

# OECD Roundtable of Mayors and Ministers

MOBILISING INVESTMENTS FOR URBAN SUSTAINABILITY,  
JOB CREATION AND RESILIENT GROWTH

8 March 2012, Chicago, Illinois, United States

## Issues Paper



The OECD Roundtable of Mayors and Ministers provides a pre-eminent forum to develop inter-governmental approaches for stronger, more effective urban policy. With participation from mayors, national ministers, former heads of state, and civil society, the Roundtable acknowledges the interdependence among urban policy actors and the metropolitan implications of policies in areas such as transportation, education, and environment.

Established in 2007, the Roundtable builds upon a long tradition of policy dialogue and research on urban issues at the OECD. Since 1979, OECD member countries have shared their experiences and identified best practices in urban development in terms of economic competitiveness, urban governance, local finance, infrastructure, climate change, social cohesion, immigrant integration and distressed areas ([www.oecd.org/gov/cities](http://www.oecd.org/gov/cities)). The Roundtable further contributes to the OECD's extensive experience in helping national governments design urban development policies that balance economic efficiency and environmental sustainability.

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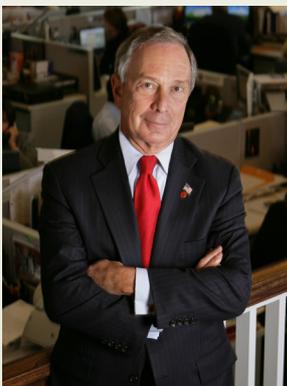
*"On the eve of Rio+20, governments are challenged to build a world that is safer, cleaner and healthier in a 'do more with less' environment. Such a sustainable world starts with sustainable cities. Partnering to invest in sustainable and resilient cities is therefore central to achieving this goal."*

*Angel Gurría  
OECD Secretary-General*



*"The City of Chicago welcomes the upcoming collaboration between the C40, the OECD, and US HUD, as we look to develop new solutions to the most pressing sustainable infrastructure problems facing cities around the world. During my time in office I have focused heavily on how strategic infrastructure investments can build a stronger foundation for job creation, economic growth and sustainable development, and I look forward to working with other mayors and ministers to explore new approaches to these common challenges."*

*Rahm Emanuel  
Mayor of Chicago*



*"City leaders understand better than anyone that the stakes are high. We know that on our rapidly urbanizing planet, cities hold the key to unlocking the solutions to climate change. The upcoming OECD roundtable provides an ideal opportunity for Mayors and Ministers to establish clear principles for local-national collaborations that will be communicated to Rio+20 conference in June."*

*Michael R. Bloomberg  
Mayor of New York City  
Chairman of the C40*



*"The OECD Urban Roundtable of Mayors and Ministers will be an invaluable opportunity for us all to share best practices. We know that cities and regions that embrace sustainability and resiliency will have a built-in competitive edge in attracting jobs and private investment which is a top priority for the Obama Administration. Through these collaborations with our municipal leaders, we will be able to develop effective, place-based solutions that support our cities and help them grow sustainably."*

*Shaun Donovan  
Secretary  
U.S. Department of Housing and Urban Development*



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# I. Why is investing in cities critical to sustainable economic growth?

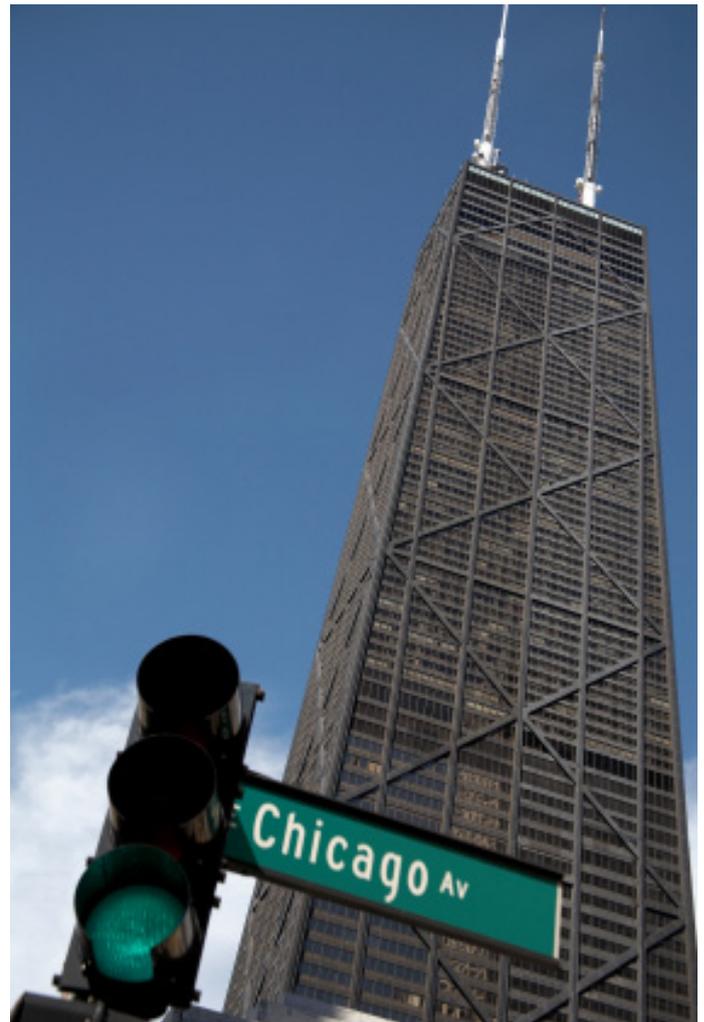
## Business as usual is no longer an option

The global crisis has opened a window of opportunity to reconsider new sources of long-term sustainable growth. The repercussions from the worst financial and economic crisis of our lifetimes continue to be felt across the globe. In advanced economies, concern over sovereign debt, banking sector turmoil, political upheaval, and high unemployment are all weighing heavily on prospects for growth. Emerging economies are still growing at a healthy pace, but their growth rates are also moderating and they are not immune to the possibility of an economic downturn, given that global trade volumes falling strongly (OECD, 2011a). A large number of countries are still struggling to break through the middle-income "glass ceiling", and some continue to suffer under the weight of extreme poverty (OECD, 2010a).

An economic development model based on heavy resource consumption and pollution is no longer an option.

- Growing population and wealth mean greater energy demand. By 2050 the global population is expected to grow from 7 billion to over 9 billion, bringing with it higher living standards, a GDP four times larger than today and a projected 80% increase in global energy demand (OECD, 2012a).
- Greenhouse gas emissions are exceeding safe targets. Without ambitious action, greenhouse gas emissions are expected to increase by another 50% by 2050, primarily driven by a projected 70% increase in CO<sub>2</sub> emissions from energy use (OECD, 2012a). The world is far off course from achieving the international goal under the UN Framework Convention on Climate Change (UNFCCC) to limit the global average temperature increase to 2 degrees Celsius.
- Growing water demand threatens supplies. Globally, water demand is projected to increase by 55% globally between 2000 and 2050, with most of the increase from manufacturing (+400%), electricity (+140%) and domestic use (+130%) (OECD, 2012a).
- Declining urban air quality poses a major threat to public health. Urban air pollution is set to become the top environmental cause of premature mortality globally by 2050 (OECD, 2012a).

**Delaying action will only increase costs.** Delaying climate action and limiting emission cuts to the insufficient pledges made in Copenhagen and Cancun would raise the global cost of mitigation by 50% compared to starting more ambitious actions globally today, and also increase the risk of irreversible environmental impacts (OECD, 2012a). Waiting for the adoption of more advanced technologies or restricting emission reductions to the Copenhagen and Cancun pledges would require costlier, faster and larger-scale efforts after 2020. The combined "costs of inaction" could result in losses equivalent to a 14% decrease in global per capita consumption (Stern, 2007; OECD, 2008).



Human well-being can no longer be separated from economic growth. Countries all over the world are confronting a deep social crisis, and poverty and inequality have increased everywhere. The roots of this social crisis go back to before the Great Recession and stretch well beyond developing countries.

The gap between rich and poor has reached the highest level in 50 years in OECD countries, with the average income of the richest 10% of the population roughly nine times greater than that of the poorest 10%. Greater inequality raises economic, political and ethical challenges as it risks leaving a growing number of people behind in an ever-changing economy (OECD, 2011b).

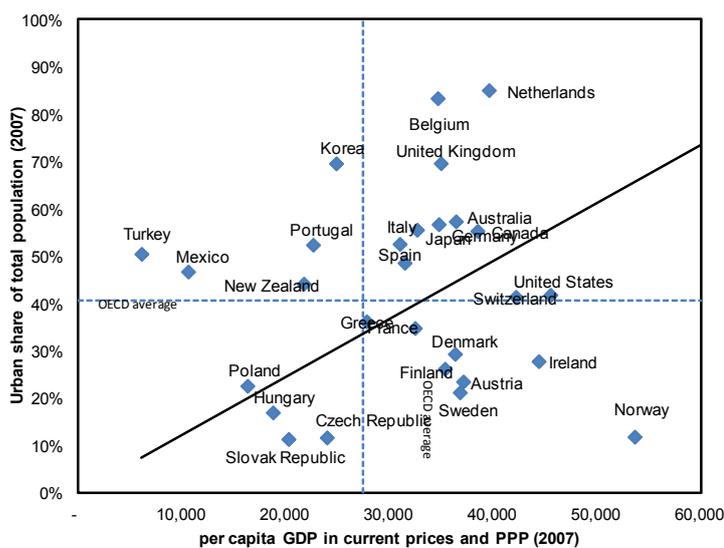
The call for more social and economic justice is being made with increasing clarity and stridency in many large cities, from Tahrir square in Cairo to the Puerta del Sol in Madrid, from the streets of Tunis to the avenues of New Delhi, from pro-democracy unrest in Thailand in 2010 to the Occupy Wall Street movements in New York City, Oakland, and many other US cities (OECD, 2011c).

# A sustainable world is not possible without sustainable cities

A new sustainable economic development model is needed, and cities are at the heart of it. Over 50% of the world's population is now living in cities<sup>1</sup>, and 70% of the population is expected to be urban by 2050. Within the next decade, there will be more than 500 cities of more than a million people, including several "megacities" with a population exceeding 20 million (UN Habitat, 2010). Cities are essential to making growth stronger, greener and more inclusive, for four reasons:

1. **Cities are critical drivers of national growth.** Urban areas in the OECD tend to feature higher income and productivity (Figure 1). Just 2% of OECD regions, mainly the largest OECD urban areas, produce 1/3 of all growth in the OECD (OECD, 2011d). In both India and China, the five largest cities' economies contribute approximately 15% of national GDP—roughly three times their share of the population (UN Habitat, 2010). As centres of innovation, cities play a disproportionate role in knowledge-generation, which will clearly play a critical role in strategies to address climate change and resource scarcity.

Figure 1. Urbanisation and income  
Share of total population in predominantly urban regions and per capita GDP in OECD countries



Notes: Urban share of total population by country refers to population in predominantly urban regions as a proportion of total population. Iceland and Luxembourg were not included in the sample as the OECD Regional Database does not identify predominantly urban regions in those countries. Switzerland was not included as GDP figures at sub-national level in that country are not available. Mexico's per capita GDP data refer to 2004; New Zealand's per capita GDP data refer to 2003; Turkey's per capita GDP data refer to 2001. PPP is purchasing power parity. Source: Calculations based on data from the OECD Regional Database.

2. **Cities concentrate environmental challenges – and climate vulnerabilities.**

- **Greenhouse gas emissions.**

Cities account for an estimated 67% of global energy use and 71% of global energy-related CO<sub>2</sub> emissions (IEA, 2010). The 40 large-city members of the C40 Climate Leadership Group alone represent 4% of the world population but generate 18% of global GDP and 10% of global carbon emissions (C40 & ARUP, 2011). Estimates of urban CO<sub>2</sub> emissions per capita vary greatly throughout the OECD, with the highest emissions recorded in US metro regions and the lowest recorded in Mexican metro regions (Figure 2).

- **Vulnerability to climate change impacts.**

A 50 cm sea-level rise combined with baseline socio-economic growth by 2070 could triple the population at exposed to coastal flooding and expose ten times the amount of assets exposed, representing 9% of global GDP in 2070 (Nicholls, et al., 2008). Rising temperatures, exacerbated by the urban heat island effect increases the likelihood of heat waves, spikes in energy demand and power blackouts, which threaten both the local economy and public health.

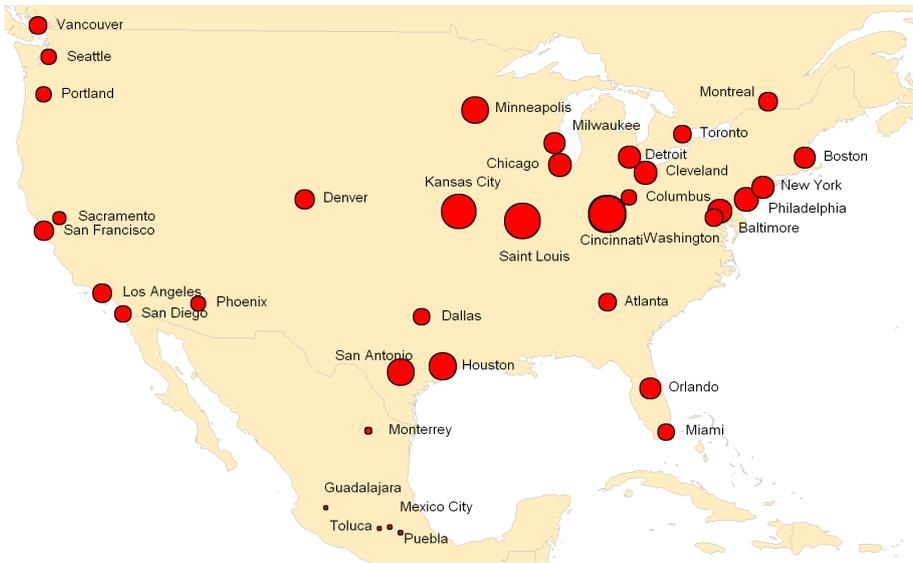
- **Growing urbanisation increases pressures on the environment.**

Within the next decade, there will be more than 500 cities of more than a million people, including several "megacities" with a population exceeding 20 million, while the average size of the world's 100 largest cities will have reached 8.5 million (UN Habitat, 2010). The expansion of cities without adequate investment in housing and other essential infrastructure, or unmitigated growth and insufficient planning more generally, can give rise to substandard living conditions. Urbanisation also often entails a range of environmental pressures associated with the geographic concentration of people and economic activity, including severe air and water pollution, as well as the accumulation and inappropriate disposal of household and industrial waste. For instance, the OECD projects that without new policies, the health impacts of urban air pollution will continue to worsen to 2050 and become the top environmental cause of premature mortality worldwide (OECD 2012a, forthcoming).

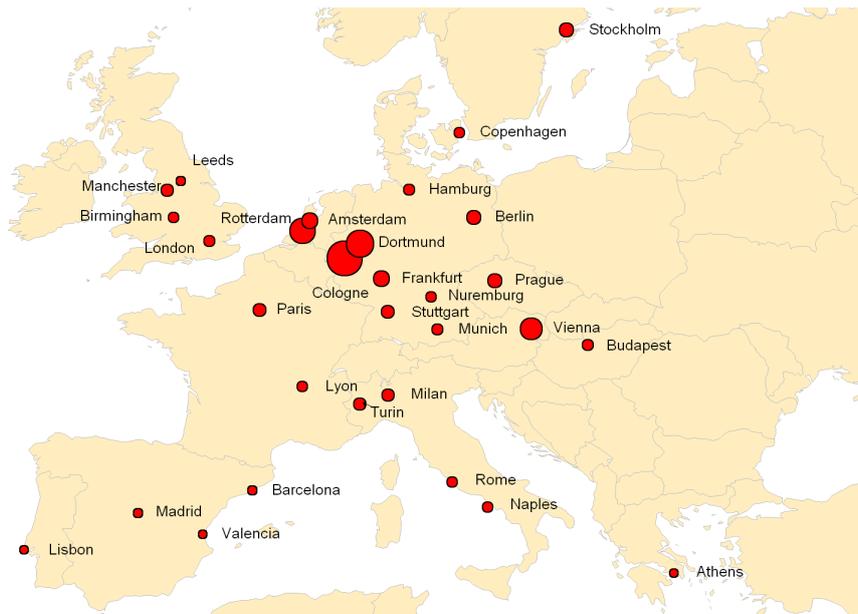
1. Throughout this Issues Paper, the term "city" refers to urban municipalities located in metropolitan regions.

Figure 2. Estimated CO<sub>2</sub> emissions per capita in OECD metropolitan regions, tonnes of CO<sub>2</sub> per capita (2005)

North American OECD metropolitan regions



European OECD metropolitan regions



Asian OECD metropolitan regions



Note: size of the circles corresponds to level of CO<sub>2</sub> emissions. Data not available for some OECD member countries. This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

Source: OECD calculation using the Emissions Database for Global Atmospheric Research (EDGAR), version 4.1. See OECD (2011e) "Redefining urban: A new way to measure metropolitan areas in OECD countries," Regional Development Working Paper (GOV/TDPC/TI(2011)3), OECD, Paris; and OECD (2011f), "Measuring the environmental performance of metropolitan areas with geographic information sources," Regional Development Working Paper, GOV/TDPC/TI(2011)6, OECD, Paris

3. Urban form – and lifestyles – matter. There is a strong relationship between urban form and sustainable development.

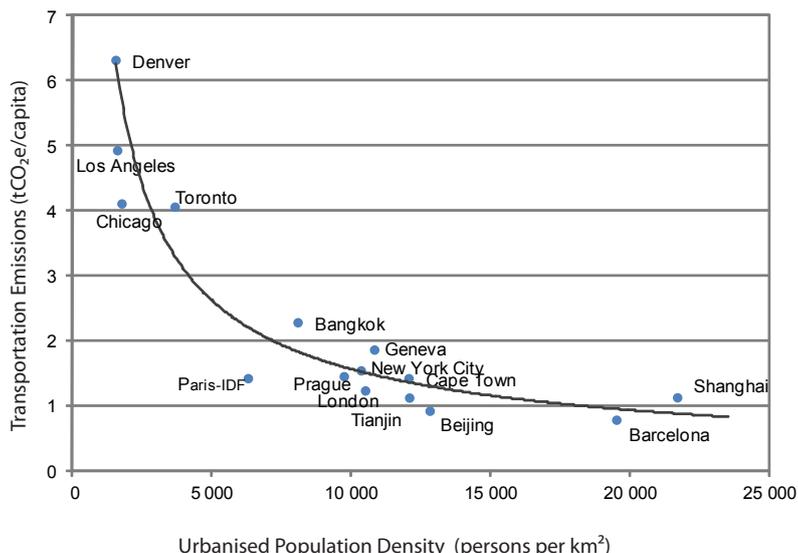
CO<sub>2</sub> emissions from transport are likely to be greater in less densely populated areas than in more densely populated areas (Figure 3). However, over 2000-2050, the consumption of land for built-up areas will increase faster than total population in 30 out of 34 OECD countries. Sprawling urban form tends to be accompanied by high levels of private vehicle use, and also makes it difficult to build enough demand to efficiently deliver public services.

For example, the cost savings by containing sprawl in the United States are estimated to be USD 12.6 billion for water and sewer infrastructure and USD 110 billion for road infrastructure (OECD, 2012b forthcoming; OECD, 2002). Urban sprawl can contribute to social exclusion as well, by increasing the distance between lower-income neighbourhoods and centres of employment and effectively reducing the size of the local labour market.

When OECD functional urban regions within the same bracket for GDP per capita and national energy prices are compared, CO<sub>2</sub> emissions for lower-density cities can range up to roughly three times more than for cities with higher density (Figure 4). However, density is not the whole story. Other factors that come into play include availability of public transportation, lifestyle choices, and the proximity to industry, power generation and other potential sources of greenhouse gas emissions. Urban areas can become less dense – to a point – without necessarily moving far up the CO<sub>2</sub> emissions curve, in part due to innovation. This is important because many fast-growing cities in emerging economies are currently highly dense but are expected to become less dense over time (LILP).

For example, in China over the past 30 years, the urban population has increased by 1.6 times while the total constructed urban area has increased by 4 times. Correspondingly, the density of total constructed urban area has decreased from around 20,000 in early 1980s to around 10,000 recently. However, the relationship between density and CO<sub>2</sub> emissions per capita implies that whether emerging economies will urbanise following a low-density or a high-density model will make a big difference in their future CO<sub>2</sub> emissions. In other words, the urban form and the density of cities should be taken into account in global CO<sub>2</sub> emissions reduction plans.

Figure 3. CO<sub>2</sub> emissions from ground transportation in large metropolises

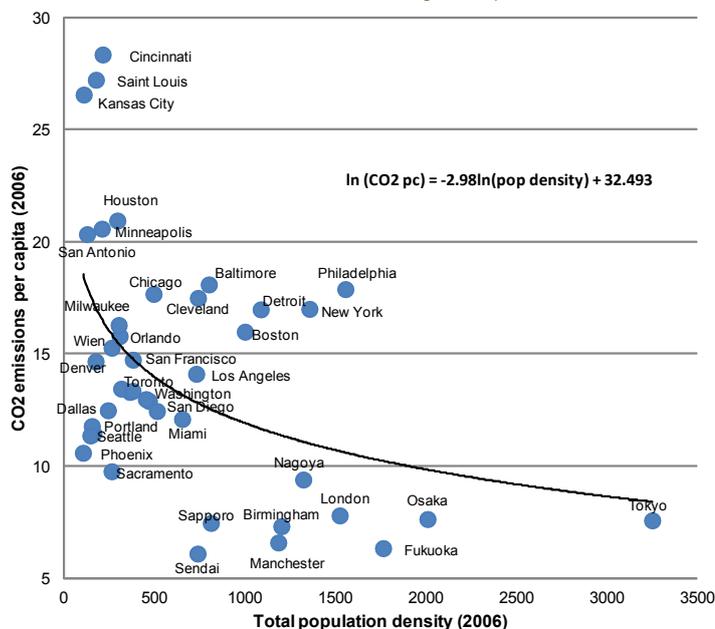


1. The density of the urbanised land surface is calculated without including green areas.
2. Analytical units and reference years used for these calculations: Barcelona (city, 2006); Geneva (canton, 2005); London (Greater London, 2003); Paris-IDF (IDF region, 2005); Prague (Greater Prague, 2005); Chicago (Chicago Metropolitan Area, 2005); Denver (city and county, 2005); Los Angeles (county including 88 towns or cities, 2000); New York (city, 2005); Toronto (Greater Toronto, 2005); Bangkok (city, 2005); Beijing (province, 2006); Shanghai (province, 2006); Tianjin (province, 2006); Cape Town (city, 2006).

Source: Kennedy, C. (2011), Calculations (personal communication) adapted by C. Kennedy, October 2011, using methodology from Kennedy, C. et al. (2009), "Greenhouse Gas Emissions from Global Cities", Environmental Science and Technology, Vol. 43, No. 19, American Chemical Society, Washington, US, pp. 7297-7302.

Note: Figure shows estimates of per capita emission for all sectors; variations from the curve can partly be explained by differences in emissions from electricity consumption. Source: OECD Metropolitan Database 2011

Figure 4. Population density and estimated CO<sub>2</sub> emissions per capita in a selection of large metropolitan areas



Note: Figure shows estimates of per capita emission for all sectors; variations from the curve can partly be explained by differences in emissions from electricity consumption. Source: OECD Metropolitan Database 2011

#### 4. The struggle for inclusive growth is most intense in cities.

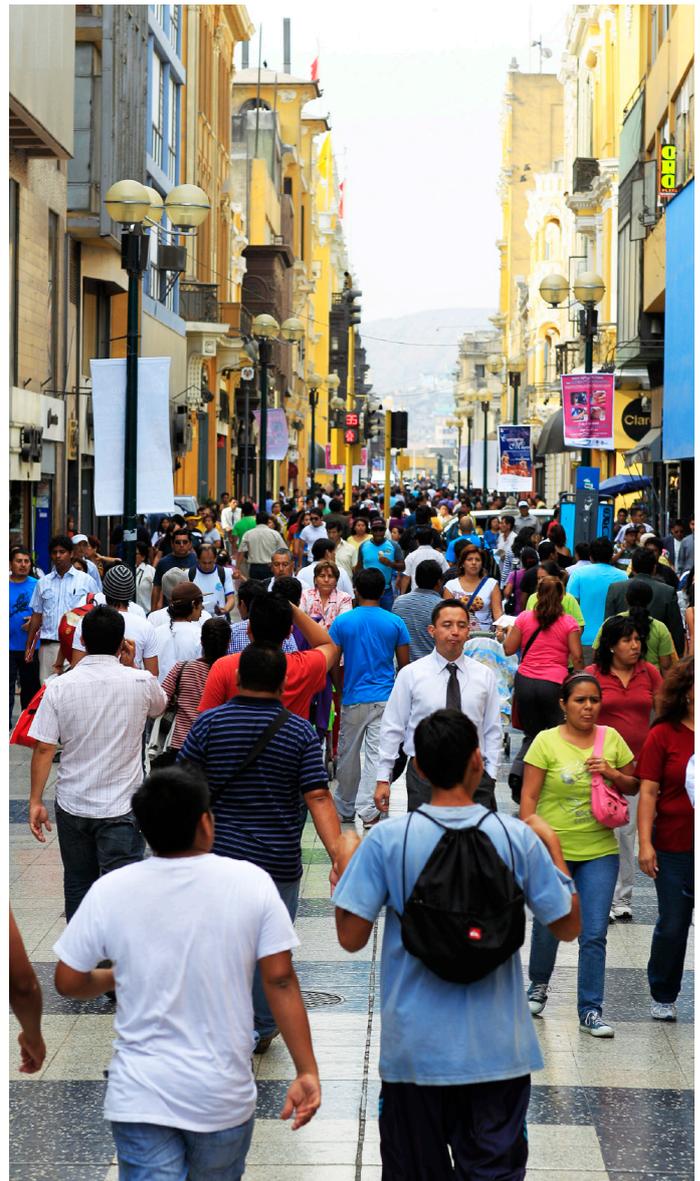
There is an urban paradox: wealth and economic growth concentrate in cities, but so do exclusion and poverty. Poverty in cities tends to cluster spatially into socially segregated neighbourhoods, laying the groundwork for social unrest. No city is immune from social exclusion, whether it occurs in the centre of a restructured industrial hub (Rotterdam, Lille, Detroit) or in the suburbs of some of the richest metro-regions in the world (Paris, London, Chicago). Developing country cities whose population has grown faster than their industrial base have to face the acute challenge of upgrading and incorporating slums, whose population worldwide is projected to reach 889 million by 2020 (UN Habitat, 2010).

### Urban green growth provides a model for achieving sustainable development

Green growth is a key element of sustainable development and economic recovery. Green growth offers a way forward towards a new sustainable development paradigm that will respond to the triple challenge of expanding economic opportunities while mitigating the environmental and social pressures that threaten our ability to seize these opportunities. Green growth fosters economic growth and development while ensuring that natural assets continue to provide the resources and ecosystem services on which our well-being relies. To do this it must catalyse investment, competition and innovation, which will underpin sustained growth and give rise to new economic opportunities. In that sense, green growth is not a replacement for sustainable development, but a means to help achieve it (OECD, 2011g).

Cities have a unique role to play in advancing inclusive green growth and sustainable development. Cities have greater potential to create synergies between environmental and economic objectives because policies that respond to the negative effects of urban agglomeration address both environmental and economic growth priorities, for example road congestion charges, brownfield redevelopment or sustainable cost recovery for water and waste services.

Moreover, attractiveness is a key factor in a city's economic growth and can be hampered by a poor environment. Congestion, pollution and public service constraints affect not only environmental quality, but also the efficiency of local economic activities and cities' ability to attract firms and skilled workers. Finally, the implementation of green growth at the local level can address social issues in a more direct way than at the national level. There are clear instances where green growth initiatives can provide social co-benefits simultaneously, such as reducing social exclusion through public transit enhancements and reducing households' energy costs through energy-efficiency retrofits or solar water heaters.



Taking these examples into account, we define urban green growth as:

*Fostering economic growth and development through urban activities that reduce negative environmental externalities, the impact on natural resources and the pressure on ecosystem services. The greening of the traditional urban economy and expanding the green urban sector can generate growth (through increased supply and demand), job creation and increased urban attractiveness. These effects are in part the result of stronger interactions at the urban level among economic efficiency, equity and environmental objectives (OECD, 2011g).*

Making the most of complimentary policies is also important for developing country cities. Given the importance of urbanisation as a driver of economic growth, there are strong opportunities for efforts that promote greener, more environmentally friendly cities to complement those that promote rapid economic development. A policy approach which aims to address the adverse effects of urbanisation, including environmental degradation, will also contribute to making cities more economically dynamic, thereby supporting broader national economic goals (OECD, 2012c).

Policies aimed at inclusiveness in developing country cities – and therefore at social equity and economic efficiency – often yield double benefits in the form of environmental improvements. This is the case of a mass transportation system replacing old and energy-inefficient taxis and small buses. If public transportation policies are combined with land use policies designed to combat urban sprawl, further reductions in local and global air pollution can be achieved. This is also the case with policies aimed at substituting wood and charcoal for cooking by electricity and bottled gas, as they reduce indoor air pollution and excessive deforestation (OECD, 2011h).

Investments to make cities more environmentally resilient can contribute to green growth. Given their higher densities, more complex infrastructure, and tendency to be located near coasts and waterways, cities in both developing and developed countries are particularly vulnerable to the impacts of rising temperatures, more-severe storms, and rising sea levels. Infrastructure investments to reduce vulnerability to these anticipated impacts of climate change can contribute to economic growth. For example, investments to improve the climate resilience of energy, water and transportation infrastructure can contribute to urban attractiveness as firms are likely to factor the long-term reliability of these services into their siting decisions.

The value of resilient infrastructure will also become increasingly explicit as more and more insurance companies factor in vulnerability to climate impacts into the cost of coverage. Resilient infrastructure investments can result in new jobs, particularly in occupations related to construction and engineering. Finally, improvements to urban infrastructure aimed at increasing resiliency to climate impacts can also increase the efficiency of water and energy delivery, resulting in cost savings for utilities, local governments, and consumers.

## Investing in green urban infrastructure can contribute to recovery

Investing in sustainable cities presents an opportunity for countries to recover from the recession. To make the most of public investments for recovery, governments at all levels need to efficiently manage trade-offs and maximise synergies among policies where they occur. Policies are more likely to reach their goals when they take into account the assets specific to a particular place and seek to co-ordinate the various sectoral policies affecting that place (OECD, 2011d). Not surprisingly, several national stimulus and recovery plans have focused on urban infrastructure projects in key urban sectors such as building, transport, energy and public utilities.

### In practice

Urban sectors have been featured in national green stimulus policies. Korea's "Green New Deal Policy" featured public investment in major infrastructure projects, including the expansion of a high-speed rail line, to stimulate a jump in short-term public employment. In Australia, AUD 3.2 billion were announced for energy-efficiency measures for homes. In the US, the American Recovery and Reinvestment Act (ARRA) focused on the renewable energy sector, requiring states to direct part of their stimulus funding to green investment. In Canada, green measures accounted for approximately 8% of the stimulus budget, with a particular focus on sustainable energy (Hanak, 2009; OECD, 2011i). Transport infrastructure investment has also been a core pillar of the UK economic stimulus plans as a means of generating short-term job creation (e.g. UK's new cross-London rail link and high-speed rail line from London to the north).

Investing in sustainable urban infrastructure can create jobs and jump-start economic recovery along a more sustainable, long-term development path. Green urban infrastructure projects can create jobs, decrease the urban carbon and environmental footprint, and strengthen the resiliency of cities to both economic and environmental shocks. Examples of employment-intensive urban investments include: housing and construction, renewable energy and recycling, pollution control, smart grid upgrades and multi-modal public transportation systems. These initiatives generate short-term employment and improve the overall efficiency of the urban system, which should yield further economic gains over the medium-long term.

## Actual green urban infrastructure investment falls far short of need, however

Investing in green urban infrastructure is challenged by the current global fiscal constraints in an environment where public authorities at all levels are doing more with less. Resources are scarce and all levels of government are affected. Some fiscal stimulus packages, including in the US and South Korea, focused to some extent on urban green growth initiatives, providing more room for public investment in the short term. Since 2010, however, most OECD countries have attempted to curb public debt by reducing public expenditure. As a result, many cities around the world have been faced with a reduction of their local budgets due to reduced intergovernmental transfers and decreased tax bases.

At the same time, global infrastructure investment needs are huge. The OECD has estimated that USD 35 to 40 trillion will be needed to improve the world's infrastructure: this is about USD 2 trillion dollars per year, or 2.5 % of global GDP (OECD, 2007). Major sectors that will need increases in investments include road, rails, telecoms, electricity and water. In line with these estimates, the International Energy Agency (IEA) estimates that an average of USD 48 billion per year will need up to 2030 to be invested into the energy sector alone to meet global population growth, especially for the BRIICS countries: Brazil, Russia, China, India, Indonesia and South Africa (IEA, 2011). The same IEA estimates that a USD 46 trillion increase in energy investment would be required globally between 2010 and 2050 to deliver low-carbon energy systems, which would yield cumulative fuel savings equal to USD 112 trillion (IEA, 2010). A large share of this investment is required in cities.

The urban infrastructure deficit in developing countries is particularly acute. A high proportion of the urban population in Africa and Asia and a significant proportion in Latin America and the Caribbean live in homes and settlements with little or no infrastructure (i.e. no all-weather roads, no drains, no piped water supplies and no provision for electricity). Most urban centres in developing countries have no sewers, including many with several million inhabitants. One recent estimate suggested that the cost of removing the housing and infrastructure deficit in developing countries by 2030 would be about USD 6.3 trillion – and this would include USD 700 billion for expanding housing and infrastructure for growing urban populations (Parry et al, 2009 in UN Habitat, 2010).

Greening urban infrastructure investments are expensive, but fit within the context of global infrastructure investment needs. The total capital cost of infrastructure investments needed to mitigate greenhouse gas emissions of all C40 cities is estimated at approximately USD 3 trillion. This is not an incremental cost, but a total cost, much of which may replace other capital investments. This estimate includes investments by the private sector and all levels of government over multiple years, and does not account for the potential monetary benefits of such investments. If the OECD estimates of global infrastructure investment needs at 2.5% of global GDP per year were applied to the C40 cities, total infrastructure investment needs in C40 cities could be estimated at USD 275 billion per year. The full, multi-year investment needed to reach carbon-neutral activity in all C40 cities is thus estimated at ten times the annual infrastructure investment need in those cities. However, existing urban infrastructure investment falls far short of this. For example, investment by local governments in 20 EU cities averages USD 270 per capita per year, which, if applied to the C40 population, would equal only 80 USD billion per year.

Adaptation to climate changes in cities will require significant funding as well. While estimates on the extent of these costs vary, they generally indicate the need for considerable investment. Global climate change adaptation costs alone are estimated to be between USD 49 billion and 171 billion per year until 2030 (UNFCC, 2007) or several hundred billion dollars a year (International Strategy for Disaster Response, 2009), and cities will need to bear a large share of this cost.

Individual city calculations support overall estimates of green urban infrastructure investment needs. London, for example, has estimated that meeting the Mayor's target to reduce CO<sub>2</sub> emissions by 60% by 2025 will cost about GBP 40 billion and the Mayor's existing climate change mitigation programme is projected to cost about GBP 14 billion by 2025 (KPMG and C40, 2011). These calculations cannot be extrapolated to other cities, as local circumstances vary (e.g. existing infrastructure, required improvements, costs of workforce training, and baseline data). However, an overview of the available data on capital costs of projects in different cities gives some indication of the costs of green urban infrastructure investment, specific to individual city contexts (Table 1).

3. This estimate is based on a rough estimate of C40 emissions of 1,750 MtCO<sub>2</sub>e (Hoorweg et al., 2011) and an average mitigation cost effectiveness of carbon neutral infrastructure projects in cities of 550 t CO<sub>2</sub>e / USD million (Kennedy et al. 2009). This estimate does not account for future population growth in C40 cities. A better estimate of the total capital cost, e.g., broken down by sector, could be produced if GHG inventories were accessible for all C40 cities.

4. Given that the estimated GDP of C40 cities is about USD 11 trillion (Hoorweg et al., 2011)

5. This projection is now considered by some to be an underestimation (Parry et al. 2009), and by others to be an overestimation (World Bank, 2012).



Table 1. Capital costs of selected green projects in a number of OECD cities

Project	City	Annual GHG Savings (kt CO <sub>2</sub> e)	Capital costs (USD million)	Annual GHG Savings (ktCO <sub>2</sub> e/year/ USD million)
Transportation				
Bus Rapid Transit	Vancouver	1.8	39.2	45.9
Congestion charging	London	120	244	491.8
Bike sharing	Paris	18	132	136.4
Buildings				
Solar Air Heating	Montreal	1.34	1.96	683.7
Energy				
Solar Centre Receiver Station	Seville	110	41	2682.9
Urban Wind Power	Toronto	0.38	1.21	314
Solid Waste				
Source-Separation and Methane Production	Sydney	210	75	2800
Incineration-Based CHP	Gothenburg	205	453	452.5
Water/Wastewater				
Biogas from sewage	Stockholm	14	15	933.4

## II. How can we increase green infrastructure investment in cities?

Meeting the need for green urban infrastructure will require a new focus on green funding and innovative solutions. Green infrastructure for cities requires upfront investments, with benefits that will sometimes occur only in the long run and risks related to uncertainty over regulatory, economic and technological developments, including energy prices and the cost of CO<sub>2</sub> emissions. The relatively limited size of urban projects, transaction costs related to mobilising private finance and limited capacity at the urban level present constraints that will have to be addressed. Of course, these considerations are neither insurmountable nor unique to green issues. They apply to “conventional” infrastructure investment as well, a great deal of which must be undertaken in coming decades even if cities do nothing to address environmental sustainability challenges. Nevertheless, the green dimension adds a further degree of uncertainty to the process.

Both cities and investors are often tempted to focus on short-term priorities and concerns, so the challenge will be to develop viable business cases for investment in green urban infrastructure. A new focus on green urban finance and innovative finance solutions is needed, and a range of instruments can help to achieve these goals (Table 2).

Table 2. Main financial instruments in the main green urban sectors

Instruments	Transportation	Buildings	Water /Waste	Energy
Taxes		Property tax		
Fees and charges	Congestion charges Parking fees HOT lanes	Building permits	Tariffs and fees	Electricity user fees
Grants	General grants with environmental indicators; specific grants for environmental goods and services; matching grants			
PPPs	Concessions and Private Finance Initiatives (PFIs), energy performance contracts			
Land-based income		Development charges/impact fees Value capture tax Higher density building rights Tax increment financing		
Loans and bonds	Loans and green bonds			
Carbon finance	Clean development mechanism/Joint Implementation, voluntary carbon offsets			

Cities need to do more with less. In light of the global recession, debt crisis and other financial changes, there are fewer funds available for green urban infrastructure investment. This means creating the right incentives, mobilising the private sector, and tailoring financing mechanisms to urban sectors.

### 1. Get the incentives right.

Urban revenue sources can either help or hinder green policy priorities. Fiscal policies – operating within and across levels of government – should be reconsidered to identify perverse incentives to green growth and sustainable development (see Corfee-Morlot et al., 2012). Relevant instruments include taxes, fees and grants, where fiscal policies and market-based instruments have the potential to provide incentives for green innovation and for green growth in key sectors. These sectors include building (property tax) and transportation (fees and charges), and water and waste (fees and charges). To the extent possible, taxes, charges and fees should be designed to confront agents with the full marginal social cost of actions affecting the environment. At a minimum, this means eliminating the anti-green bias of some existing local tax provisions and the perverse incentives created by many environmentally harmful subsidies.

Three broad principles need to be borne in mind when identifying an appropriate mix of green revenue reforms:

1. **Policy coherence across levels of government is critical.** Reforms to urban revenue sources need to be designed with an eye on the broader policy framework. The greener the national framework, the easier it will be to address city-specific challenges and to ensure coherence and consistency between national and local policies. At times, national-level initiatives may make the need for local action unnecessary; in other cases, they may, on the contrary, create new opportunities for cities to act. And if co-ordination is poor, national and local initiatives can hinder each other's effectiveness. The national framework is particularly important with respect to pricing signals for non-localised environmental externalities, such as greenhouse gas emissions. (Some specific aspects of the national framework that merit particular attention in this context are considered below.)
2. **A holistic approach is necessary.** Efforts to green urban revenue sources may have undesirable distributional consequences. These concerns should be addressed in the context of the entire tax and benefit system, rather than trying to ensure that each individual policy measure serves both environmental and equity objectives. Thus, changes to transfers or non-environmental taxes and charges may be needed to offset the distributional impact of reforms seeking to green some revenue sources.
3. **The instruments should be sophisticated but the package should be simple.** The design of specific instruments will in many cases need to be quite sophisticated in order to avoid creating perverse incentives. Congestion charges, for example, will probably be more effective if they vary according to vehicle type, peak hours, etc. Nevertheless, it is important to keep the overall policy package as simple as possible. An overly complex system of environmental taxes, charges and fees makes impact assessment harder and raises the risk of unintended interaction effects or perverse incentives.

## Property taxes and development fees

Property taxes should be designed to limit urban sprawl. Throughout the OECD, local governments earn the most revenue from property taxes. The impact of these taxes on land use, density and urban sprawl depends on policy choices – what is included and excluded from the tax base, how property value is defined for different classes of property (e.g. residential, multi-residential, farm, commercial and industrial properties), what percentage of the value is taxable, and how effective tax rates vary within and among property classes.

By altering the relative price of property, these taxes can influence a number of decisions regarding property improvement, size and location – and ultimately increase or decrease urban sprawl (Deskins & Fox, 2010).

Priority action to decrease sprawl through property taxes includes:

- Eliminate policies that favour single-family homes over apartments. Policies that favour single-family homes over multi-family properties result in less dense development. Perverse incentives are created when single-family residential properties are offered lower taxes than higher-density properties of the same value (Haveman & Sexton, 2008).
- Tax the land value, not the property. When property taxes are based on land value, rather than buildings or other improvements to the property, owners have an incentive to develop the land to its most profitable use. Development in the urban core could be encouraged by replacing a traditional property tax with a land value tax, or a split-value tax that includes higher rates for land value and lower rates for structures or other improvements.

### In practice

Some municipalities in Pennsylvania, US, use a split-rate property tax to tax land more heavily than structures or other improvements.

Development fees can discourage sprawl and fund infrastructure.

In several countries, municipalities have the discretion to negotiate infrastructure improvements with developers when the municipalities make new land available for urban development. Such contributions from developers could be designed to discourage sprawl if they manage to cover the real costs of infrastructure provision to the new site.

This could be achieved through:

- **Area-specific development charges**, which are a one-time levy on developers to finance the growth-related infrastructure investments needed to serve the new development or, in some cases, redevelopment. This type of pricing policy can be an effective planning tool that renders developers fully responsible for their project costs on to the developer, promotes the need to correct for the external costs of development by increasing land cost, and generates funds for infrastructure development and compensation programmes. For example, the extension of the metro-line in Copenhagen was financed through fees from development of the Ørestad area of Copenhagen (OECD, 2009).



- **The sale of additional building rights.** In São Paulo, for example, the building rights for additional floor space on the top of existing buildings that exceeded normal maximum density were sold in areas authorised for higher-density development. Similar mechanisms can be found in the state of Maharashtra (India), where the maximum floor space index was increased and the extra floor space sold to developers. Both initiatives have generated additional infrastructure funding while increasing urban density. The sale of additional building rights is particularly relevant for growing cities with scarce land, as long as construction and safety standards are taken into account.
- **Taxing low-density development.** France introduced a scheme in 2010 that taxes development that does not meet minimum density requirements. The City of Austin (Texas) has introduced a special transportation levy on all municipal utility bills, based on the estimated average number of daily trips, in effect penalizing less-dense development.

## Transportation fees and charges

Transportation fees should discourage car use and encourage public transit and non-motorised travel. While national or state/provincial governments control most transportation-related taxes, local governments often control transportation fees and charges. The following instruments have been used successfully to reduce the share of car traffic, reduce emissions, and raise funding to finance local transportation infrastructure:

- **Congestion charges** are fees for road use that are applied exclusively or more intensely during peak traffic periods. Congestion charges have reduced CO<sub>2</sub> emissions up to 19.5% in the cities where they have been applied and decreased other air pollutants as well (Beevers & Carslaw, 2005) (Table 3). Higher-polluting vehicles may be charged higher rates (e.g. Singapore, Milan), which more closely ties the congestion charges to greenhouse gas reduction goals. Some cities (e.g. London) use the revenue from congestion charges to finance urban public transport.

Table 3.  
Impacts selected urban congestion charges

	London	Stockholm	Singapore	Milan
Introduced	2003	2006	1975 1998 (2nd generation)	2008
Reduction CO <sub>2</sub> emissions (in %)	19.5%	13%	n.a.	9%
Period of effect	2002-2003	January-July 2006	n.a.	January-December 2008
Other effects	Reductions of emissions (NO <sub>x</sub> , PM <sub>10</sub> ), car traffic	Reductions of emissions (NO <sub>x</sub> , CO, PM <sub>10</sub> ), vehicle passages	Reductions of car traffic and car share n modal split.	Reductions of emissions (PM <sub>10</sub> , NH <sub>3</sub> , NO <sub>x</sub> ) and traffic volumes.

Source: OECD (2010b), *Cities and Climate Change*, OECD, Paris

- **Variable parking fees and taxes** can reduce car trips and encourage public transportation use (OECD, 2010b). Parking fees can even more effectively discourage car use by charging higher rates in congested areas or during peak hours (e.g. Los Angeles and New York City), especially if the parking tax revenue is used to finance public transit.
- **High occupancy toll (HOT) lanes** encourage carpooling by charging a toll on vehicles with less than a minimum number of occupants (usually two or three). The effectiveness of HOT-lanes is mixed, considering the relatively high costs for collecting tolls: e.g. a major HOT lane in Los Angeles has operating expenses totalling 27% of gross revenues (Dachis, 2011).

### Utility fees

Utility fees should encourage resource conservation. Water, waste and energy fees should be used to signal the scarcity of the resource being consumed. This will discourage resource consumption and waste generation, which can in turn increase efficiency and revenues. Many local governments already do link fees to actual consumption of water and energy and actual generation of waste, but many others could strengthen this link to promote conservation and less waste. Fees that are tied to resource consumption or waste generation can fund service delivery and infrastructure improvements, although they are best considered as part of a funding package that also includes taxes and transfers.

### Impact of national policy

National policies' impacts on local incentives should also be reviewed. As noted above, national government policies can support or undermine local green development. It is important to identify and remove perverse incentives so as to encourage infrastructure investment in line with sustainable development and green growth goals.

- **Remove national obstacles to local incentives.** National regulations may in some cases constrain local governments' ability to act. For example, several countries require national government approval for cities to use revenue from congestion charges, as they are considered new taxes (e.g. Denmark).

- **Strengthen local authority to act.** National governments could also introduce requirements and standards for infrastructure cost recovery (e.g. Netherlands).
- **Design general grants to cities to compensate for environmental service provision and opportunity costs of environmental preservation.** A large share of many cities' revenues comes from development rights, building permits and the income related to new development. Some national governments have begun to compensate local governments for these opportunity costs by revising their grant allocation formulas to account for environmentally protected municipal land.
- **Provide specific-purpose and matching grants to align local action with national green growth and sustainable development goals.** Green urban infrastructure investments are often public goods with effects beyond local governments, so intergovernmental grants would have to "internalise" these externalities, which can be done through specific purpose grants. A way to align national and urban objectives consists of matching grants, which depend on co-funding by the local government that receives the grant. This reduces the marginal cost of investment for local governments and therefore increases the level of goods they are willing to provide.

### In practice

Portuguese national grants reward municipalities for designating Natura 2000 sites and other protected areas within their boundaries, representing 5% of total money allocated through this grant. Several Brazilian states allocate state tax revenues to municipalities based in part on the amount of land municipalities set aside for environmental protection (OECD, 2010b).

## 2. Mobilise private finance

Private sector urban financing is increasingly being used for green infrastructure projects. Three conditions help make this possible and determine their success: ensuring sufficient return in order to balance the risk (matching the right financing tool to the risk); scaling the project to be large enough to lower transaction costs, increase returns and attract investment; and guaranteeing competitive pricing signals for green technologies used.

*Public-private partnerships can diversify green finance.*

Public private partnerships (PPPs) are already funding a diverse set of green urban infrastructure projects. Several urban infrastructure projects funded through PPPs were identified by the C40 Climate Leadership Group as best practices (Table 4) (C40 and ARUP, 2011).

Table 4. C40 best practice projects

	Activity	City	Country	Governance	Type of contract
Transport	Bicycle sharing	Paris	France	PPP	Concession
		London	UK	PPP	
		Barcelona	Spain	PPP	
		Oslo	Norway	PPP	
		Lyon	France	PPP	
		Stockholm	Sweden	PPP	
		Brussels	Belgium	PPP	
		Seville	Spain	PPP	
		Dublin	Ireland	PPP	
	Copenhagen	Denmark	NGO		
	Bicycle paths	Bogota	Columbia	In-house	
	Congestion charge	Stockholm	Sweden	Procurement	
Energy	Renewable energy supply	Austin	USA	In-house	
		Melbourne	Australia	Procurement	Supply and install
		Rizhao	China	Public	Regulation, subsidy
		Barcelona	Spain	Public	Regulation
	Energy savings	Chicago	USA	In-house	
		Copenhagen	Denmark	In-house	
		Tokyo	Japan	Public	Regulation
	Street lighting	Los Angeles	USA	In-house	
Building	Energy savings	Berlin	Germany	PPP	ESP1
		London	UK	PPP	EPC2
		Stuttgart	Germany	In-house	
		Paris	France	PPP	PFI3
Urban development		Dongguan	China	PPP	
Waste	Waste management	Gothenburg	Sweden	PPP	Management contract
		Sydney	Australia	PPP	BOO4
		Dhaka	India	NGO	
Water	Water distribution	Tokyo	Japan	In-house	
		Emefuloni	South Africa	PPP	BOT5
		Austin	USA	Public	Regulation, subsidy

1. Energy Savings Partnership

2. Energy Performance Contracting

3. The French PFI applied to Energy Performance Contracting is called *Contrat de Partenariat de Performance Énergétique*

4. Build-Own-Operate contracts: the private operator builds, owns, and operates the infrastructure project.

5. Build-operate-transfer contract: the operator builds the infrastructure project, operates it and eventually transfers ownership of the project to the government.

Source: OECD (2012d forthcoming), *Financing urban green growth*, OECD Regional Development Working Paper OECD, Paris; C40 and ARUP (2011), *Climate Action in Megacities: C40 Cities Baseline and Opportunities Version 1.0*, C40 Climate Leadership Group, available at: [www.arup.com/Publications/Climate\\_Action\\_in\\_Megacities.aspx](http://www.arup.com/Publications/Climate_Action_in_Megacities.aspx).



## What are public-private partnerships?

Public-private partnerships (PPPs) are long-term contractual agreements between a private operator, company, or consortium and a public entity under which a service is provided, generally with related investments. PPPs are characterised by the transfer of some of the risk to the private partner and long-term contracts, covering multiple stages of an investment project. Unlike traditional public sector procurement, where the private contractor simply designs and/or builds what the public sector orders, PPPs involve a competitive tendering process in which private operators bid for a contract to design, finance and manage the risks involved in delivering public services or assets. In return, the private contractor is paid fees by the public body and/or tolls from users for the long term operation and maintenance of the asset. Two main types of PPPs – concessions and private finance initiatives (PFIs) – differ in terms of the level of risk the private sector assumes. Payment under PFIs depends on the operator's ability to meet performance targets, while revenues under concessions are directly tied to consumption, and so are more exposed to risk associated with changes in demand.

PPPs can make green public investment more efficient and effective, under the right conditions. PPPs can make undertaking and operating large projects more efficient through competitive bidding and concession contracting processes. PPPs can also diversify business risks and the stakeholders engaged in the project. These benefits depend, however, on well-designed, well-implemented concessions and related government regulations. Conditions for successful green urban PPPs include:

- **Interaction and negotiation:** Interaction and negotiation with one or several operators during the call for bidders phase can clarify the objectives of the partnership, but is a practice that is far from common. However, it can provide innovative technological solutions that had not been envisioned by the public body. In order for this phase to be efficient, the public body must have enough expertise and generate enough competition to be able to challenge the candidates.
- **Effective partnerships:** Because PPPs can last much longer than traditional procurements for assets or services – from 15-90 or more years – it is essential to establish a real partnership beyond a mere financial relationship, based on cooperation and sharing of expertise. This requires the public entity to have sufficient expertise to design the PPP in way that meets long-term sustainable development and green growth goals.
- **Clear environmental objectives:** Effective green PPPs are only possible if their environmental objectives and their weight in the award procedure are clear. The addition of green requirements after the project has begun can raise costs and risks locking in technologies that are incompatible with sustainable development or green growth goals. Environmental objectives should be clearly defined and output should be measurable, which requires the development of better city-level sustainable development indicators.
- **Anticipation of change:** Enabling efficient response to changing requirements and new technologies is key to long-term success of a PPP. In addition, the contract should include descriptions and projections of how partners will facilitate the evolving PPP relationship over time and what will happen (renegotiation, termination etc) in the event of unanticipated events, such as lower than expected demand (Sydney harbour tunnel) or higher than expected costs (Paris bicycle share programme).

National government assistance can increase the success of urban green infrastructure PPPs. In addition to the necessary pre-conditions of transparency and sound financial management practices for all private-sector contracting, national governments can also support the development of green urban PPPs by:

- **Providing incentives to reduce the uncertainty related to urban green growth projects.** The high level of uncertainty characteristic in green projects increases the insecurity and instability of the PPP. Certain national governments (e.g. South Korea) have put in place financial transfer and incentive measures to eliminate some of this uncertainty and stimulate urban green growth PPPs.
- **Increasing cities' capacity to design and manage PPPs.** Local governments face the challenge of designing and implementation PPP contracts with private sector partners who may have much greater technical expertise and knowledge of the project requirements. To minimise this information asymmetry, national governments should provide technical assistance to cities. This could take the form of what has been called "dedicated PPP units", specialised public bodies with PPP experts, which already operate at the national in several OECD countries to increase the capacity of the public sector in engaging in PPPs (OECD, 2010c).

### In practice

The national government of South Korea implements various kinds of financial and tax incentive policies that can facilitate green growth PPP financing, in line with its First Five-Year Action Plan for Green Growth initiated in 2009. More specifically, the government provides (i) construction subsidies, (ii) compensation for base cost, (iii) infrastructure credit guarantees via the Infrastructure Credit Guarantee Fund, and (iv) tax incentives.



## *Value-capture taxes and tax-increment financing are innovative ways to leverage private finance.*

Existing models can be used to access private sector leverage. Private finance for green urban infrastructure can be increased by capturing the value increases resulting from new public infrastructure investment. This has been particularly applied in the transportation sector. Singapore, for example, has made ample use of these instruments to finance infrastructure, but the implementation challenges Poland faced with similar instruments show that it is essential to use well-established methodologies to measuring value increases.

- Value capture tax is an increase in property values arising from public infrastructure development. This higher value results from the increased desirability of the location, better access, and the potential for higher rents, increased resale value and higher-density development. Value capture taxes have been used to finance transport infrastructure in cities as different as Hong Kong, Miami, Milan and Bogotá.
- Tax increment financing (TIF) allows municipalities to earmark tax revenue from assessed property values within a designated area as economic development and use those finances to fund local public transportation programmes, for example.

## *Cities can increase their use of loans and bonds.*

Larger access to loans and bonds could help to mobilise finance for green urban investment. Bonds provide institutional investors, such as pension funds, stable yields and limited risks. Urban green growth investments currently use both to a limited extent, but they could be more often leveraged for infrastructure investments (Della Croce et al., 2011). There is a relationship between access to borrowing and cities' own revenue sources: the more revenue sources a city has, the higher its perceived repayment capacity, and thus the greater its access to debt markets, including loans.

Local government access to private loans could increase as long as sound local financial management practices are in place. Some OECD member states' fiscal rules may ban local governments from borrowing or issuing bonds; while others constrain the size of municipal budget deficits or debt levels. In most OECD countries, local governments are only allowed to borrow to finance investment (i.e. the golden rule for debt financing). In some countries, only long-term borrowing is limited to investment, while short-term loans may be used to finance operating expenditures.

Local borrowing is also subject to prudential regulations, based on debt service and repayment capacity. In most countries, collateral restrictions exist for debt issuance. As a result of all these constraints, local governments generally have a low debt to GDP ratio; only in a few OECD countries, like Denmark, Iceland, Italy and the Netherlands, does the stock of local government liabilities reach 10% of GDP or more. However, sound local financial management practices could limit the risk that increasing access to borrowing could also increase sub-national fiscal irresponsibility.



Green bonds are promising vehicles for cities to attract private finance. Green bonds provide a channel for directing institutional investor capital towards green projects (Della Croce et al. 2011). Institutional investors in OECD countries are looking for long-term investments with steady yields and limited risks; so their portfolios are dominated by bonds, accounting for half of total assets under management in OECD pension funds. The share of bond investment in green infrastructure is currently small, and even smaller for green urban infrastructure, but three promising models exist:

1. **Multi-national development banks have started to fund green bonds.** To ensure returns, the World Bank's green bonds were structured with standard financial features, such as a AAA credit rating. Urban green investment projects are estimated to make up 20% to 25% of the green bond portfolio. Other development banks have created similar instruments: the European Investment Bank has developed Climate Awareness Bonds that financed green projects in several cities, such as district heating in Paris.
2. **US Green Bonds.** Unlike many other countries, the US has a well-developed market of tax-exempt local bonds that can substantially help finance cities. These include: Clean Energy Renewable Bonds (CREBs), Qualified Energy Conservation Bonds (QECBs), Property Assessed Clean Energy Bonds (PACE) and Build America Bonds (BABs) (e.g. see Della Croce et al. 2011). Some cities, including Chicago, have developed their own green bond programme for energy efficiency and renewable energy goals. Such programmes, however, are only viable for cities that have credit ratings that are similar to the national credit ratings; if not, a national programme would make more sense.
3. **Climate-specific institutional investors groups.** Several institutional investors have grouped together to form climate change groups (e.g. Institutional Investors Group on Climate Change (IIGCC) and the Investor Network on Climate Risk). They are creating their own financing packages such as climate bonds and could potentially be interested in urban sustainability projects.

## What are green bonds?

Green bonds are fixed-income securities issued to raise the necessary capital for a project that contributes to a low carbon, climate resilient economy. While green bonds can be issued by governments, multi-national banks or corporations, most to date have been issued as AAA-rated securities by the World Bank and other multi-lateral development banks, such as the European Investment Bank (EIB) and the Asian Development Bank (ADB). Green bonds have been designed to attract capital from institutional investors, or as a means for governments to direct funding to climate change mitigation. The current market size for all green bond issuance – approximately USD 15.6 billion – is however still marginal (0.017%) compared to the capital held in global bonds markets.

**Green bonds are most promising when cities and national governments cooperate.** Cities generally have lower credit ratings than their respective national governments, as their default risk is considered to be higher (Canuto & Lio, 2010). When green bonds are issued by cities and local governments, investors will be looking for risk compensation. This is the reason why the federal government in the

US financially supports municipal bonds (through tax exemptions and subsidies). For this reason, some form of urban-national cooperation is required in order to make green bonds for cities a viable option. For cities in low and middle-income countries, the World Bank offers green bonds as part of project financing within a country's assistance portfolio, so cooperation with national governments is necessary.

**Green infrastructure banks could help solve market failures and the challenge of limited market size.** Development banks serve to unify finances and distribute it across countries; such projects may include waste infrastructure or water treatment. Development banks like the Green Infrastructure Investment Bank (GIB) being set up by the UK, may offer financial benefits such as technical assistance or lengthening the repayment period for a loan. For this purpose, the UK Government unified local government spending into a lump sum of GBP 100 million to invest in smaller waste infrastructure projects (typically in the size range of GBP 15-25 million), on a fully commercial basis.

The waste infrastructure projects will be transacted initially through specialized fund managers experienced in this sector, in order to ensure that government funds are deployed on equal terms with private capital. The bank manages the full procurement process of these types of loans and investments.

*Carbon finance could be more widely applied in cities.*

**Obstacles to cities' access to carbon finance need to be addressed.** Cities could also take better advantage of opportunities provided by carbon finance (Clapp et al., 2010). The two greenhouse gas offset mechanisms put in place by the Kyoto Protocol under the UNFCCC are the Clean Development Mechanism (CDM) and Joint Implementation (JI). Both can serve as sources of revenue for metropolitan areas. CDM allows developed countries to purchase certified carbon credits from approved emission reduction projects in developing countries, and JI from emission reduction projects in other developed countries. In addition, voluntary carbon markets can and have been used to put a price on carbon, independent of any national emissions cap.

Another option is to use domestic offsets as an incentive mechanism, by agreement between local and national governments; in this case national governments could agree to "pay" local governments for emission reductions achieved by local policies, thus assisting with the achievement of national mitigation targets. To date, the participation of cities and urban mitigation projects in the global carbon markets remains extremely limited. Reasons for low participation include (Clapp et al. 2010; World Bank, 2010):

- limited autonomy of urban authorities to directly regulate greenhouse gas emissions;
- limited budgets and access to start-up capital;
- limited institutional and technical capacity;
- difficulties in measuring the effects of urban mitigation projects with existing methodologies and lack of standardised methodologies (e.g. for greenhouse gas inventories at the urban level);
- small scale of municipal-level greenhouse gas reduction initiatives (e.g. improved efficiency of street lights) that do not warrant the transaction costs of pursuing carbon finance ;
- lack of support from national governments

Overcoming these barriers could facilitate cities' engagement in carbon finance. Future use of these instruments by cities needs to be integrated into urban planning and financial frameworks so that carbon financing, if and when available to support urban mitigation projects, also contributes to the broader urban sustainability agenda.

## 3. Tailor financing mechanisms to urban sectors

**Each of the above mechanisms apply in different ways to specific urban sectors.** The sectors of *building, transportation, energy, water and wastewater*, and *solid waste* present opportunities for green growth and sustainable development, as they are not only the dominant sources of urban energy consumption and greenhouse gas emissions, but they also shape resource consumption, waste generation, and quality of life.

They can present opportunities to reduce environmental impact and to contribute to growth, particularly in terms of job creation, strengthening the market for green goods and services, urban attractiveness, cost savings, and increasing social equity.

## Building sector - financing green building construction and energy efficiency retrofits

What are the priorities for building sector green infrastructure investment?

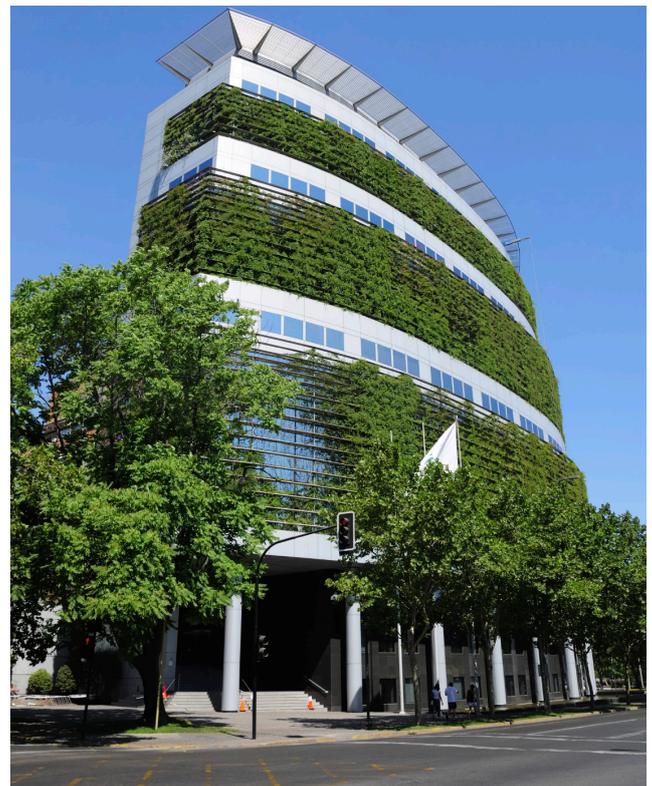
- Public construction of green buildings and investments in eco-neighbourhoods e.g. Stockholm Royal Seaport.
- Lowering the barriers to private construction of green buildings e.g. Kronsberg Passive House Estate in Hannover, Germany
- Energy-efficiency retrofitting of city-owned buildings e.g. matching funds for retrofitting schools in Japanese cities.
- Lowering the barriers to energy-efficiency retrofitting of privately owned buildings e.g. Berlin energy efficiency retrofit programme, Melbourne commercial retrofit loan programme.

What financing mechanisms could be used?

- Financial mechanism such as Property-Assessed Clean Energy (PACE) programmes allow property owners to borrow funds from their municipality to pay for efficiency improvements. The cost of the loan is added to the property tax bill and is repaid as part of regular tax payments. PACE loans stays with the property, encouraging investment even by property owners who do not expect to stay long enough to recover their investment.. Municipalities establish a funding pool from private investors to pay for the upfront installation costs; the pool is repaid into a revolving loan fund.
- Intergovernmental grants, loans or subsidised tax deduction for municipal bonds can leverage private financing for a city to retrofit its government property.
- Energy Service Companies (ESCOs) offer energy efficiency improvement or energy services based on performance, in which the ESCO's payment is directly linked to the amount of energy saved (in physical or monetary terms) (e.g. Energy Performance Contracting) (Ürge-Vorsatz, et al 2007). Cities may set minimum requirements for energy savings and help individual property owners contract with ESCOs.
- Leveraging partnerships from CDM/JI could incentivise private investors.

### What are the buildings sector environmental challenges?

Buildings are key energy consumers and contributors to greenhouse gas emissions. On average, energy used in buildings in OECD cities account for 35-40% of cities' energy consumption on average (Milan conference), and in C40 cities' building energy accounts for 45% of carbon emissions (C40 & ARUP, 2011).



What are the socio-economic benefits of investing in building sector green infrastructure investments?

- **Job creation:** Green building construction and energy-efficiency retrofits are expected to generate considerable job growth over the medium to long term in many cities. Retrofitting existing buildings to increase their energy-efficiency involves a relatively high demand for low and semi-skilled labour. The design and construction of new green buildings call for both low and medium-to-high skilled labour.
- **Strengthening the market for green goods and services:** Green building regulations and energy-retrofitting programmes can stimulate the demand for more resource-efficient products and energy efficiency consulting services all along the value chain.
- **Increased urban attractiveness:** Energy-efficiency retrofitting and new green building requirements improve the quality of a city's residential and commercial building stock, which can attract new firms and residents.
- **Cost savings:** The green building design and construction sector has the potential to generate cost and energy savings for energy consumers.
- **Social equity.** Retrofitting can lower energy costs for poorer households, who often spend a greater share of their budget on energy. Some cities have implemented specific green jobs programmes that target disadvantaged groups.

## Transportation sector – financing public transportation, greening fleets and encouraging non-motorised travel

What are the priorities for transportation sector green infrastructure investment?

- Expanding public transportation lines and modes, and enhancing quality e.g. Paris, Beijing
- Enabling non-motorised travel e.g. Paris's 'Vélib' programme and bicycle lane improvements, Rio de Janeiro's Samba and Montreal's Bixi programme
- Greening the public fleet e.g. Toronto's Green Fleet Plan
- Reducing vulnerability of transportation infrastructure to climate change impacts e.g. flood risk included in the design of Copenhagen's metro stations (OECD, 2011)

### What are the transportation sector environmental challenges?

The sector, which includes the movement of both people and goods, is a major determinant of cities' environmental footprint pollution, as it is responsible for 23% of world CO<sub>2</sub> emissions and a significant amount of localised pollution. Rising income and car use in developing countries will exacerbate traffic congestion and air pollution. For example, in Bangkok, transportation alone is responsible for 38% of the city's total emissions whereas electricity contributes with 33% and solid waste and wastewater with 20% (UN-Habitat, 2010).

What financing mechanisms make this possible?

- **Tax increment financing (TIF)** allows municipalities to earmark property tax revenue from assessed property values within a designated area as economic development and use those finances to fund local public transportation programmes.
- **The build-operate-transfer (BOT) model** enables the recovery of private-sector investment through its operation and maintenance: a private entity receives a concession from the public sector to finance, design, construct, and operate a facility stated in the concession contract.
- **Receipts from congestion charges, HOT lanes, parking fees and taxes** are used to finance urban public transport. Cities and local government dispose of fees and charges through which they can finance local transportation infrastructure.
- Intergovernmental grants, loans or subsidised tax deduction for municipal bonds can leverage private financing for building roads.
- Direct public investment through green bonds, green investment banks and CDM/JI incentivise private sector investments by leveraging partnerships for a portion of the costs of the infrastructure development. For example, Transmilenio Bus Rapid Transit System in Bogota Colombia (Clapp et al., 2011).



What are the socio-economic benefits of investing in transportation sector green infrastructure investments?

- **Job creation:** The urban transport sector represents a significant public employer in many cities: operation of the public transportation sector employs 164 043 people in Mumbai, 78 393 in New York City and 24 975 in London (UNEP, 2011). Developing and expanding public transit networks can lead to both short-term job creation during the construction phase, as well as job growth over the medium- and longer-term (e.g. operators and maintenance workers). Furthermore, the development of new multimodal stations when the public transport network is extended can lead to the creation of yet further jobs linked to the growth of new activities (establishment of offices, businesses and other services).
- **Strengthening the market for green goods and services:** Developing the public transport network and vehicles that generate less pollution can help to fuel regional demand for transport-related green goods and services all along the value chain, such as the manufacturing of parts for public transit equipment.
- **Increased urban attractiveness:** Expanding the public transit network can effectively expand the size of the regional labour market– an asset in attracting firms. Public transport infrastructure investments tend to increase the value of nearby properties. Finally, urban amenities designed to attract people to non-motorised forms of travel can enhance the attractiveness of the urban area to firms and residents (e.g. walkable neighbourhoods, bicycle-share programmes).
- **Cost savings:** Investments to reduce the use of personal vehicles also reduce the costs associated with congestion, which can undermine urban competitiveness. Increasing the climate-resiliency of transport infrastructure is also expected to generate cost savings over the long term.
- **Social equity:** Expanding public transit and enhancing options for non-motorised travel can reduce urban fragmentation and the exclusion of poorer and disadvantaged neighbourhoods. Increased accessibility can increase job opportunities for residents of neighbourhoods previously disconnected from or ill served by public transportation.

## Energy sector – investing in, generating and enabling renewable energy generation

What are the priorities for energy sector green infrastructure investment?

- **Renewable energy generation.** e.g. Los Angeles GreenLA Climate Action Plan targets or Copenhagen's development of wind energy installations to offset energy use
- **District heating and cooling.** e.g. expansion of Copenhagen's district energy system to include cogeneration; changes in energy grid model
- **Purchase of renewable energy for city or regional operations.** e.g. Seoul's plan to expand its renewable energy share from 1.5% in 2007 to 20% by 2030.
- **Requiring or lowering the barriers to distributed renewable energy generation** e.g. Barcelona Solar Ordinance

### What are the energy sector environmental challenges?

Fossil fuels still account for a large share of cities' energy consumption. In 2007, cities and towns directly consumed approximately 340 EJ (8 100 Mtoe) of primary energy, with higher per capita consumption of coal, gas and electricity than rural residents (IEA, 2008). The share of renewable energy consumed will need to increase greatly to meet greenhouse gas emission reductions targets. The IPCC 4th Assessment Report projected 33% electricity and 10% biofuels coming from renewable energies in 2030 (IEA, 2009; IPCC, 2007). Cities' impact on greenhouse gas emissions varies greatly with the carbon intensity of the energy source. For example, Cape Town has comparatively lower per capita electricity consumption than Geneva but its electricity consumption has a higher greenhouse gas emissions factor per unit since South Africa uses coal to generate 92% of its electricity while Switzerland relies heavily on hydropower (Kennedy et al, 2009b).

What financing mechanisms make this possible?

- Financial mechanism such as Property-Assessed Clean Energy (PACE) programmes allow property owners to borrow funds from their municipality to pay for distributed renewable energy technologies, similar to energy efficiency investments in the building sector.
- Intergovernmental grants, loans or subsidised tax deduction for municipal bonds can leverage private financing for a city to generate or purchase renewable energy.
- Leveraging partnerships from CDM/JI could incentivise private sector investments. For example, the Fuel Switching and Energy Efficiency Project in the North Rhine Westphalia, Germany (Clapp et al., 2011).

What are the socio-economic benefits of investing in energy sector green infrastructure investments?

- **Job creation:** New investments in renewable technologies are generally more labour-intensive than investments to expand fossil fuel-based energy generation. Distributed solar Photovoltaic (PV) in particular are labour-intensive: installing a



large 100 MW solar PV array in the desert requires significantly less labour than installing 100 MW of 4 kW residential rooftop PV systems (i.e., 25 000 systems). Labour demands, particularly for maintenance and operation vary significantly across renewable technologies. Installing 1 Mwa of wind turbine capacity creates an estimated 0.7-2.9 times as much permanent employment as a comparable natural gas combined cycle (NGCC) power plant; installing 1 Mwa of rooftop solar PV creates an estimated 7.8 times more employment than a NGCC power plant (Kammen et al., 2006; OECD, 2010b).

- **Strengthening the market for green goods and services:** Stimulating the renewable energy sector can lead to increased demand for renewable energy technologies all along the value chain, including manufacturing, installation, maintenance and consulting services.
- **Increased urban attractiveness:** Increasing a city's share of renewable energy has been part of some cities' strategies to attract firms and residents by offering cleaner energy protection, improved air quality, and responding to a demand for green energy.
- **Social equity:** (IEA, 2011) Distributed renewable energy, such as solar panels, can provide more reliable sources of power than what many poorer households in developing countries currently experience.

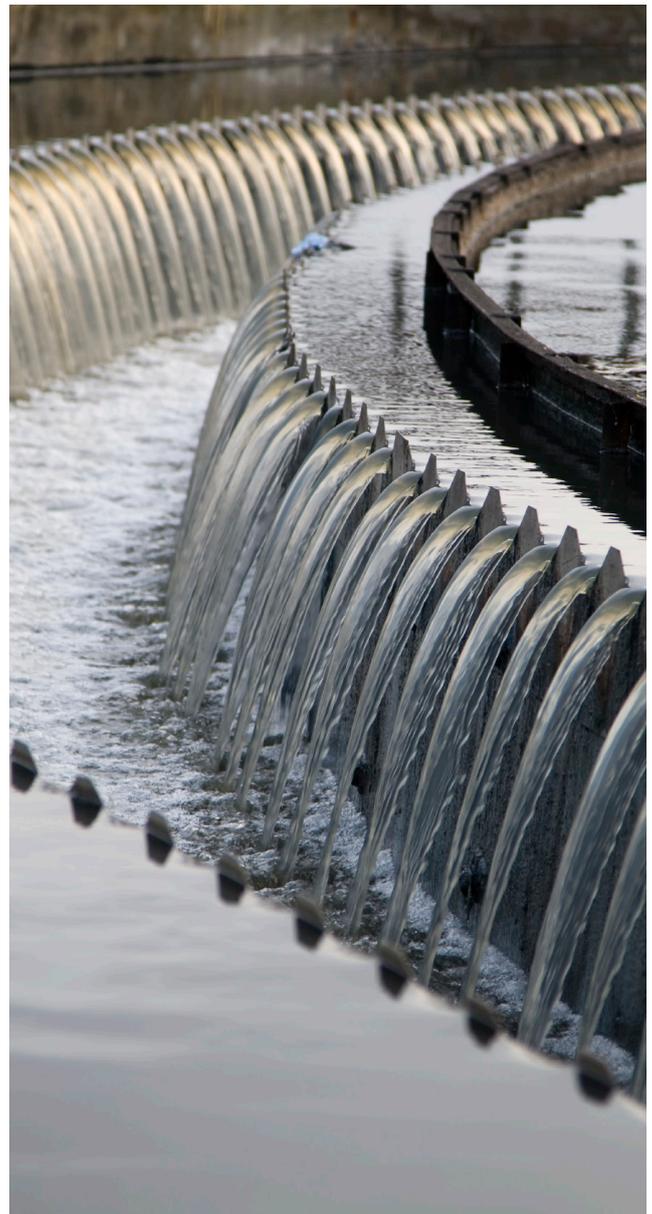
## Water sector – improving water quality and increasing conservation

What are the priorities for water sector green infrastructure investment?

- **Infrastructure upgrades** to increase efficiency, improve wastewater treatment quality, and increase resilience to climate change impacts (e.g. tackling water leakage by upgrading pipes in Tokyo)
- **Deploying water conservation and reuse technologies** through financial incentives for recycled water systems and low-flow appliances (e.g. Melbourne)
- **Using natural systems to provide wastewater treatment service** (e.g. land treatment for wastewater and vegetated land, and constructed wetlands for small communities and rural areas) OECD (2011h); and C40 & ARUP, 2011)

### What are the water sector environmental challenges?

While most OECD countries have been able to ensure adequate access to a safe water supply for human needs and significant efforts have been made to treat organic pollution from urban wastewater, considerable investments are needed to retrofit wastewater infrastructure and insufficient progress has been made to tackle pollution arising from agricultural runoff and other non-point sources of pollution. A large share of the population in many developing countries lacks access to sewerage infrastructure. Progress in establishing more sewerage infrastructure is expected to continue to 2030, but it is still projected that there will be 1.1 billion more people worldwide in 2030 who lack access to basic sanitation services compared with 2000 (OECD, 2011h; Jouravlev, 2004).



What financing mechanisms make this possible?

- User fees linked to water consumption
- Intergovernmental grants, loans or subsidised tax deduction for municipal bonds
- Leveraging partnerships from CDM/JI could incentivise private sector investments. For example, the Solar Water Heating Systems programme in Ho Chi Minh City, Vietnam, which uses the “programme of activities” approach. (Clapp et al. 2011).

What are the socio-economic benefits of investing in water sector green infrastructure investments?

- **Job creation:** Investment in water efficiency could boost overall GDP and create jobs across a range of sectors, including the construction, manufacturing, retail trade and waste sectors, and provide low-skilled jobs (Alliance for Water Efficiency, 2008) A US Council of Mayors report found that adding one job in the water and sewerage sectors creates 3.68 jobs in the national economy to support these jobs (Krop, et al., 2008).

- **Strengthening goods and services:** Demand for water technologies to conserve and improve water quality can boost innovation across the value chain (e.g. Milwaukee Water Council cluster).
- **Increased attractiveness to firms:** Adequate water and sanitation can be key drivers for economic growth (OECD, 2011h). Recent estimates by the US Conference of Mayors indicate that USD 1.00 of water and sewer infrastructure investment can increase private long-term output (GDP) by USD 6.35 (Krop, et al., 2008).
- **Cost savings.** Water is energy intensive in its delivery, which contributes to higher cost. Increased water conservation contributes not only to water savings but also energy savings.
- **Social equity:** The benefits of basic water supply and sanitation services, including time gains and reductions in waste-borne diseases, can far exceed the costs particularly in developing countries.

## Waste sector – diverting waste from landfills and creating energy from waste

What are the priorities for waste sector green infrastructure investment?

- Waste-to-energy and landfill methane capture-to-energy plants (e.g. Amsterdam Afval Energie Bedrijf waste-to-energy plant provides electricity to 285 000 households and district heating and hot water to 20 000 households; Durban waste-to-energy; Monterrey, Mexico landfill methane gas capture providing electricity to power the city's light-rail transit system and its streetlights)
- Direct investment in public or enabling of private recycling and composting services (e.g. San Francisco's composting programme).

### What are the waste sector environmental challenges?

Urban waste contributes to climate change through the release of methane (CH<sub>4</sub>) and, to a lesser extent, CO<sub>2</sub> in landfills and emitted by waste incinerators. Waste generation levels are growing in OECD countries, and are projected to increase by 38% from 2005-2030 (OECD, 2008). In BRICS countries, the increase will be more severe: for example, urban municipal waste generation in China is expected to grow 214% over 2004-2030, to 1.5kg/capita/day, and in India it is expected to grow 130% over 2001-2030, to 1.4kg/capita/day (OECD, 2008; World Bank, 2005). Municipal waste generation in Brazil, Russia, Indonesia and South Africa in 2005 was already significantly higher than in China and India, approaching waste generation rates in Asian OECD countries. Over half of all waste is inappropriately disposed of in Brazil, Indonesia and South Africa (OECD, 2008).

What financing mechanisms make this possible?

- User fees linked to waste generation
- Intergovernmental grants, loans or subsidised tax deduction for municipal bonds
- Leveraging partnerships from CDM/JI could also incentivise private sector investments. Example: the Landfill Gas Utilisation Project in Christchurch City, New Zealand (Clapp et al, 2011).

What are the socio-economic benefits of investing in waste sector green infrastructure investments?

- Job creation and social equity: Operations promoting re-use can create employment or training opportunities for marginalised populations (Curran & Williams, 2010; Sharp & Luckin, 2006). Informal recycling plays an important role in cities throughout Asia and in Latin America (Nas & Jaffe, 2004; Leslie & Utter, 2006).
- Strengthening the market for green goods and services: Programmes to increase recycling can strengthen private sector operations. For example, Kitakyushu, Japan launched the Eco-Town project in 1997 to foster an industrial recycling cluster, which by 2008 had grown to 26 companies and 17 research institutions were in operation, employing 1 352 people (OECD, 2011h).
- Cost savings – Eco-industrial parks save firms money by converting waste and lost energy from one firm into inputs for another. For example the diverse firms in the eco-park of Kalundborg utilise each other's surplus heat and waste products, with annual estimated savings of USD 12-15 million.
- Social equity – Given the impact on water, air and health of waste that is inappropriately burned or dumped, investments to recycle or incinerate waste in line with environmental best practices can improve the quality of life for poorer communities, where inappropriate waste disposal may be more prevalent.



### III. How can cities advance the Rio+20 agenda?

#### Cities matter for global sustainable development

In June 2012, two decades after the first Earth Summit, the international community will return to Rio de Janeiro to secure a renewed commitment to a sustainable model of development that is inclusive, economically resilient and respectful of the environment. The Rio+20 global conference centres on two themes: (a) the green economy in the context of sustainable development and poverty eradication, and (b) the institutional framework for sustainable development.

Potential operational outcomes currently under discussion by countries may include:

- Initiation of a process toward development of global Sustainable Development Goals (SDGs) for 2015 that, while universal and applicable worldwide, would allow for differentiated approaches among countries.
- A call to business and industry to develop green economy plans or commitments for their respective sectors, with concrete goals and benchmarks of progress (e.g. net creation of jobs).
- A voluntary Compendium of Commitments, which would house commitments to advance sustainable development, brought forward by governments, the private sector, NGOs and other stakeholders.
- The creation of an international knowledge-sharing platform to facilitate countries' green economy policy design and implementation, as envisaged in the current Rio+20 zero draft outcome document.

Whatever countries agree to at Rio+20, it will be critical that cities be reflected as integral actors for two fundamental reasons:

1. Addressing urbanisation will be necessary for achieving sustainable development objectives. A more sustainable, equitable form of urbanisation is imperative for advancing the green economy and sustainable development agenda of the Rio+20 conference.
2. Local government officials are already taking action towards inclusive green growth. They are the core implementers of national policies relating to climate change, water reform and waste management, and they are the level of government that is closest to citizens. City officials have also engaged in public information and awareness campaigns to change consumer behaviour in favour of cleaner, greener habits.

#### Cities are key to implementing green growth and sustainable development

It will take city-level action to implement green growth strategies and advance towards sustainable development. The lead-up discussions to Rio+20 have revealed divergent views on how to define the green economy and how it is applied to different country circumstances in relation to sustainable development.

While interrelated, sustainable development, green economy and green growth should be understood as distinct but mutually reinforcing concepts. Stronger policy complementarities at the local level put cities in a better position to reconcile economic, environmental and social equity objectives.

#### The link between green growth and sustainable development.

According to the UN, sustainable development emphasises "a holistic, equitable and far-sighted approach to decision-making at all levels... not just strong economic performance but intra-generational and intergenerational equity" (UN, 2012). The concepts of both the green economy and green growth, on the other hand, focus more explicitly on the intersection of environmental and economic objectives. The OECD definition of green growth focuses on fostering economic growth and well-being in the context of scarce natural assets (OECD, 2011g). The OECD recognises that green growth is not a replacement for sustainable development, but a means to help achieve it. In this view, green growth is a practical and flexible approach for accelerating progress in the economic and environmental pillars of sustainable development, while taking full account of the social consequences of greening the growth dynamic of economies. There is no "one-size-fits-all" prescription for implementing green growth. Greening the growth path of an economy will depend on policy and institutional settings, level of development, resource endowments and particular environmental pressure points.

Within any green economy plans that emerge from the Rio+20 Conference, it will be necessary to reflect cities as both a separate theme and a cross-cutting issue.

As the UN Secretary-General points out, "a green economy in the context of sustainable development and poverty eradication is an approach to economic decision-making that will need to be built from the bottom up, responding to national and local priorities and challenges" (UN SG submission).

Any plans or commitments for a green economy need to recognise both:

- The urban dimension as an integral part of the policy framework for sustainable development. Urbanisation merits treatment as a separate theme given the large impact of the urban form on environmental, economic and social equity objectives.
- The interconnection of urban policies with sustainable development priorities. Cities are the focal point for the implementation of many sustainable development priorities, in areas such as water and wastewater services, and air pollution. Local government action is one of the key determinants of the success or failure of many national level sustainable development targets.

Green growth policies at the urban level should take into account their potential impact on jobs and inequality. While green growth can contribute to social equity, the latter must be explicitly addressed in green growth policy design to ensure that inequality does not rise. Green growth initiatives need to be assessed not only in terms of their impact on local economic growth and the environment, but also in terms of opportunities for low, medium, and high-skilled workers.

Strategies for greener growth must also explicitly account for any distributional effects, especially on low-income and disadvantaged communities. Although a “green premium” may be necessary to attract investments, it may also result in disproportional pricing, preventing the poor from taking advantage of greener goods and services.

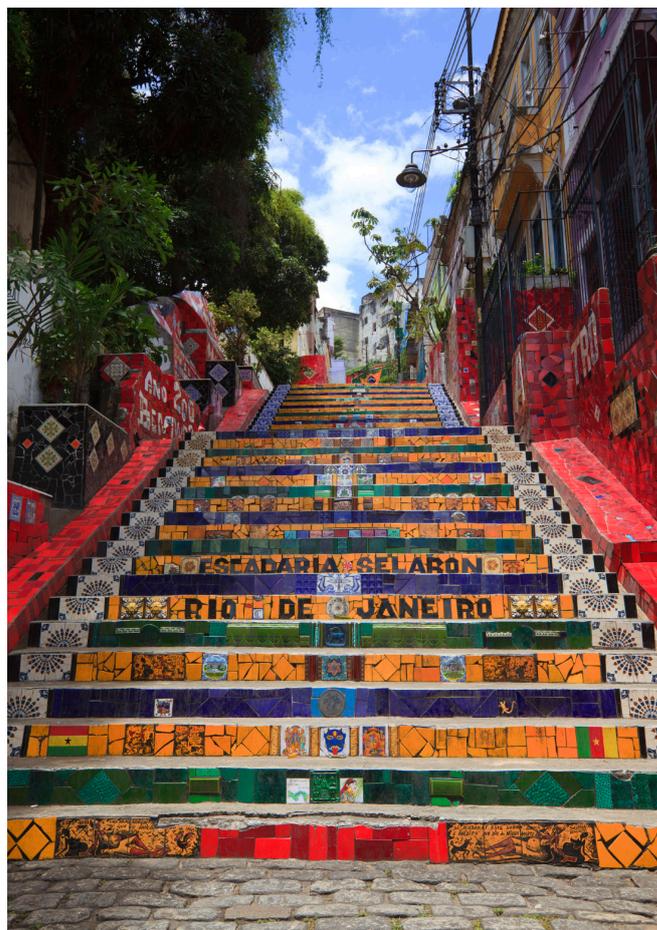
The alignment of green growth and poverty eradication goals is even more critical in rapidly growing cities in developing countries. Policies aimed at inclusiveness – and therefore at social equity and economic efficiency – can often yield double benefits in the form of environmental improvements. This is the case of a mass transportation system that replaces old energy-inefficient taxis and small buses. Initiatives to eradicate poverty and combat urban social fragmentation must thus complement the design of developing country cities’ green policies.

### In practice

The Mayor’s Tower Renewal Project in Toronto provides an example of how green growth initiatives can align with social equity objectives. The programme aims to conduct energy-efficiency retrofits in over 1 000 apartments in towers built before 1984, which would cut electricity use by 50%, gas consumption by over 50%, water consumption by 20%, and the production of waste for incineration by 30%. The programme recruits labour in low-income communities in co-operation with building unions, and offers workers training. Social equity is achieved here both through improvements to homes in low-income neighbourhoods and through local job creation (OECD, 2011h).

A national framework is needed to advance urban green growth, including (OECD, 2010b; OECD, 2011h):

- A clear policy and regulatory framework at multiple levels of government that cuts across sectors to integrate economic, environmental and social equity objectives (OECD, 2010b)
- National pricing signals on carbon and natural resources, such as through a carbon tax or cap-and-trade system (OECD, 2011g)
- Removing national barriers to local action (such as national policies that conflict with or prevent local action) (OECD, 2010b; OECD, 2011h)
- Providing technical assistance, funding and knowledge sharing (for example, establishing common methodologies for urban socio-economic and environmental indicators) (OECD, 2010b)
- Providing coherent and accessible financing mechanisms



## Cities need their own set of green growth indicators

There is a need to develop more effective tools for measuring cities progress towards green growth. A natural starting point could be a measurement framework that includes goals at the city scale and proposes general principles for sustainable and just cities. This could include for instance: (a) Integrated public transportation; (b) Wide access to high-quality public services; (c) Efficient land-form that prioritizes infill over greenfield development and discourages “leapfrog” development; (d) Access to open space (e.g. parks, riverways); (e) Significant share of energy from renewable sources; (f) Energy-efficient, affordable housing and (g) Support for green industries and greening existing industries.

There is also need for developing more effective tools for measuring progress towards commitments related to Rio+20. This could include:

- The establishment of an internationally harmonised methodology for collecting reliable, comparable data at the city scale (OECD, 2011g; OECD, 2010b).
- Estimates of approximate costs and time-horizons of needed investments. A better understanding of a city’s baseline conditions can make prioritisation of expenditures easier and make for local governments more efficient.
- Indicators to capture the triple metric of job-creation effects, impact on the local environment and the distribution of benefits.

Measuring progress towards green growth in cities requires looking beyond GDP. OECD environmental and socio-economic indicators at the metropolitan scale provide reliable comparisons of urban density, estimated greenhouse gas emissions, air pollution, land-use cover and forest ecosystem, and carbon absorption for the 90 the largest OECD metropolitan regions.

The OECD has also ongoing work with more comprehensive indicators (such as Green Growth Indicators, the Beyond GDP initiative, the How's Life initiative and the Better Life Index), which can support countries' efforts to monitor the impact of green growth and sustainable development initiatives, including by providing regional and urban-level data.

In partnership with cities, including the C40, an important measurement agenda for cities would include working a harmonised methodology for collecting reliable, comparable data at the city scale. These need to be embedded in a framework and selected according to well-specified criteria. Ultimately, they need to be capable of sending clear messages that speak to policy makers and the public at large.

## Cities' participation in the institutional arrangements for green growth and sustainable development is critical

It is important to enhance cities' participation in multi-level governance for sustainable development. Implementation barriers have stymied progress on the 1992 Rio agenda. Factors include a lack of good governance, technical capacity, and sufficient measurement and monitoring tools. Involving sub-national governments into the Rio+20 agenda could provide an important contribution to close the implementation gap.

Multi-level governance gaps to be addressed include:

- More coordinated policies at multiple levels of government, including a greater level of horizontal coordination and planning among national ministries, such as those responsible for infrastructure, environment, finance, economic growth and social development (OECD, 2010b; OECD, 2011h).
- A reinforcement of cities' long-term planning capacity, especially in developing countries, for instance through technical assistance, sharing of best practices, and financial assistance. Short-term development decisions can "lock in" low-density, sprawling urban forms that result in high greenhouse gas emissions from transport and energy-intensive delivery of public services.
- Better equipping cities with the necessary expertise and financial resources to fulfil their implementation responsibilities. In a tight fiscal environment, national governments can maximise the value of their efforts through best practices sharing and grant mechanisms that encourage policy innovation.

There is an increasing awareness among the global community of the great challenges raised by a fast and uncontrolled urbanisation process and the key role sub-national governments play in advancing a sustainable development agenda. This sentiment was echoed in a large number of institutional submissions to the Rio+20 conference, including in the Zero Draft.

International networks of cities and global associations of local governments such as the C40, ICLEI, UCLG, and others have been increasingly active in advancing climate and sustainable issues. Although the question of stronger involvement of local governments in the global governance architecture remains controversial, it is important to capitalise on this burgeoning "peer-to-peer" community in a post Rio+20 agenda.

Consultations mechanism involving cities along with other public, private and intergovernmental organisations need to be developed. With an aim to identify and address key knowledge gaps and assist in the design and implementation of public policy, an international knowledge platform has been proposed as a potential operational outcome of the Rio+20 conference. The recently launched Green Growth Knowledge Platform (GGKP), based on a core partnership between the OECD, the Global Green Growth Institute, UNEP and the World Bank, could provide a useful basis for such an international knowledge-sharing platform.

To expand our understanding of urban green growth and sustainable development, the GGKP could foster partnerships with associations of local governments. For example, these could be focused on advancing the harmonisation of methodologies for measuring cities' CO<sub>2</sub> emissions, as well as guidelines for evaluating the full economic, environmental and social costs and benefits of urban green infrastructure investment. The GGKP's findings could in turn inform the programmes of work of its founding institutions, which could streamline the practical implementation of policy research in both developed and developing country cities.

### The Green Growth Knowledge Platform (GGKP)

The GGKP is aimed at enhancing and expanding efforts to identify and address major knowledge gaps in green growth theory and practice, and at helping countries to identify, design and implement policies to move towards greener economies. To this end, it seeks to create a global network of expert researchers, practitioners and policy makers to promote widespread consultation and facilitate world-class research with a view to improving the policy tools necessary to foster economic growth in the context of sustainable development. The GGKP will help to assess and refine local, national and global policies to facilitate their implementation in both developing and developed countries, with the aim of increasing local environmental co-benefits and stimulating growth.

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