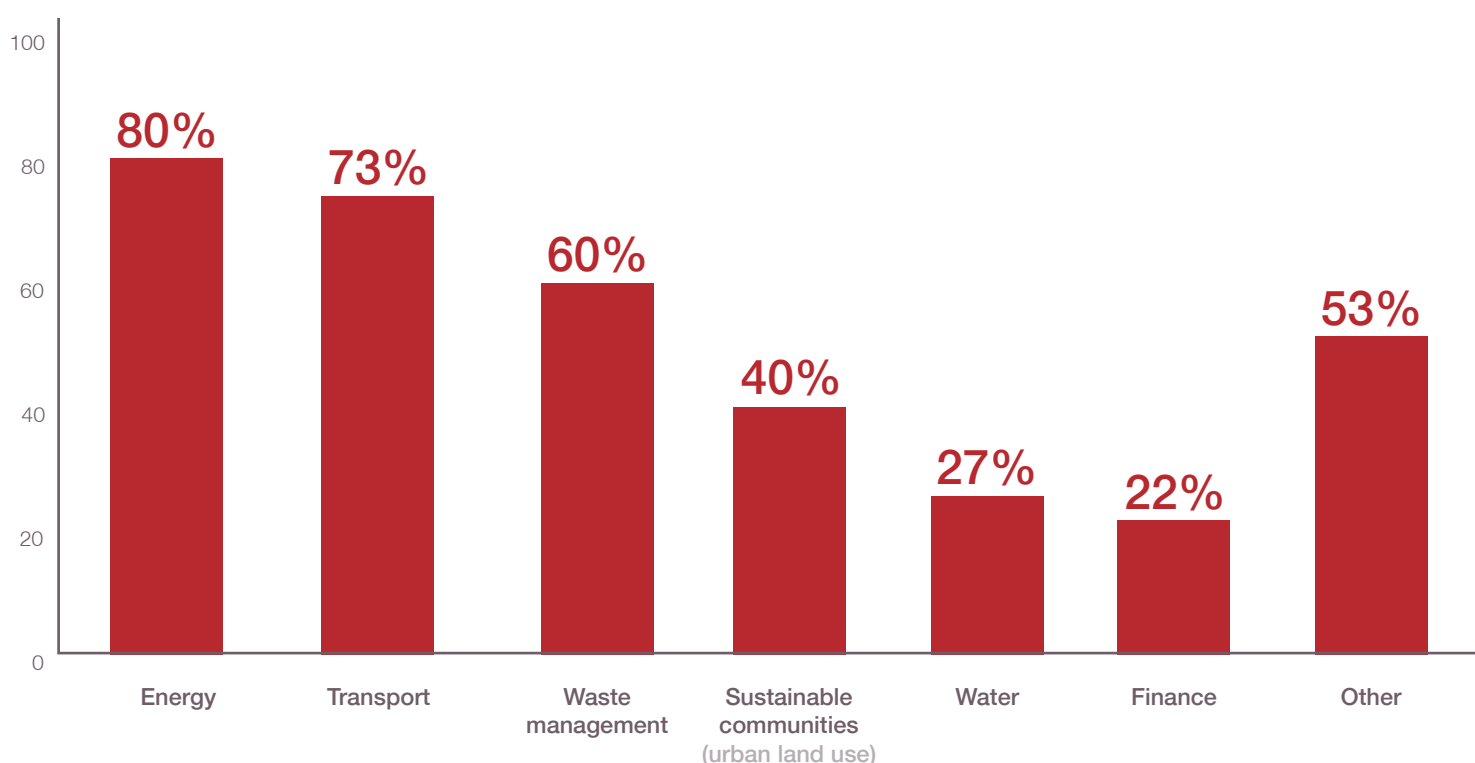
**All reporting cities are taking actions to reduce their emissions.** Every C40 city reports at least one emissions reduction activity. The most common actions reported are in the areas of energy and transport. 80% of C40 cities disclose actions in the energy sector, while 73% disclose actions related to transportation. All told, C40 cities report 489 total actions designed to reduce emissions.

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**The importance of the C40 network.** Our analysis points to the existence of a “network effect” for cities of the C40. On several key criteria, C40 cities outperform the overall average, suggesting that there may be a relationship between C40 participation/affiliation and higher awareness of the risks and opportunities of climate change. For instance, C40 cities are more likely to identify economic opportunities from climate change than cities not in the network.

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**Fig. 32** City-wide emissions reduction activities reported by C40 cities, by category (% of cities).



**Note:** The energy category is comprised of actions reported under Energy demand in buildings, Energy supply and Outdoor lighting. Sustainable communities is made up of actions in the Urban land use category. The other category includes actions reported under Education, Public procurement, Food and Other.

**Fig. 33** Map of C40 Cities.

	City		City		City		City
1	● Addis Ababa	16	● Copenhagen	31	● Greater London	46	● Rotterdam
2	● Amsterdam	17	● Curitiba	32	● Los Angeles	47	● San Francisco
3	○ Athens	18	○ Dhaka	33	● Madrid	48	● Santiago
4	● Austin	19	○ Delhi	34	● Melbourne	49	● São Paulo
5	● Bangkok	20	○ Hanoi	35	○ Mexico City	50	● Seattle
6	● Barcelona*	21	○ Heidelberg	36	● Milan*	51	● Seoul*
7	● Basel	22	○ Ho Chi Minh City	37	● Moscow	52	○ Shanghai
8	○ Beijing	23	● Hong Kong	38	○ Mumbai	53	○ Singapore
9	● Berlin	24	● Houston	39	○ New Orleans	54	● Stockholm
10	● Bogotá	25	● Istanbul*	40	● New York	55	● Sydney
11	● Buenos Aires	26	● Jakarta	41	● Paris	56	● Tokyo
12	○ Cairo	27	● Johannesburg*	42	● Philadelphia	57	● Toronto
13	● Caracas	28	● Karachi	43	● Portland	58	● Warsaw
14	● Changown	29	● Lagos	44	● Rio de Janeiro	59	● Yokohama
15	● Chicago	30	○ Lima	45	● Rome		

● Disclosing city  
 ★ Cities that report privately



**Note:** Singapore joined C40 after the 2012 disclosure cycle.



45

Responding C40 cities

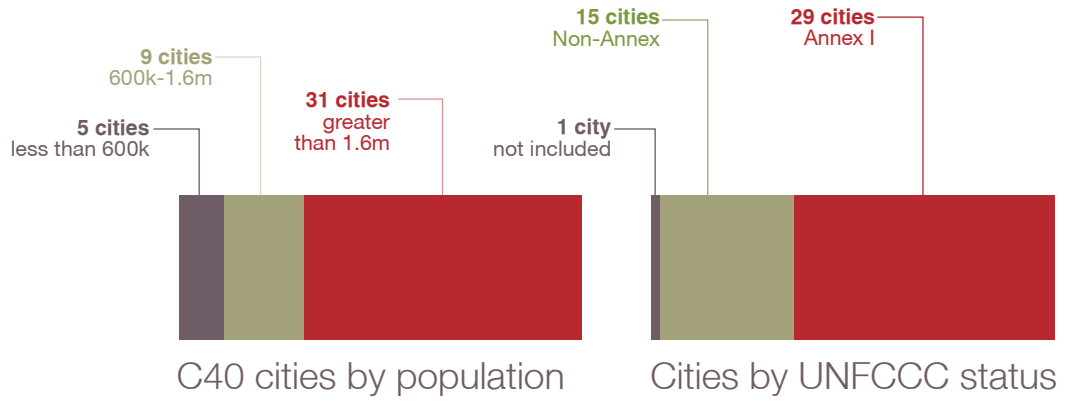
738,079,229

tonnes GHG

Total emissions reported

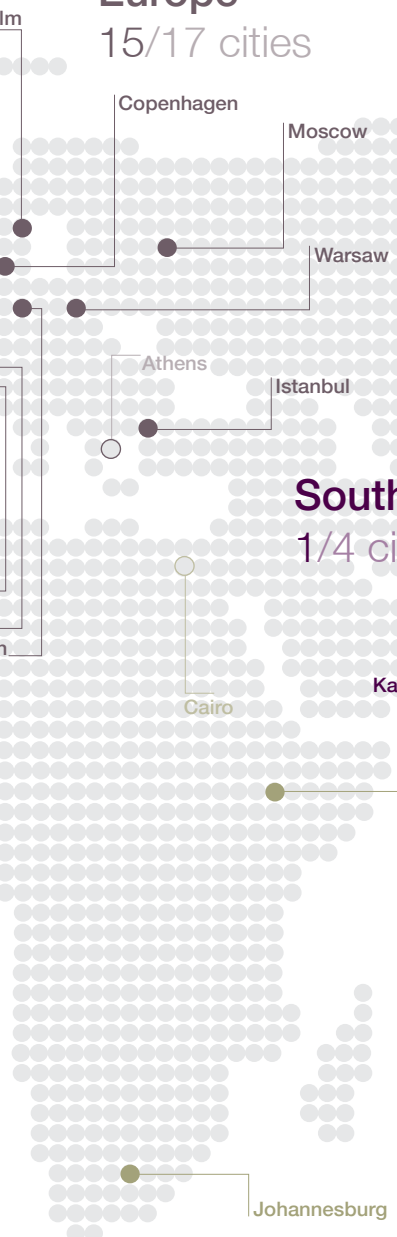
197,252,961

Total population of responding C40 cities



### Europe

15/17 cities



### South & West Asia

1/4 cities



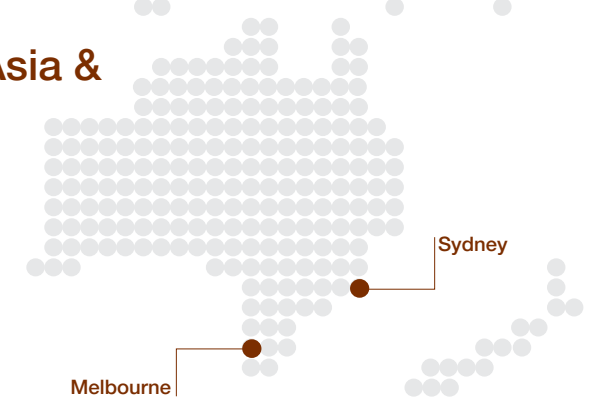
### East Asia

5/7 cities



### Southeast Asia & Oceania

4/7 cities



## C40 Initiative Areas

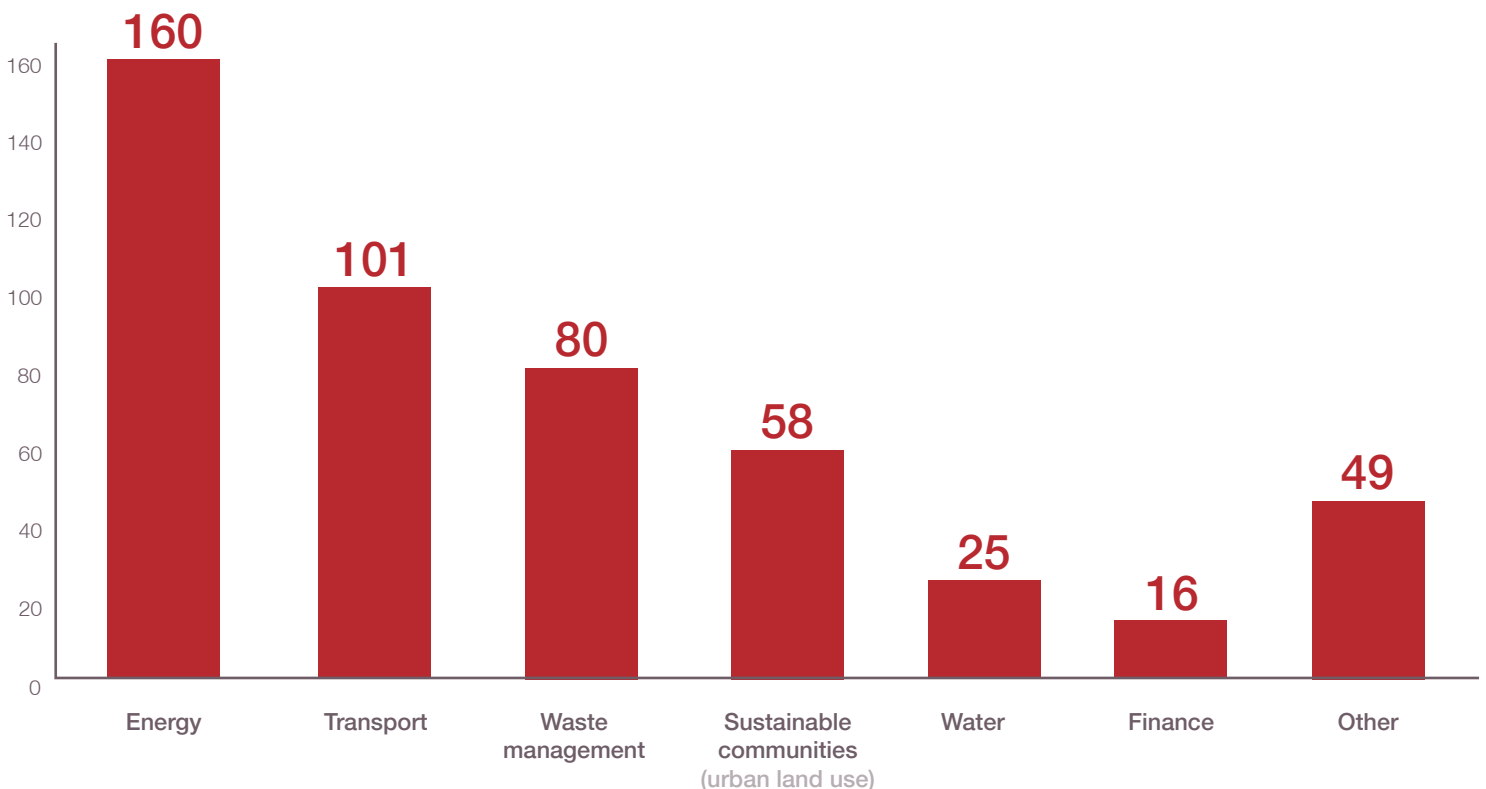
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In April 2012, C40 began its focus on seven initiative areas for its activities: Energy, Transportation, Waste Management, Sustainable Communities, Water Drainage and Infrastructure, Finance and Economic Development, and Measurement and Planning. C40 convenes networks of cities with common goals and challenges, providing a suite of services – peer-to-peer exchange; research & communication; and direct technical support.

C40 cities report 489 individual actions to reduce greenhouse gas emissions across all sectors in their responses to CDP this year. We have analyzed all the actions reported by C40 cities to CDP this year and grouped them into categories that map to the seven C40 initiative areas.

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**Fig. 34** City-wide emissions reduction actions reported by C40 cities, by category (# of actions).



**Note:** The energy category is comprised of actions reported under Energy demand in buildings, Energy supply and Outdoor lighting. Sustainable communities is made up of actions in the Urban land use category. The other category includes actions reported under Education, Public procurement, Food and Other.

# Energy

C40's Energy Initiative has four broad areas of focus: building retrofits, outdoor lighting, other city infrastructure investments (including district and distributed energy) and city-owned utilities. Of all emissions reduction actions reported by C40 cities this year, actions related to these areas are the most frequently cited. 80% of C40 cities report some 160 total actions related to energy, comprising about 33% of all reported C40 emissions reduction activities.

C40 action on energy efficiency and building retrofits is mature, especially among developed cities. Energy efficiency/retrofit is the most popular demand-side energy action reported by C40 cities. Many of these actions are already in place at a transformative scale in developed cities. London's RE:FIT program, for example, has already retrofitted 86 public buildings in the city, and the program is ongoing. Rome's energy efficiency program is saving 600,000 tonnes of CO<sub>2</sub>e over lifetime. Sydney reports a whole host of energy efficiency programs, estimated to be saving 321,000 tonnes CO<sub>2</sub>e per year by 2030.

C40 cities are making investments in Combined Heat and Power (CHP). CHP is the most popular single action reported in the energy supply category. 31% of C40 cities report CHP projects at a city-wide level. European and Australian cities in particular report significant activity using CHP: Melbourne, for instance, encourages the installation of combined heat and power in private developments, with a target to achieve 400MW of installed, distributed CHP in the city. Rome expects to save 50,000 tonnes CO<sub>2</sub>e from installing CHP in a hospital. And Berlin is using CHP to support its district heating system.

**Fig. 35** City-wide emissions reduction energy activities reported by C40 cities, by status (# of actions).

Activity	Currently in-effect at a transformative scale across the entire city	Currently in effect and being piloted	Currently in-effect at a significant scale across most of the city	Still under current consideration or awaiting final authorization	No information provided	Total
<b>Energy</b>	49	44	33	16	18	<b>160</b>
Energy demand in buildings	33	33	23	5	11	<b>105</b>
Energy supply	12	5	5	10	6	<b>38</b>
Outdoor lighting	4	6	5	1	1	<b>17</b>

**Fig. 36** City-wide emissions reduction energy activities reported by C40 cities, by type of initiative (# of actions).

Activity	Mostly project or program based	Mostly mandate, regulatory, or policy-driven	Utilizes (dis)incentives to affect behaviors	Based around the collection of data or information	Other	No information provided	Total
<b>Energy</b>	62	43	18	14	1	22	<b>160</b>
Energy demand in buildings	39	29	15	8		14	<b>105</b>
Energy supply	13	11	2	5	1	6	<b>38</b>
Outdoor lighting	10	3	1	1	0	2	<b>17</b>

**Fig. 37** City-wide emissions reduction energy use activities reported by C40 cities (% of cities).

	% of cities
Energy Demand in Buildings	76%
Energy Supply	47%
Outdoor Lighting	29%

Financing for reported energy-related actions is more diverse than for other action areas. Cities report a wider breadth of funding strategies to finance energy supply actions reported. Just one third of reported energy supply projects receive municipal funding, compared to much higher figures for other types of projects.

C40 is exploring new regional networks related to energy, with initial areas of focus around municipal and commercial retrofits, as well as codes and benchmarking. The Outdoor Lighting Program will be reformed into a C40 Network and will continue to provide high-level direct assistance on individual projects. Finally, C40 is exploring the establishment of a Municipal Utilities Network for cities that own and/or operate (in whole or in part) utilities, as well as networks to support clean energy, including district energy, solutions.



**“Buildings energy efficiency programs including Better Buildings Partnership (base buildings), City Switch Green Office Program (commercial office tenancies), Green Apartments, Smart Business Live Green (small to medium business) and others.”**

Sydney

### **Berlin**

“The district heating system was renovated and expanded to about 1,600 km of cable length and a total heat output of 7,683 MW. More than 600.000 homes are supplied from this network.”

### **Melbourne**

“The City’s 1200 Buildings program aims to catalyse the retrofit of private commercial buildings. The program offers reduced rate financing through an innovative lending mechanism whereby loans are secured through the Council’s property tax mechanism.”

# Transportation

73% of reporting C40 cities (33) disclose actions related to transportation. These 101 actions comprise 21% of all the emissions reduction activities reported by C40 cities. Some of these actions focus on improving the efficiency of existing transport networks, like Moscow's efforts to make its buses and freight systems more fuel efficient. But C40 cities are also undertaking ambitious transportation overhauls designed to make their cities less reliant on cars. Houston's light rail expansion—currently in pilot—will eventually include 5 new rail lines and connect each major activity center in the city. Portland's East Side Streetcar will open in 2012, and the city expects to soon begin work to connect this streetcar to even more areas of the city.

C40 cities report a significant number of actions on cycling and walking. The most frequently reported actions on transport are related to creating infrastructure for non-motorized transport. Twenty-five C40 cities report actions to encourage non-motorized transport options like walking and cycling in their cities, from the creation or expansion of bicycle lanes to cycle sharing programs. Rio de Janeiro anticipates that expanding its cycleway network will save 5,500 tonnes of CO<sub>2</sub>e over its lifetime. Seattle recently completed a master plan for both cycling and walking.

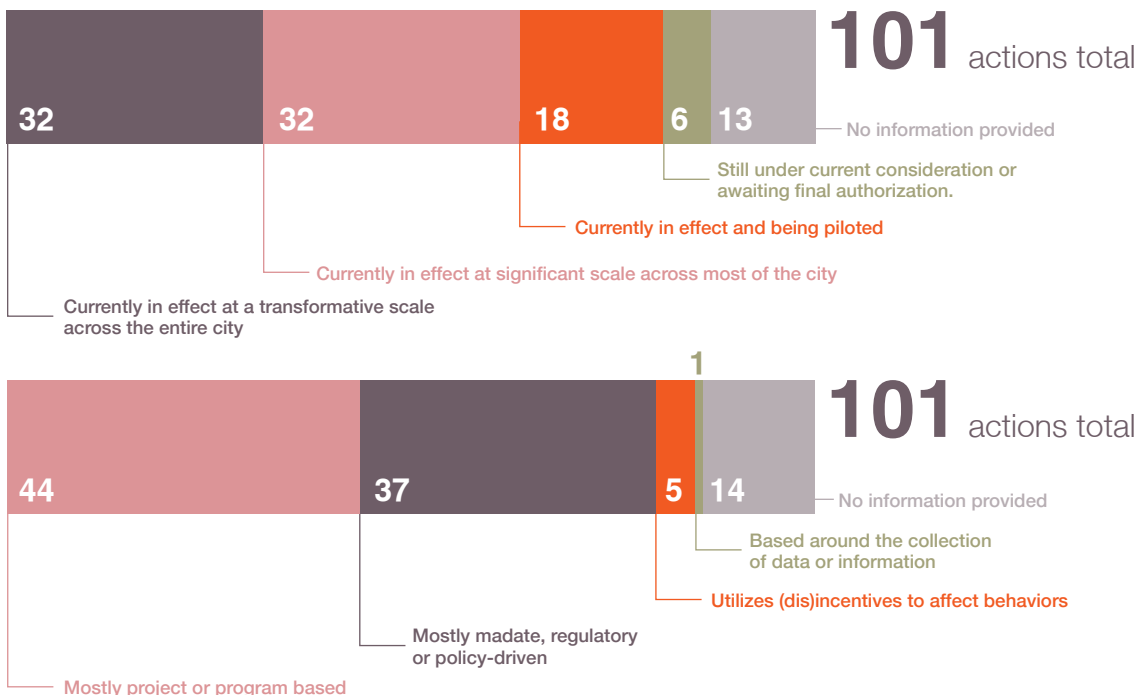
Like other emissions reduction activities, C40 cities report they are financing transport actions primarily from general municipal funds. However, there are some notable exceptions. Transport actions are also the second-most likely type of reported action to receive project-specific financing. The US Federal Government

## Ask me about... Quantifying GHG Reductions from Transport Projects

**Paris:** Paris estimates its efforts to improve its infrastructure for non-motorized transport will save the city up to 600,000 tonnes CO<sub>2</sub>e over their lifetime.

**Rio de Janeiro:** Rio provides estimates of the GHG reduction potential for every one of its transport actions, totalling an anticipated lifetime reduction of over 500,000 tonnes CO<sub>2</sub>e.

**Fig. 38** City-wide emissions reduction transport activities reported by C40 cities, by status, by type of initiative (# of actions).



## Up close

### The network effect

C40 cities demonstrate slightly more awareness about several key areas related to climate change than the non-C40 cities in this report. A number of factors may cause this finding, but one interesting possibility is that we may be seeing a quantifiable “network effect”, in which member cities of the C40 derive benefit (in this case, increased awareness of issues related to climate change) from other members.

**84% of C40 cities** (38 cities) report that climate change presents economic opportunities for their city, compared with 79% of non-C40 cities.

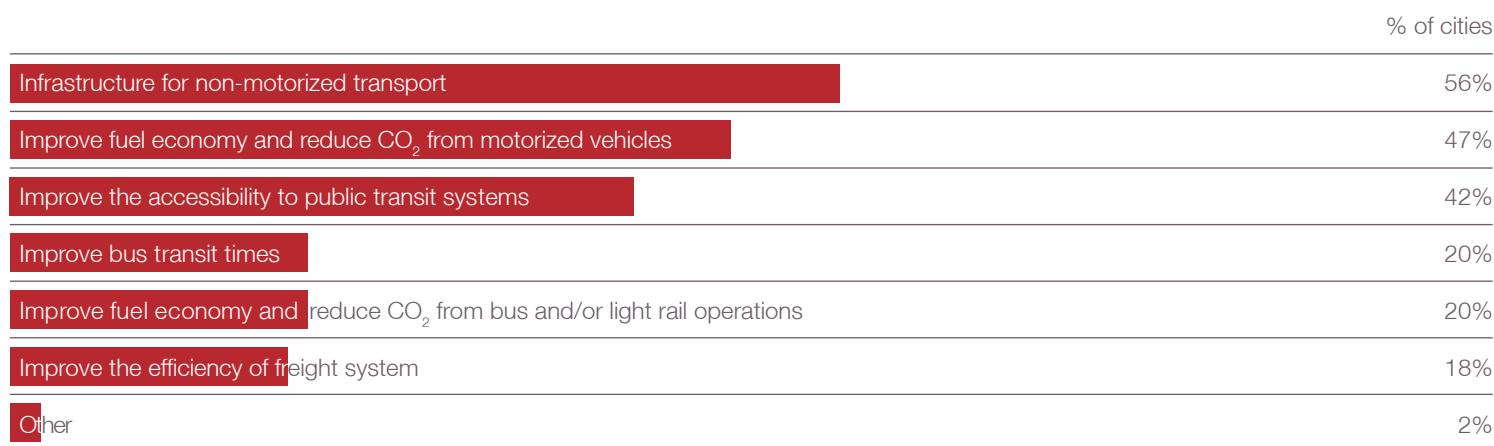
A higher percentage of C40 cities identify economic risks from climate change as well. **71% of C40 cities** report that they have identified economic risks from climate change, compared to 61% of non-C40 cities.

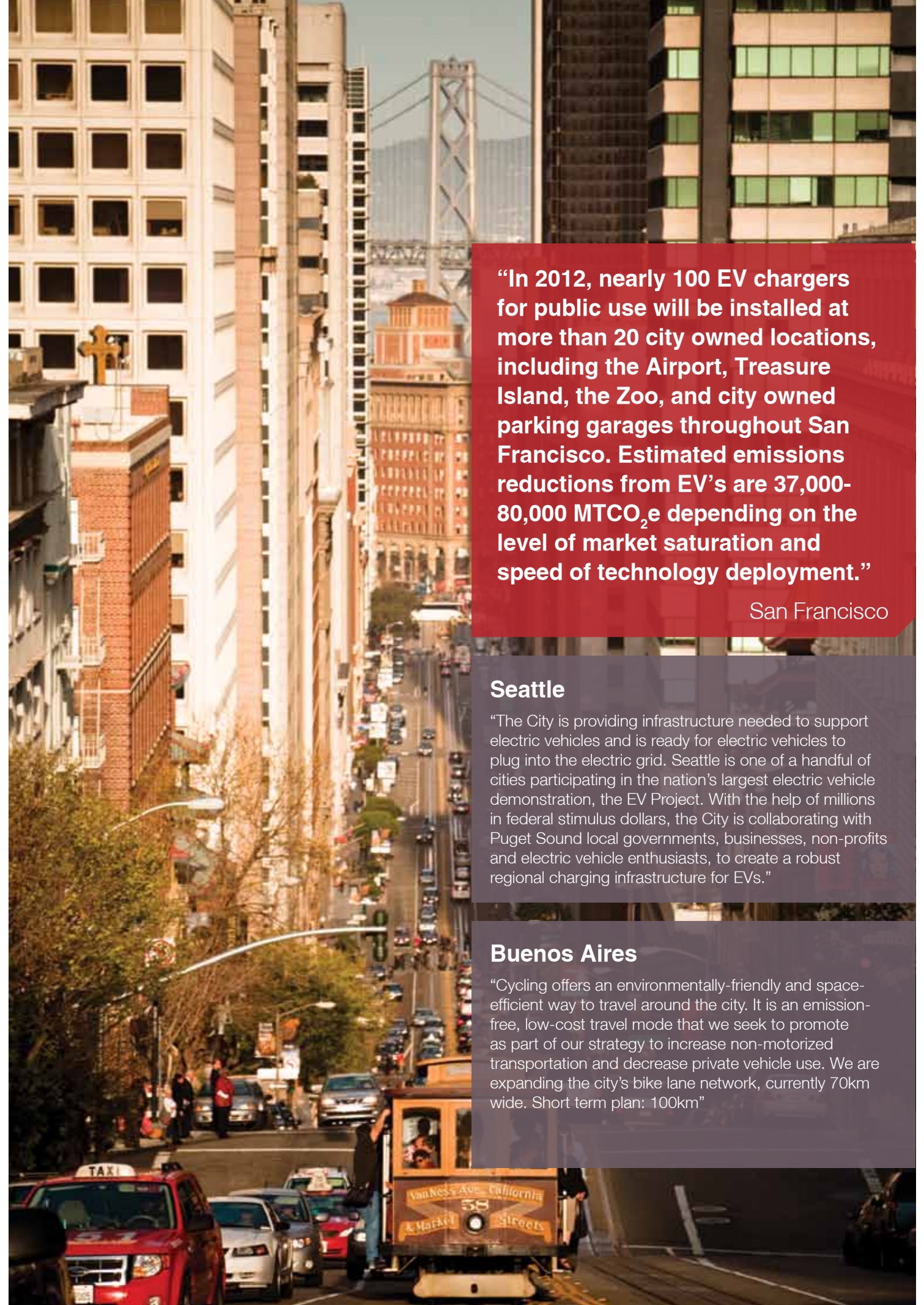
C40 cities are also engaging with their supply chains at a higher rate than non-C40 cities. **Over half of C40 cities** (51%) report activities with their supply chains, compared to 39% for non-C40 cities.

is part-financing Seattle’s Electric Vehicle (EV) infrastructure program, providing stimulus funding to help create a regional infrastructure to support EV vehicles. Rio de Janeiro is constructing a Bus Rapid Transit system using financing from the Brazilian Development Bank, among others.

C40’s Transportation Initiative focuses on personal mobility and low-carbon fleets. Existing and planned networks include the C40 Electric Vehicle Network, Non-Motorized Transport, Bus Rapid Transit, and Transportation Demand Management. In the future, the initiative will support a new network around the existing Hybrid Electric Bus Test Program in Latin America.

Fig. 39 City-wide emissions reduction transport activities reported by C40 cities (% of cities).





**“In 2012, nearly 100 EV chargers for public use will be installed at more than 20 city owned locations, including the Airport, Treasure Island, the Zoo, and city owned parking garages throughout San Francisco. Estimated emissions reductions from EV’s are 37,000-80,000 MTCO<sub>2</sub>e depending on the level of market saturation and speed of technology deployment.”**

San Francisco

## Seattle

“The City is providing infrastructure needed to support electric vehicles and is ready for electric vehicles to plug into the electric grid. Seattle is one of a handful of cities participating in the nation’s largest electric vehicle demonstration, the EV Project. With the help of millions in federal stimulus dollars, the City is collaborating with Puget Sound local governments, businesses, non-profits and electric vehicle enthusiasts, to create a robust regional charging infrastructure for EVs.”

## Buenos Aires

“Cycling offers an environmentally-friendly and space-efficient way to travel around the city. It is an emission-free, low-cost travel mode that we seek to promote as part of our strategy to increase non-motorized transportation and decrease private vehicle use. We are expanding the city’s bike lane network, currently 70km wide. Short term plan: 100km”

## Waste Management

60% of C40 cities report actions related to waste management, comprising 80 total actions, or 16% of all emissions reductions activities reported by C40 cities this year. These actions are diverse and ambitious: Bangkok is now collecting residential recyclables in local villages, and Warsaw reports on its work to modernize its waste facilities, which will eventually convert approximately 135,000 tons of waste into energy. Buenos Aires is running a pilot program to explore the benefit of putting trash containers on street corners in the city.

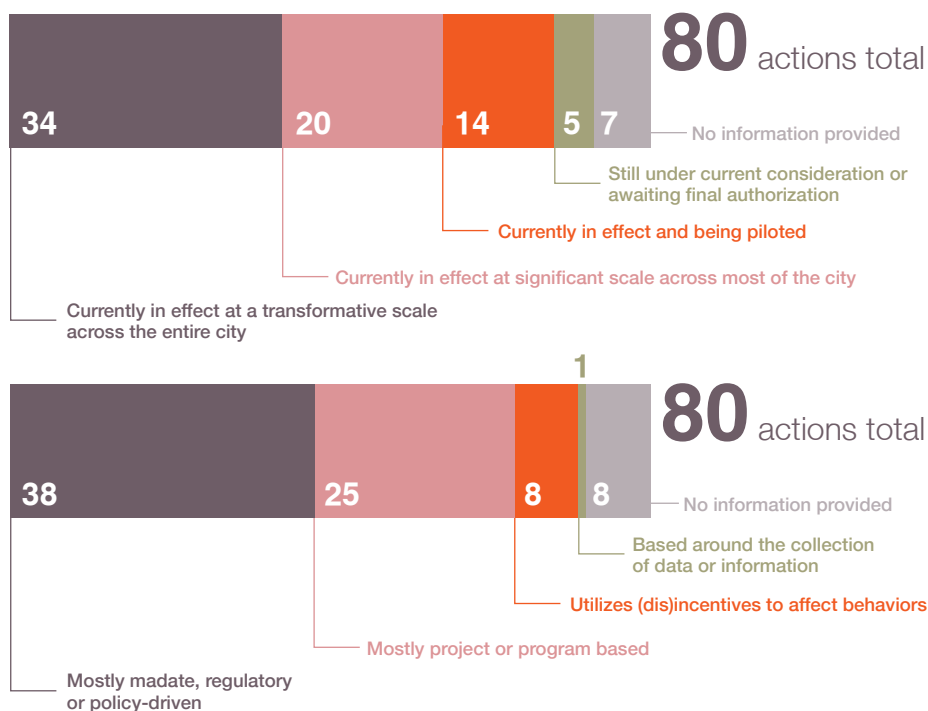
More than other initiative areas, waste management actions are among the most likely reported actions to be driven by regulation, mandates, or policies. These types of city policies drive over half of all waste actions reported by C40 cities, as cities seek to increase the uptake of recycling and other measures to reduce the amount of waste going to landfills. Seattle, for instance, rolled out an ordinance in July 2010 that requires that all take-away containers to be recyclable or compostable.

## Ask me about... Recycling

**San Francisco:** San Francisco is pursuing a goal of zero waste to landfill by 2020. San Francisco leads the USA with a 78% diversion rate from landfill, documented for 2009. This represents an annual reduction of disposal to landfill from over 850,000 tons in 2000 to under 450,000 tons in 2010, due primarily to the increasing amount of material being recycled and composted.

**Warsaw:** Warsaw is undertaking the extension and modernization of the waste-to-energy plant to 135,000 tonnes of capacity by 2015, expanding to 390,000 tonnes of capacity by 2020. Warsaw will also construct another plant by 2018. Overall, the planned share of energy from waste is expected to increase from less than 1% in 2009 to 8% by 2018.

**Fig. 40** City-wide emissions reduction waste management activities reported by C40 cities, by status, by type of initiative (# of actions).





General municipal funds tend to finance waste management actions reported by C40 cities. C40 cities finance 72% of reported waste actions out of their own budgets, higher than the overall average across all actions. Cities are more likely to look for outside funding for larger projects, like landfill gas capture, as in Bogota, Stockholm, and Changwon. C40 cities do not report any assistance from development banks, but Rio de Janeiro credits BNDES with financing in part its landfill gas capture project as well as its recycling initiative.

C40's Waste Management Initiative focuses on integrated waste management, converting waste into energy and products, and innovative policies, including zero waste and pay-as-you-throw.

**Fig. 41** City-wide emissions reduction waste management activities reported by C40 cities (% of cities).

	% of cities
Recycling or composting collections and/or facilities	42%
Waste prevention policies or programs	31%
Waste to energy	31%
Improve the efficiency of waste collection	29%
Landfill gas capture	16%
Integrated waste management	13%
Improve the efficiency of long-haul transport	4%
Other	2%

## Sustainable Communities

C40 cities are not just taking action on climate change on a sector-specific basis, but are also addressing climate change at the district and city-wide level. Cities report activities like land use planning, green space, and transit-oriented development to CDP under the broad category of “Urban Land Use.” C40 cities show a strong tendency to tackle climate change in these areas, especially among developed cities. Eighteen C40 cities (or 40% of reporting C40 cities) report emissions reduction activities relating to urban land use, comprising a total of 58 individual actions reported.

The most popular area of focus reported by C40 cities is adding/preserving green space. Fourteen C40 cities report 15 individual actions focused on green space and biodiversity. Rio de Janeiro is undertaking a comprehensive program to reduce deforestation in the city, coupled with a reforestation program. The city estimates that these two programs will save over 200,000 tonnes of CO<sub>2</sub>e. Eco-districts are also a popular area of focus for C40 cities. Paris, Tokyo and Melbourne are all currently piloting eco-district strategies. Paris estimates that its Eco-District strategy will save the city 250,000 tonnes of CO<sub>2</sub>e over its lifetime.

## Sustainable communities in action

The City of Melbourne is poised for dramatic growth over the next decade, with several large-scale regeneration and new development projects in planning or in progress, including Victoria Harbour, a C40 Climate+ Candidate. Guided by existing policy efforts, including Melbourne’s Zero-Net Emissions by 2020 and Total Watermark—City as a Catchment, the city is approaching such projects as opportunities to advance Melbourne’s overall sustainability goals through infrastructure improvements in renewable energy, wastewater, and transit, as well as innovative land use and densification strategies.

As such, Melbourne emerged as a natural leader for the Sustainable Community Initiative’s new Sustainable Urban Development Network, launched in March and chaired by Lord Mayor Robert Doyle.

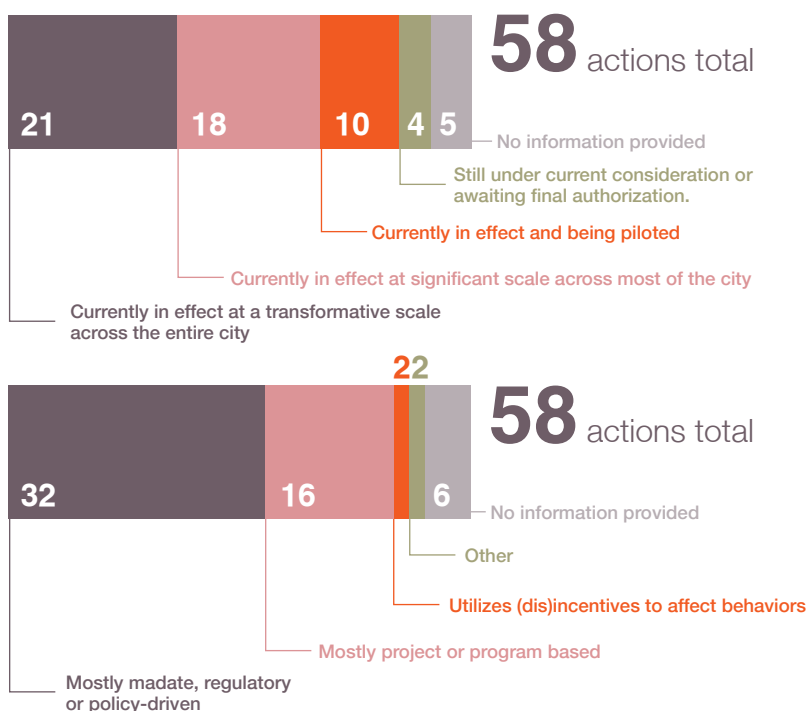
“We are striving to create communities that improve our city’s carbon footprint, climate resilience, and quality of life,” said Lord Mayor Doyle. “And we expect that our participation in C40’s networks will help inform our efforts through pragmatic benchmarks, robust research, and exchange of best practices.”

Written by Melbourne

Of the existing urban land use actions that C40 cities report, 40% are already in place at a transformative level across the city. These include actions like the development of Stockholm’s Royal Seaport, an eco-district development slated for completion in 2025, and Seattle’s Compact Cities strategy, which is part of the city’s overall Comprehensive Plan. With the exception of Rio de Janeiro, no developing cities report action related directly to urban land use. However, in other areas of their responses, both Addis and Lagos mention initiatives to increase the amount of green space in their cities.

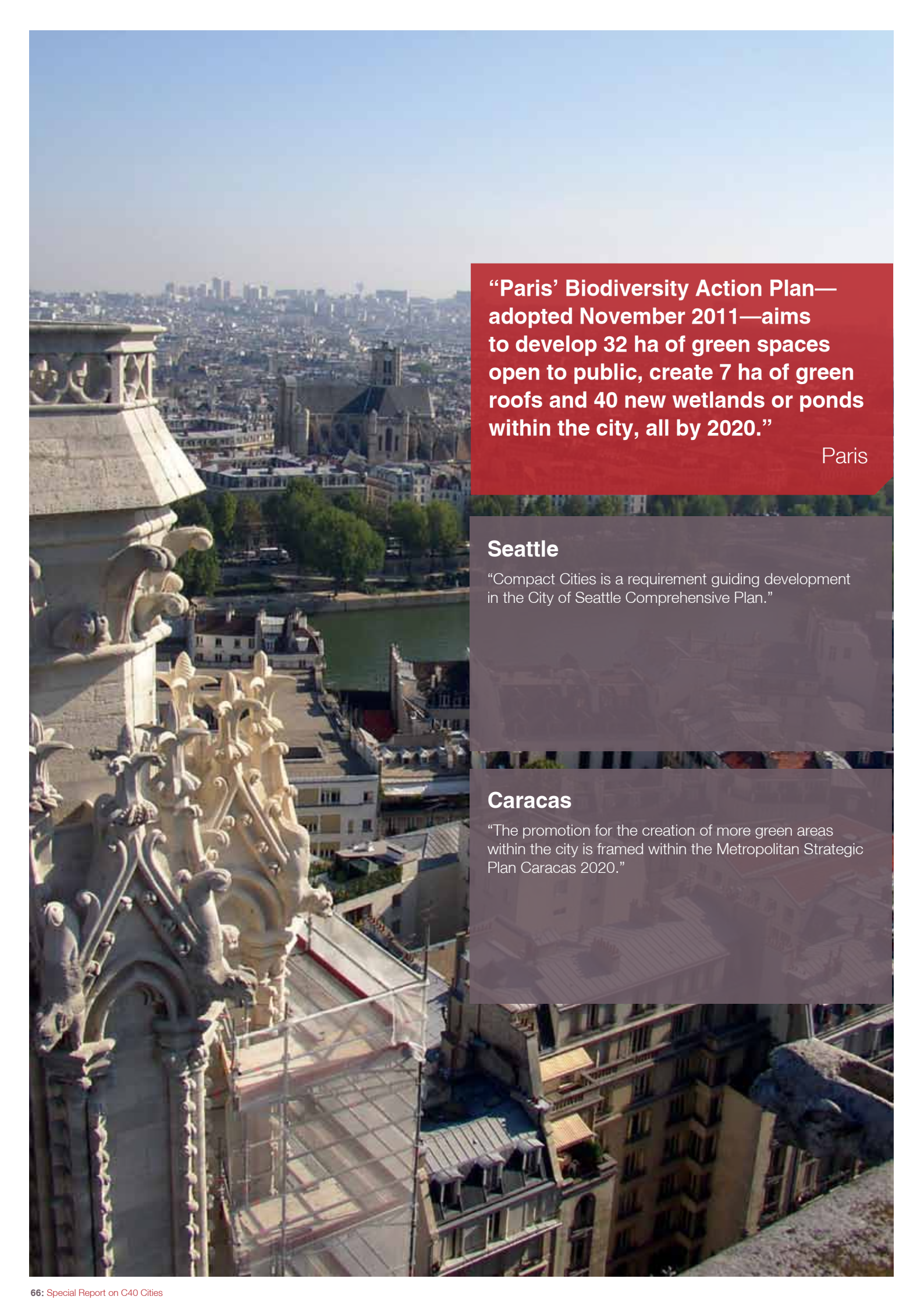
C40’s Sustainable Communities Initiative helps member cities meet their key priorities in new-build sustainable development. Existing networks include the Sustainable Urban Development Network, chaired by the City of Melbourne, and the Climate Positive Development Program.

**Fig. 42** City-wide emissions reduction urban land use activities reported by C40 cities, by status, by type of initiative (# of actions).



**Fig. 43** City-wide emissions reduction urban land use activities reported by C40 cities (% of cities).

Activity	% of cities
Greenspace and/or bio-diversity preservation and expansion	31%
Eco-district development strategy	20%
Brownfield redevelopment programs	16%
Compact cities	16%
Transit oriented development	16%
Urban agriculture	16%
Limiting urban sprawl	13%

An aerial photograph of Paris, France, showing a dense urban landscape with a prominent Gothic cathedral in the middle ground. In the foreground, the ornate stone facade of a building is visible, featuring intricate carvings and a balcony. A red text box is overlaid on the right side of the image.

**“Paris’ Biodiversity Action Plan—adopted November 2011—aims to develop 32 ha of green spaces open to public, create 7 ha of green roofs and 40 new wetlands or ponds within the city, all by 2020.”**

Paris

### Seattle

“Compact Cities is a requirement guiding development in the City of Seattle Comprehensive Plan.”

### Caracas

“The promotion for the creation of more green areas within the city is framed within the Metropolitan Strategic Plan Caracas 2020.”

## Water Drainage and Infrastructure

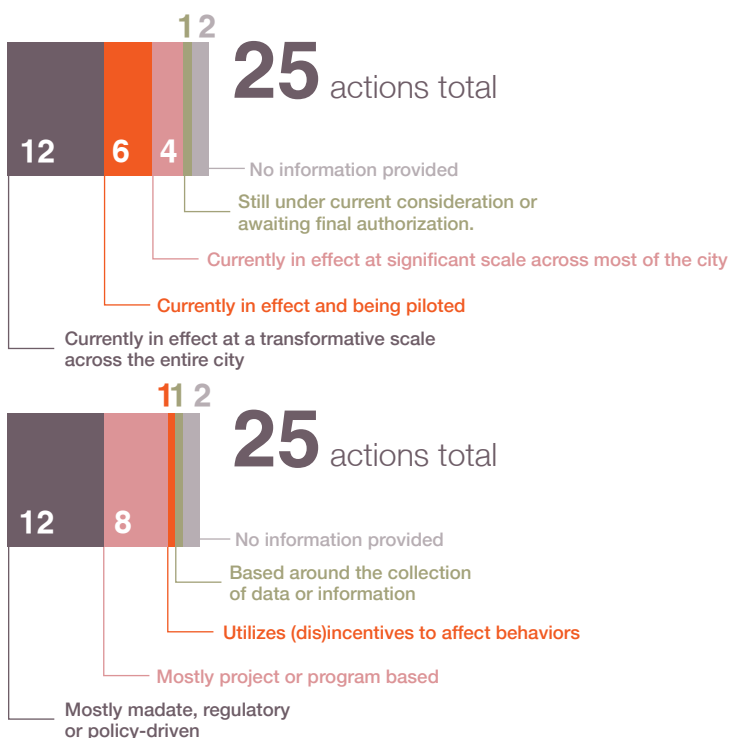
Twelve C40 cities (27%) report emissions reduction actions related to water, totalling just 5% of all C40 actions related to water. In addition, a relatively high percentage of reported actions are at the pilot stage, suggesting that reducing GHG emissions related to water can be a difficult issue for C40 cities to address.

Across C40 cities reporting actions on water, water metering and billing is the most popular emissions reduction action. Vancouver, for instance, has installed improved water meters in single-family homes over the past few years. San Francisco has undertaken an ambitious program to automate collection of water meter data using low-frequency radio waves. Five C40 cities cite water recycling programs, including Austin, which is piloting a “purple-pipe” system for redistributing non-potable water.

But while only a small number of cities report water-related emissions reduction activities, a large number of cities report water-related activities to adapt to climate change. Nineteen C40 cities report 28 actions designed to capture and control stormwater. Tokyo, for example, reports a project to upgrade its trunk sewers and pumping stations in response to more intense rainfall and increasingly frequent storms. The city also expects to suffer from more frequent droughts; as a result, the city is simultaneously undertaking repairs to its water infrastructure to reduce leakages and improve efficiency.


C40’s Water Drainage & Green Infrastructure Initiative features the existing Connecting Delta Cities Network, chaired by the City of Rotterdam and launched at the Tokyo Adaptation Workshop in 2008. Going forward, C40 will launch new networks on green infrastructure and urban drainage and adaptation.

**Fig. 44** City-wide emissions reduction water activities reported by C40 cities, by status, by type of initiative (# of actions).



**Fig. 45** City-wide emissions reduction water activities reported by C40 cities (% of cities).

Activity	% of cities
Water metering and billing	18%
Wastewater to energy initiatives	16%
Water recycling or reclamation	13%
Methane recovery for reuse	9%

A nighttime photograph of a city skyline, likely Philadelphia, with several skyscrapers illuminated against a dark blue sky. In the foreground, a river reflects the city lights. A red semi-transparent box is overlaid on the right side of the image, containing text about Philadelphia's water infrastructure plan.

**“The Philadelphia Water Department’s Green City, Clean Waters plan re-envisioned the stormwater infrastructure in Philadelphia and focuses heavily on green infrastructure as a highly beneficial alternative to traditional infrastructure.”**

Philadelphia

### **Buenos Aires**

“In the light of an expected increase in extreme rain events and severe storms, and taking into consideration that in the City of Buenos Aires paving intensifies runoffs, important contributions to our strategy include the maintenance of the rainfall drainage systems, the management of water reservoirs, and the expansion of new piped relief canals to control the main underground creeks.”

### **Karachi**

“The natural storm water drains are heavily encroached. Efforts are under way to relocate the inhabitants to a safer place and have service roads on sides of drain to ensure regular cleaning and widening of drains. Funding is a major issue for such a massive work.”

## Finance and Economic Development

Finance represents an area of opportunity for C40 cities. Ten C40 cities mention finance-related actions, and finance activities comprise just 3% of all C40 actions reported.

Nevertheless, C40 cities are showing areas of leadership in the finance sector. Non-C40 cities, for example, report a lower percentage of finance-related activities than C40 cities, suggesting that C40 cities are ahead of the curve. In addition, C40 cities report a number of innovative financing strategies. London, for example, has tapped funding from the European Union to create the London Green Fund, a £100 million fund which finances decentralized energy and energy efficiency projects in public buildings. Indeed, clean technology funds like London are the most common finance-related action that C40 cities report: seven C40 cities report hosting a clean technology fund of some kind.

C40's Finance & Economic Development Initiative will be defined under three broad areas of focus: green growth and economic development, sustainable infrastructure financing, and carbon finance. To date the initiative features two networks launched during the Organization for Economic Cooperation and Development's (OECD) Mayors and Ministers Roundtable in Chicago in March 2012: The Sustainable Infrastructure Finance Network and the Green Growth Network. The Sustainable Infrastructure Finance Network will be co-chaired by the Cities of Chicago and Basel. This network will identify and support innovative financing solutions for sustainable urban infrastructure, increasing the economy feasibility of green development. The Green Growth Network, chaired by the City of Copenhagen, will investigate how cities can work with business to create jobs

**Fig. 46** City-wide emissions reduction finance activities reported by C40 cities, by status, by type of initiative (# of actions).



**Fig. 47** City-wide emissions reduction finance activities reported by C40 cities (% of cities).

Activity	% of cities
Clean technology funds	16%
ESCO financing	9%
Adaptation infrastructure finance	4%
Carbon finance / markets	4%
Carbon finance capacity building	2%

and identify the socio-economic benefits of sustainable policies and solutions. In addition, the network will continue to develop partnerships to facilitate financing of priority projects in C40 Cities, including further definition of the World Bank partnership.



**“Copenhagen has an ambition of becoming the world’s first carbon neutral capital and the city has a goal of using this as a catalyst for ‘Green Growth’, focusing on green energy, green transportation and green construction. With more than 400 cleantech companies in the metropolitan area, Copenhagen is in pole position in the global clean tech race.”**

Copenhagen



## Melbourne

“The ‘Sustainable Melbourne Fund’ was established to lend money to initiatives that deliver environmental benefits, including clean energy projects.”





## Ask me about... Carbon finance

How do cities get smart on carbon finance?

**Lagos** reports that the city has taken steps to improve its knowledge of carbon finance and how to tap these markets.

## Ask me about... Project specific financing

How do cities fund carbon reduction actions?

Many of the actions that **Amsterdam** reports rely on project-specific financing, outside grants, or other forms of funding that lie outside the municipal government's budgets.

## Learning from Chicago

Chicago enjoys strong real estate fundamentals, including a strong workforce and well-developed infrastructure. Efforts to facilitate property development include Chicago's Green Permitting program, which offers expedited permitting for projects with significant environmental benefits (achieving up to 50% reduction in permit time) as well as partial permit fee waivers up to \$25,000. Cross-sector collaboration enables real estate tools like Chicago's Site Selector, a web-based mapping tool that draws on the City of Chicago's open data portal, commercial real estate information, and quality-of-life amenity data to help property developers make investment decisions. City support for economic development - including a recent reduction in the number of Chicago business license types from 117 to 49 - spurs business growth and job creation while ensuring that Chicago is home to a strong corporate and residential tenant base.

"Increasing sustainability throughout Chicago can create dramatic economic opportunity throughout our neighborhoods and improve the overall quality of life for residents," said Mayor Rahm Emanuel. "We have done this in many ways, from recycling to LEED buildings, from protected bike lanes to energy efficiency. We will continue to look for ways to make Chicago more sustainable, and to embed sustainability throughout the city."

Written by Chicago

## Measurement and Planning

C40's Measurement and Planning Initiative aims to provide leadership and support for local accounting, reporting and climate action planning efforts, and to identify areas of greatest opportunity for C40 strategic involvement while also measuring progress in accelerating climate protection.

The results of one major effort in this field are contained in this report. Over 75% of C40 cities are now reporting annually on their climate change-related information through CDP. In 2012, C40 promulgated new participation standards which require, among other actions, all cities to embark on a phased approach to annual, public reporting via CDP's platform. With three-quarters of cities reporting, nearly all publicly, C40 cities are well on their way to achieving the goal of 100% annual disclosure.

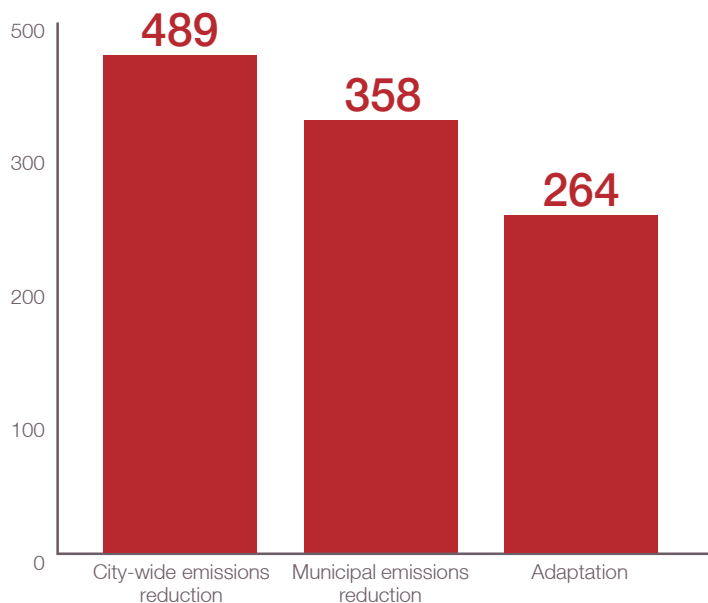
One of the hardest areas to measure and update annually is city-wide greenhouse gas emissions. Fifteen stellar C40 cities report updated city-wide emissions inventories from last year. Eight of these cities report reductions in emissions from last year. Cities like London, New York, Melbourne, Tokyo, and San Francisco are demonstrating exemplary leadership among C40 cities in their commitment to annual measurement of emissions.

C40 cities also report their own activities to collect and disseminate data. 5% of the emissions reduction activities that C40 cities report are explicitly based around the collection of information. Berlin's Solar Atlas, for instance, is a project to collect and communicate data on the solar potential of building rooftops in the city. Madrid reports on its Pro Clima Forum, which sets and monitors voluntary targets with local companies on energy efficiency, green procurement, and green fleets. Madrid is also collecting

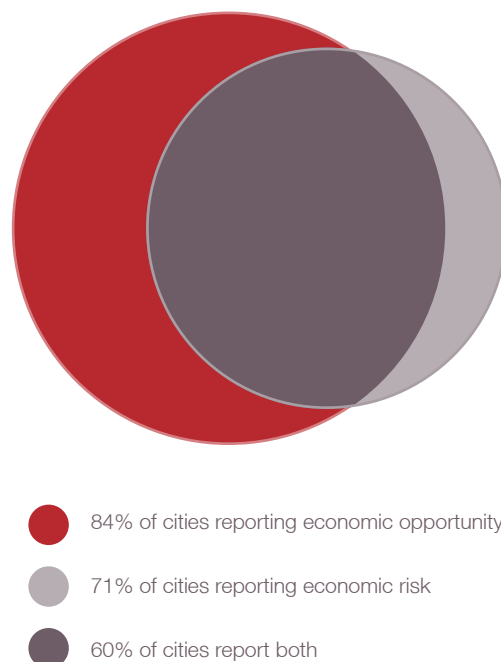
and communicating information about best practices designing, constructing, maintaining, and demolishing buildings to educate local stakeholders.

The C40 Measurement and Planning Initiative will continue to be developed over the next six months, but will include finalizing the community-scale inventory protocol (developed in partnership with ICLEI, World Bank, WRI and others) and expanding the existing partnership with CDP to provide greater support for local accounting and reporting efforts. C40 will continue to identify areas of greatest opportunity for C40 strategic involvement while also measuring progress in accelerating climate protection, and establishing new partnerships to develop adaptation planning tools. This effort will also support networks dedicated to climate action planning to meet both mitigation and adaptation or resiliency objectives.

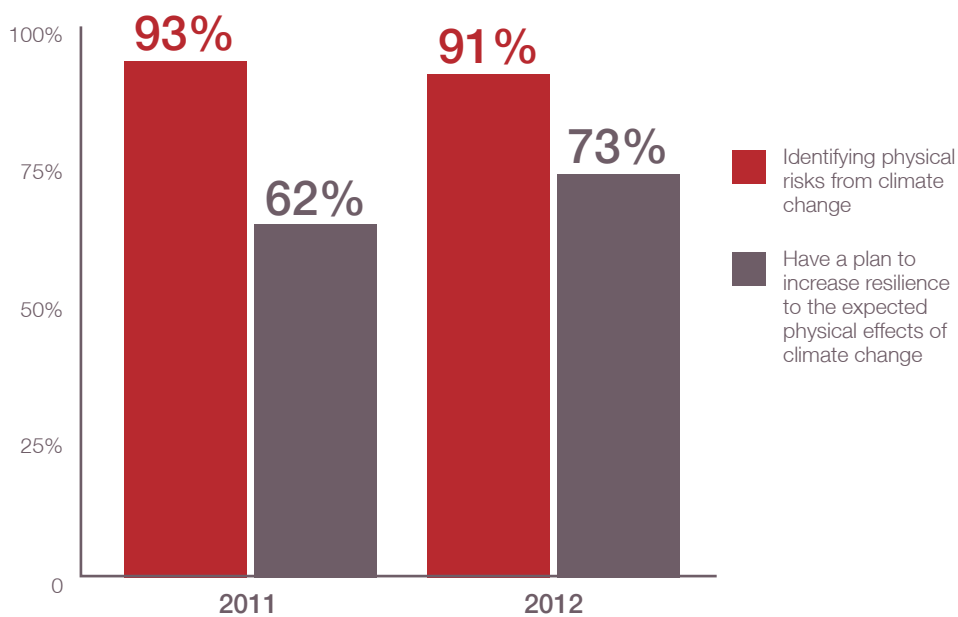
**Fig. 48** Number of actions reported by C40 cities, by type.



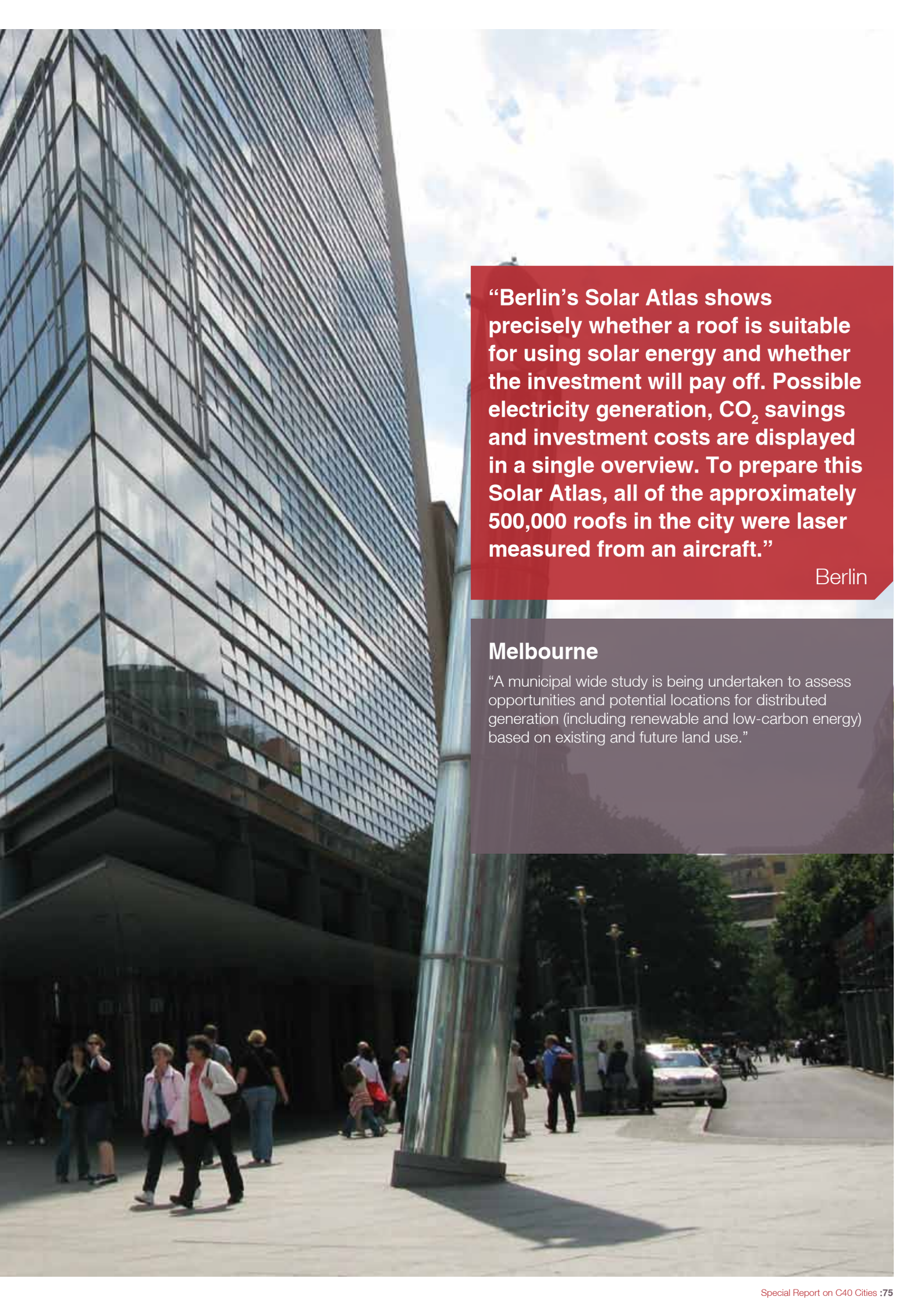
**Fig. 49** C40 cities identifying economic opportunities vs. economic risks from climate change.



**Fig. 50** Climate change preparedness of C40 cities, by year (% of cities).







**“Berlin’s Solar Atlas shows precisely whether a roof is suitable for using solar energy and whether the investment will pay off. Possible electricity generation, CO<sub>2</sub> savings and investment costs are displayed in a single overview. To prepare this Solar Atlas, all of the approximately 500,000 roofs in the city were laser measured from an aircraft.”**

Berlin

## Melbourne

“A municipal wide study is being undertaken to assess opportunities and potential locations for distributed generation (including renewable and low-carbon energy) based on existing and future land use.”

# What's next?

Looking to the future for cities

**The 73 cities reporting to CDP this year are demonstrating leadership, transparency, and a commitment to measure and manage their greenhouse gas emissions. Their responses showcase the cutting-edge climate change actions that are happening at the local level in every region of the world.**

## **Innovation is a common theme among reporting cities.**

More than 25 city governments mention the word “innovation” in their responses to CDP this year. Cities report approaches to greenhouse gas reduction and adaptation that are incredibly creative—Changwon’s carbon point system, in which points are provided to households who use less electricity or water compared with same period in previous years, or Philadelphia’s UnLitter Us campaign, which features spoken word poetry to engage younger citizens.

The scale of the climate change challenge, however, requires continuing innovation. Here is a look at what’s ahead for cities.



## What Are the Next Big Technologies for Cities?

Our expert panel gives a few insights into the next technological revolutions for cities.

**Simon Giles, Partner, Accenture**  
@peakflow

1. Crowd-sourced, ambient sensors: These will likely be devices that can be mounted on the outside of apartments, houses or offices that constantly provide real-time, local data on air quality, volatile organic compounds, sound, temperature humidity, etc.
2. Mobile citizen sensing: People will soon be using embedded sensors in their mobile phones to provide dynamic data on the city—think accelerometers that automatically detect potholes and mobile phones that can detect radioactivity and UV levels.

**Emma Stewart, Manager of Sustainability Solutions, Autodesk**  
@Autodesk

1. Cost-effective data capture: The capacity to collect, analyze and respond to data is advancing at a breathless pace, building on new and increasingly affordable hardware like stereoscopic cameras, wireless sensors and the omnipresent mobile phone, combined with new analytical horsepower made cost-effective by Software-as-a-Service.
2. Insightful, model-based simulation: Cities now have access to three-dimensional, spatially-accurate, and dynamic models of their cities that allow managers to play out “what-if” scenarios. These models are highly visual and conducive to sharing with everyone from the Mayor to highly-vocal citizens at a town hall meeting.



# Inno- vation

## Can a city government be innovative?

Michael Armstrong, City of Portland, USA

**Yes: ✓**

City governments have both the obligation and opportunity to develop strategies that advance multiple goals simultaneously—and this can produce tremendous innovation. In Portland, the Clean Energy Works Oregon program is designed to create jobs, advance equity, and improve housing affordability while reducing carbon. In our streets, green street facilities simultaneously manage stormwater and provide bicycle and pedestrian infrastructure, all while creating greener, more attractive neighborhoods. Often, the greatest innovations come from combining familiar pieces in unfamiliar ways, and that is fundamentally what makes cities so vibrant and successful.

Based on interview

## Necessity is the mother of invention

Rodrigo Rosa, Special Advisor to the Mayor, Rio de Janeiro

Some say “necessity is the mother of invention.” In many ways it was necessity that drove the City of Rio de Janeiro to create its most innovative feature, the Rio Operations Center – one of the most cutting-edge centers of its kind in the world. As host to a slate of mega-events including Rio+20, the 2014 World Cup and 2016 Olympic Games, and increasingly vulnerable to extreme weather events, Rio needed better information to manage the challenges and risks it faced. Integration of real-time information is the main function of the Operations Center, allowing decisions to be based on the best data, and carried out across all City departments. In this way, highly skilled operators are able to anticipate natural disasters such as landslides, and alert affected communities; as well as to improve the response time to any sudden occurrence in the city, such as accidents and fires. This is a true example of climate change adaptation and innovation leading to better management. Ultimately, the Rio Operations Center is in the service of Cariocas, the citizens of Rio de Janeiro.

Written by the City of Rio de Janeiro

# +2751%

Percent increase in Open APIs associated with city infrastructure from 2005 to 2011, according to new research from The Climate Group and others. APIs are internet services designed to provide software developers with access to large quantities of information. The Climate Group and others have shown that cities are increasingly embracing their role as marketplaces for information. Between 2005 and 2011, the number of Open APIs increased from approximately 235 to more than 6700. APIs like London’s enable third parties to provide citizens with real-time bus arrival schedules, information about bicycle-hire locations, and tips on how to make the most efficient journey from Westminster to Tower Bridge.<sup>9</sup>

<sup>9</sup>Information Marketplaces: The New Economics of Cities. The Climate Group, 2011. [www.theclimategroup.org/publications/2011/11/29/information-marketplaces-the-new-economics-of-cities/](http://www.theclimategroup.org/publications/2011/11/29/information-marketplaces-the-new-economics-of-cities/)

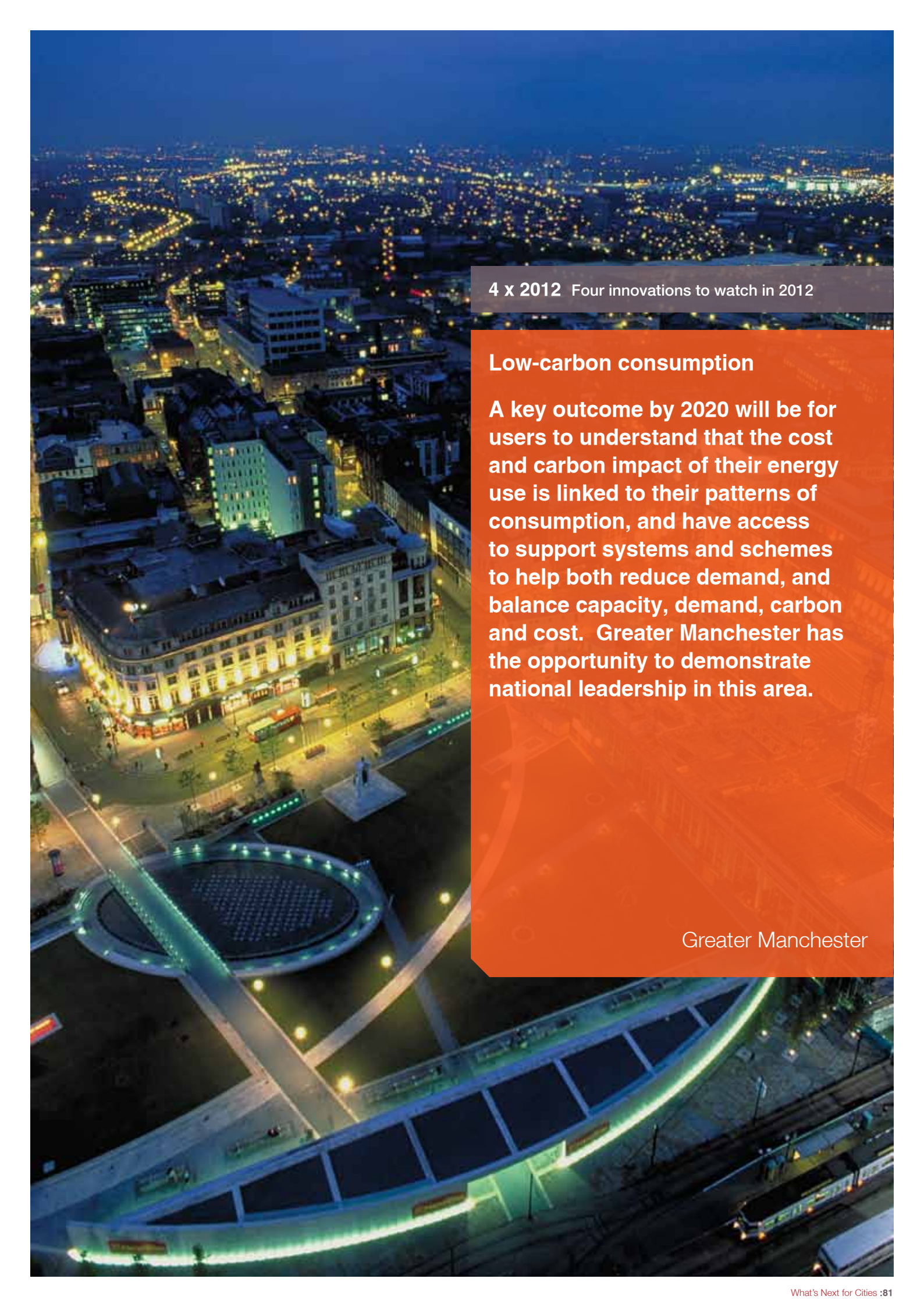


4 x 2012 Four innovations to watch in 2012

## **Triple Bottom Line Sustainability Planning**

**The City of St. Louis is developing a comprehensive triple bottom line Sustainability Plan that will be unveiled in the fall of 2012. After more than a year of conducting public engagement and gathering data—including generating the City’s first greenhouse gas emissions inventory for both local government and community scale sectors—the City’s Sustainability Plan will provide a strategic framework of objectives and strategies that can be used to guide those working to better the City toward a more socially, economically and environmentally sustainable future.**

St. Louis

An aerial night photograph of a city, likely Manchester, showing a dense urban landscape with numerous lights from buildings and streets. In the foreground, a modern, curved bridge or walkway is illuminated with green lights. The sky is dark blue, and the overall scene is vibrant with city lights.

**4 x 2012** Four innovations to watch in 2012

### **Low-carbon consumption**

**A key outcome by 2020 will be for users to understand that the cost and carbon impact of their energy use is linked to their patterns of consumption, and have access to support systems and schemes to help both reduce demand, and balance capacity, demand, carbon and cost. Greater Manchester has the opportunity to demonstrate national leadership in this area.**

Greater Manchester



4 x 2012 Four innovations to watch in 2012

## Adaptation planning

In 2010 the City launched its 'Miami 21' initiative which entails a holistic approach to land use and urban planning. Miami 21 will take into account all of the integral factors that will make each area within the city a unique, vibrant place to live, learn, work and play. Six elements serve as the lynchpins in the development of the blueprint of Miami: Zoning (Miami 21 Zoning Code), Economic Development, Historic Preservation, Parks and Open Spaces, Arts and Culture, and Transportation.

Miami



4 x 2012 Four innovations to watch in 2012

### E-Mobile Cluster

In Warsaw we have created an “E-Mobile Cluster”, which is aimed at environmentally-friendly transport, including electric and hybrid vehicles. It is an example of joint initiative of scientific institutions, local government, associations and companies operating in Warsaw area, which are willing to develop innovative technologies. We plan to support wide implementation of hybrid vehicles, and in the next phase purely electric vehicles.

Warsaw

# Appendix

Responding cities	Note	Country	Number of responding cities	Population	Climate change resilience plan	Number of adaptation actions	Economic opportunities identified	Municipal reporting year	Municipal methodology
<b>Africa</b>			<b>9</b>	<b>39,260,713</b>		<b>15</b>			
City of Abidjan		Cote d'Ivoire		5,000,000	No	1	Yes		
Addis Ababa City Administration	^	Ethiopia		2,900,000	Yes	5	No	1987 - 1993	Other
Antananarivo	*	Madagascar		1,300,000	/	/	/	/	/
City of Lagos	^	Nigeria		18,000,000	Yes	5	Yes		
Ville de Dakar	*	Senegal		1,030,594	/	/	/	/	/
City of Durban		South Africa		3,466,086	Yes	2	Yes	2010	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
City of Johannesburg	^*	South Africa		3,888,180	/	/	/	/	/
City of Pietermaritzburg		South Africa		648,000	Yes	2	Yes		
Ekurhuleni Metropolitan Municipality		South Africa		3,027,131	No	0	No		
<b>East Asia</b>			<b>7</b>	<b>39,557,394</b>		<b>25</b>			
Government of Hong Kong Special Administrative Region	^	Greater China		7,000,000	Yes	0	Yes		
Kaohsiung City Government		Greater China		1,525,642	Yes	2	Yes	2009	Other
Taipei City Government		Greater China		2,622,883	Yes	1	No		
City of Yokohama	^	Japan		3,687,382	Yes	4	Yes	2009-2010	Other
Tokyo Metropolitan Government	^	Japan		13,184,161	Yes	15	Yes	2010-2011	Other
Changwon City	^	South Korea		1,100,000	Yes	3	Yes	2011	Other
Seoul Metropolitan Government	^*	South Korea		10,437,326	/	/	/	/	/
<b>Europe</b>			<b>22</b>	<b>57,241,227</b>		<b>82</b>			
Ajuntament de Barcelona	^*	Spain		1,615,448	/	/	/	/	/
Ayuntamiento de Madrid	^	Spain		3,253,735	No	0	Yes		
Basel-Stadt	^	Switzerland		190,000	Yes	0	No		
City of Amsterdam	^	Netherlands		747,290	Yes	3	Yes		
City of Berlin	^	Germany		3,438,000	Yes	1	Yes		
City of Copenhagen	^	Denmark		539,542	Yes	2	Yes		
City of Helsinki		Finland		588,549	Yes	9	Yes	2010	Not reported
City of Manchester		United Kingdom		2,629,400	No	0	Yes		
City of Paris	^	France		2,257,981	Yes	14	Yes	2009	Other
City of Stockholm	^	Sweden		860,000	Yes	6	Yes		
City of Warsaw	^	Poland		1,700,000	Yes	1	No		
Comune di Milano	^*	Italy		1,322,750	/	/	/	/	/
Comune di Oristano		Italy		32,400	No	1	No		
Dublin City Council		Ireland		506,211	Yes	2	Yes	2011	Other
Free and Hanseatic City of Hamburg		Germany		1,796,077	Yes	2	Yes		
Gemeente Rotterdam	^	Netherlands		605,500	Yes	10	Yes		
Greater London Authority	^	United Kingdom		7,810,000	Yes	0	Yes		
Istanbul Metropolitan Municipality	^*	Turkey		13,317,240	/	/	/	/	/

Municipal emissions (metric tonnes CO <sub>2</sub> e)	Calculate municipal Scope 3	Municipal emissions verified	Municipal emissions reduction target	City-wide reporting year	City-wide methodology	City-wide emissions (metric tonnes CO <sub>2</sub> e)	Calculate city-wide Scope 3	City-wide emissions verified	City-wide emissions reduction target
2,179,451						25,962,074			
			No						No
1,075,239	No	No	No						No
/	/	/	/	/	/	/	/	/	/
			No						No
/	/	/	/	/	/	/	/	/	/
1,104,212	Yes	No	Yes	2010	Other	25,962,074	Yes	No	Yes
/	/	/	/	/	/	/	/	/	/
			No						No
			No						No
3,219,796						203,989,962			
			No	2009	2006 IPCC Guidelines for National Greenhouse Gas Inventories	42,900,000	No	No	Yes
168,642	No	No	Yes	2010	2006 IPCC Guidelines for National Greenhouse Gas Inventories	63,624,500	No	No	Yes
			No	2010	Other	15,500,000	No	No	Yes
906,000	No	No	Yes	2008-2009	Other	19,787,000	No	No	Yes
2,133,509	No	Yes	Yes	2009-2010	Other	62,178,462	No	No	Yes
11,645	No	Yes	Yes						Yes
/	/	/	/	/	/	/	/	/	/
755,508						245,932,862			
/	/	/	/	/	/	/	/	/	/
			No	2009	Not reported	13,390,000	No	No	Yes
			Yes						Yes
			Yes	2010	Other	5,045,000	No	No	Yes
			Yes	2008	Other	20,764,000	No	No	Yes
			Yes	2010	Other	2,515,250	No	Yes	Yes
215	No	No	Yes	2010	Other	3,222,900	No	Yes	Yes
			No	2009	Other	15,902,000	Yes	Yes	Yes
282,600	Yes	Yes	Yes	2009	Other	24,600,000	Yes	Yes	Yes
			No	2009	Other	2,852,000	Yes	Yes	Yes
			No	2007	2006 IPCC Guidelines for National Greenhouse Gas Inventories	10,727,200	No	Yes	Yes
/	/	/	/	/	/	/	/	/	/
			Yes						Yes
63,603	No	No	Yes						No
			No	2009	2006 IPCC Guidelines for National Greenhouse Gas Inventories	16,951,242	No	No	Yes
			Yes	2010	The International Basic Standard for Community-Scale GHG Emission Inventories (C40/ICLEI/WRI)	29,608,297	No	Yes	No
			Yes	2010	Other	43,400,000	No	No	Yes
/	/	/	/	/	/	/	/	/	/

Responding cities	Note	Country	Number of responding cities	Population	Climate change resilience plan	Number of adaptation actions	Economic opportunities identified	Municipal reporting year	Municipal methodology
Moscow Government	^	Russia		10,563,000	Yes	29	No		
Riga City		Latvia		706,413	No	1	Yes		
Roma Capitale	^	Italy		2,761,477	No	0	No	2010	Other
Village of Kadiovacik		Turkey		214	Yes	1	Yes		
<b>Latin America</b>			<b>9</b>	<b>39,267,614</b>		<b>31</b>			
Alcaldía Metropolitana de Caracas	^	Venezuela		3,205,500	Yes	7	Yes		
Bogotá Distrito Capital	^	Colombia		7,155,052	Yes	0	Yes		
City of Buenos Aires	^	Argentina		2,891,082	Yes	8	Yes	2010	Other
City of Guadalajara		Mexico		1,495,189	Yes	0	Yes		
Municipalidad de Santiago	^	Chile		4,837,295	No	1	Yes		
Municipality of Curitiba	^	Brazil		1,800,000	No	0			
Prefeitura de Sao Paulo	^	Brazil		11,244,369	Yes	0	Yes		
Prefeitura do Rio de Janeiro	^	Brazil		6,323,037	Yes	11	Yes		
San Salvador		El Salvador		316,090	No	4	No		
<b>North America</b>			<b>21</b>	<b>32,022,328</b>		<b>134</b>			
City of Atlanta		USA		540,922	Yes	1	Yes	2010	International Emissions Analysis Protocol (ICLEI)
City of Austin	^	USA		812,025	No	9	Yes	2010	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
City of Chicago	^	USA		2,833,321	Yes	12	Yes	2010	Chicago Climate Exchange
City of Dallas		USA		1,197,816	No	0	Yes	2010	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
City of Denver		USA		600,158	No	4	Yes		
City of Edina	*	USA		47,941	/	/	/	/	/
City of Houston	^	USA		2,100,000	No	5	Yes	2005	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
City of Las Vegas		USA		567,641	Yes	8	Yes	2011	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
City of Los Angeles	^	USA		4,065,585	Yes	6	Yes		
City of Miami		USA		362,470	Yes	7	Yes	2007	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
City of Philadelphia	^	USA		1,555,000	Yes	3	Yes	2010	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
City of Phoenix		USA		1,500,000	No	11	No	2005	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
City of Portland, Oregon	^	USA		566,143	No	0	Yes		
City of San Diego		USA		1,301,617	Yes	9	Yes	2008	2006 IPCC Guidelines for National Greenhouse Gas Inventories;
City of San Francisco	^	USA		815,358	No	0	Yes	2009-2010	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
City of Seattle	^	USA		608,660	Yes	9	Yes	2010	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)



Municipal emissions (metric tonnes CO <sub>2</sub> e)	Calculate municipal Scope 3	Municipal emissions verified	Municipal emissions reduction target	City-wide reporting year	City-wide methodology	City-wide emissions (metric tonnes CO <sub>2</sub> e)	Calculate city-wide Scope 3	City-wide emissions verified	City-wide emissions reduction target
			Yes	2011	2006 IPCC Guidelines for National Greenhouse Gas Inventories	44,642,239	No	No	Yes
			Yes	2008	2006 IPCC Guidelines for National Greenhouse Gas Inventories	2,303,200	No	No	Yes
409,091	No	No	No	2010	Not reported	10,008,879	No	No	Yes
			Yes	2011	2006 IPCC Guidelines for National Greenhouse Gas Inventories	655	No	No	Yes
<b>621,509</b>						<b>56,772,873</b>			
			No	2000	Other	986,450	No	No	No
			No	2008	International Standard for Determining Greenhouse Gas Emissions for Cities (World Bank)	15,921,690	No	Yes	Yes
621,509	No	No	Yes	2010	Other	9,258,903	Yes	No	Yes
			No						No
			No						No
			No	2008	The International Basic Standard for Community-Scale GHG Emission Inventories (C40/ICLEI/WRI)	3,515,890	Yes	No	No
			Yes	2003	International Emissions Analysis Protocol (ICLEI)	15,738,240	No	No	Yes
			No	2005	2006 IPCC Guidelines for National Greenhouse Gas Inventories	11,351,700	Yes	No	Yes
			Yes						No
<b>13,628,177</b>						<b>306,075,030</b>			
512,406	No	No	Yes						Yes
449,980	No	Yes	Yes	2010	Other	14,926,864	No	No	Yes
2,345,288	No	No	Yes	2010	Other	33,545,577	No	No	Yes
402,560	No	No	Yes	2010	Not reported	17,229,388	No	No	No
			Yes	2010	Other	13,028,000	Yes	Yes	Yes
/	/	/	/	/	/	/	/	/	/
1,786,109	Yes	No	Yes	2007	2006 IPCC Guidelines for National Greenhouse Gas Inventories	37,031,473	Yes	No	No
116,650	No	No	Yes	2011	International Emissions Analysis Protocol (ICLEI)	27,803,600	No	No	No
			Yes	2010	Other	13,072,399	No	No	No
81,327	Yes	No	Yes	2006	The International Basic Standard for Community-Scale GHG Emission Inventories (C40/ICLEI/WRI)	4,762,364	No	No	Yes
500,800	No	No	Yes	2010	Other	15,174,236	No	No	Yes
618,683	Yes	Yes	Yes						No
			Yes	2010	International Emissions Analysis Protocol (ICLEI)	7,664,696	Yes	No	Yes
140,000	No	No	Yes	2008	2006 IPCC Guidelines for National Greenhouse Gas Inventories	12,500,000	No	No	Yes
215,577	No	No	Yes	2010	International Emissions Analysis Protocol (ICLEI)	5,255,730	Yes	Yes	Yes
258,000	Yes	Yes	Yes	2008	Other	7,042,000	Yes	Yes	Yes

Responding cities	Note	Country	Number of responding cities	Population	Climate change resilience plan	Number of adaptation actions	Economic opportunities identified	Municipal reporting year	Municipal methodology
City of St Louis		USA		319,294	No	5	Yes	2010	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
City of Toronto	^	Canada		2,615,000	Yes	8	Yes	2008	International Emissions Analysis Protocol (ICLEI)
City of Vancouver		Canada		603,500	Yes	6	Yes	2008	Greenhouse Gas Protocol: Public Sector Standard
District of Columbia		USA		617,996	No	10	Yes	2006	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
New York City	^	USA		8,391,881	Yes	21	Yes	2010	Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)
<b>South Asia and Oceania</b>			<b>5</b>	<b>34,479,556</b>		<b>34</b>			
Bangkok Metropolitan Administration	^	Thailand		5,701,394	Yes	6	No		
City District Government Karachi	^	Pakistan		19,000,000	Yes	1	Yes		
City of Melbourne	^	Australia		98,162	Yes	14	Yes	2010-2011	Greenhouse Gas Protocol: Public Sector Standard
City of Sydney	^	Australia		180,000	No	9	Yes	2010-2011	Australian National Greenhouse and Energy Reporting (Measurement) Determination
Jakarta City Government	^	Indonesia		9,500,000	Yes	4	Yes		

\* indicates private response

^C40 Cities

## Notes

1. GHG emissions from Los Angeles could not be included in the analysis of this report due to publication timeline
2. Responses from private cities have been eliminated from regional percentages and totals

Municipal emissions (metric tonnes CO <sub>2</sub> e)	Calculate municipal Scope 3	Municipal emissions verified	Municipal emissions reduction target	City-wide reporting year	City-wide methodology	City-wide emissions (metric tonnes CO <sub>2</sub> e)	Calculate city-wide Scope 3	City-wide emissions verified	City-wide emissions reduction target
307,270	Yes	No	No	2010	International Emissions Analysis Protocol (ICLEI)	7,549,862	Yes	No	No
1,380,000	Yes	No	Yes	2008	The International Basic Standard for Community-Scale GHG Emission Inventories (C40/ICLEI/WRI)	21,900,000	Yes	No	Yes
335,550	No	No	No	2008	International Emissions Analysis Protocol (ICLEI)	2,740,000	No	No	Yes
719,896	No	No	No	2006	The International Basic Standard for Community-Scale GHG Emission Inventories (C40/ICLEI/WRI)	10,500,000	No	No	No
3,458,081	Yes	No	Yes	2010	The International Basic Standard for Community-Scale GHG Emission Inventories (C40/ICLEI/WRI)	54,348,841	Yes	No	Yes
<b>66,002</b>						<b>54,187,353</b>			
			Yes						Yes
			No						No
18,404	Yes	Yes	Yes	2009-2010	Other	4,870,289	Yes	No	Yes
47,598	Yes	No	Yes	2005-2006	The International Basic Standard for Community-Scale GHG Emission Inventories (C40/ICLEI/WRI)	5,457,064	Yes	Yes	Yes
			Yes	2005	2006 IPCC Guidelines for National Greenhouse Gas Inventories	43,860,000	No	No	Yes

### Sources for figure 5.

**Population data where not city-reported:** Helsinki (Statistics Finland), Barcelona (Institut d'Estadística de Catalunya), Riga (Municipal Portal of Riga).

**Density data where land area not city-reported:** Vancouver (Statistics Canada), São Paulo (Convention on Biological Diversity).

### Sources for figure 6.

**Population data where not city-reported:** Helsinki (Statistics Finland), Barcelona (Institut d'Estadística de Catalunya), Riga (Municipal Portal of Riga).

**Foreign exchange rates:** Note that all foreign currencies were converted into U.S. dollars using the IRS conversion rate calculator. <http://www.irs.gov/businesses/small/international/article/0,,id=206089,00.html>

**GDP Data:** United States: US Bureau of Economic Analysis; Canada: City of Toronto, Montreal Chamber of Commerce; Europe (with the exception of Barcelona, Moscow and Istanbul): Eurostat; Barcelona: Institut d'Estadística de Catalunya; Moscow: PriceWaterhouse Coopers; Istanbul: Istanbul Development Agency; Tokyo: Tokyo Metropolitan Government; Yokohama: City of Yokohama Statistical Yearbook; Seoul and Changwon: Statistics Korea; Taipei: Taiwan Statistical Reference; Hong Kong: CIA World Factbook; Brazil: Instituto Brasileiro de Geografia e Estatística; Buenos Aires: City Government of Buenos Aires Annual Yearbook; Bogotá: Banco de la República (Colombia); South Africa: Stats South Africa.

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