PART II: CHAPTER SUMMARIES

1. Cities

Cities are crucial to both economic growth and climate action. Urban areas are home to half the world's population, but generate around 80% of global economic output,[1] and around 70% of global energy use and energy-related GHG emissions.[2] Over the next two decades, nearly all of the world's net population growth is expected to occur in urban areas, with about 1.4 million people – close to the population of Stockholm – added each week.[3] By 2050, the urban population will increase by at least 2.5 billion, reaching two-thirds of the global population.[4]

The stakes for growth, quality of life and carbon emissions could not be higher. The structures we build now, including roads and buildings, could last for a century or more, setting the trajectory for greenhouse gas emissions at a critical time for reining these in.

Given the long-lived nature of urban infrastructure, the way in which we build, rebuild, maintain and enhance the world's growing cities will not only determine their economic performance and their citizens' quality of life; it may also define the trajectory of global GHG emissions for much of the rest of the century. This chapter takes stock of cities' increasing contribution to both economic growth and climate change, examines the dominant patterns of development today, and presents an alternative pathway, as well as the policies needed to support and scale it up.

We focus in particular on three categories of cities:

- **Emerging Cities** are 291 rapidly expanding middle-income, mid-sized cities in China, India and other emerging economies, with populations of 1–10 million, and per capita incomes of US$2,000–20,000.
- **Global Megacities** are 33 major knowledge-, service- and trade-based urban hubs with populations above 10 million and per capita incomes over US$2,000, including capital cities such as London, Beijing and Tokyo.
- **Mature Cities** are 144 prosperous, established, mid-sized cities in developed countries, with per capita incomes above US$20,000, such as Stuttgart, Stockholm and Hiroshima.

Research carried out for the Commission shows that, on current trends, these cities combined will account for 60% of global GDP growth between now and 2030. They will account for close to half of global energy-related GHG emissions. Some 300 emerging cities, with populations between 1 million and 10 million, will account for over half of this growth. The question for mayors, as well as for policy-makers in economics, finance, urban planning and environmental ministries, is how to plan urban development in a way that improves economic performance and quality of life while reducing GHG emissions.

A large share of urban growth around the world involves unplanned, unstructured urban expansion, with low densities and high rates of car use. If current development trends were to continue, the global area of urbanised land could triple from 2000 to 2030,[5] the equivalent to adding an area greater than the size of Manhattan every day. At the same time, the number of cars could double, from 1 billion today to 2 billion.[6]

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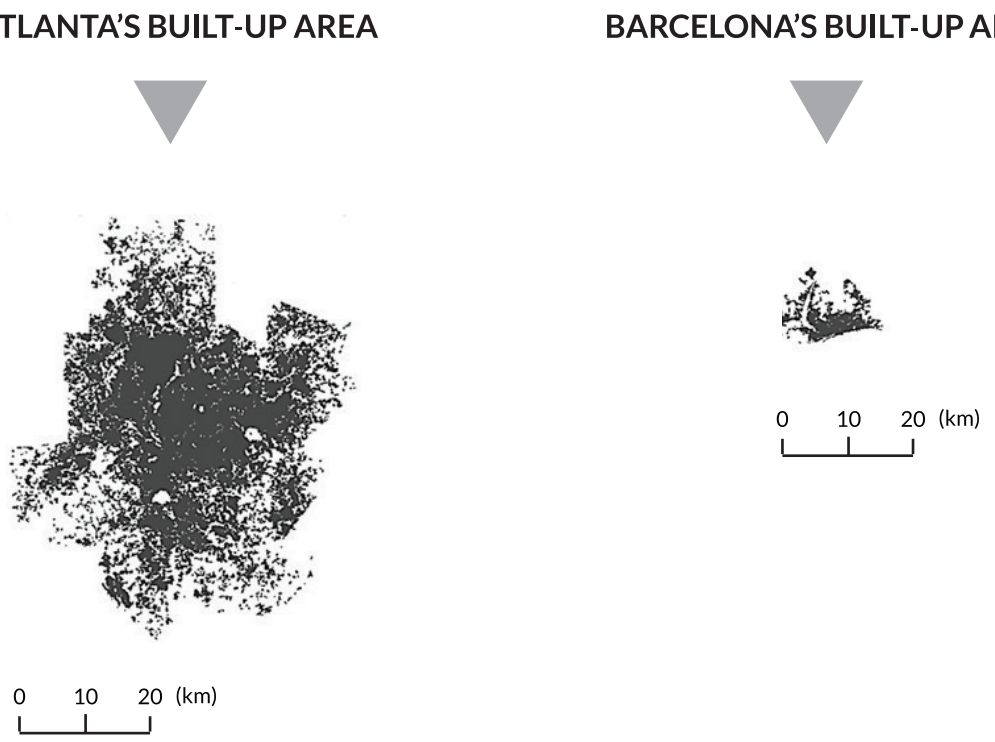
This sprawling pattern of expansion has major costs. It can double land used per housing unit, increase the costs of providing utilities and public services by 10–30% or more, and increase motor travel and associated costs by 20–50%.[7] In fast-growing low- and middle-income countries, sprawled patterns can actually double or triple many costs, because they often have to import construction equipment. Sprawl also results in greater congestion, accident and air pollution costs; locks in inefficiently high levels of energy consumption, and makes it harder to implement more efficient models of waste management and district heating.

New modelling for this report shows that the incremental external costs of sprawl in the United States are about $400 billion per year, due to increased costs of providing public services, higher capital requirements for infrastructure, lower overall resource productivity, and accident and pollution damages.[8] Costs can be even more acute in rapidly urbanising countries where resources are more limited. In China, urban sprawl has reduced productivity gains from agglomeration and specialisation, and led to much higher levels of capital spending than necessary to sustain growth.[9] Research from 261 Chinese cities in 2004, for example, suggested that labour productivity would rise by 8.8% if employment density doubled.[10]

New analysis reviewed by the Commission shows that even in this context, cities around the world have significant opportunities in the next 5–10 years to

Figure 6

Energy and emissions vary widely between cities with similar income levels, depending on past infrastructure and planning decisions: Atlanta vs. Barcelona



	ATLANTA	BARCELONA
POPULATION:	5.25 MILLION	5.33 MILLION
URBAN AREA: TRANSPORT	4,280 KM^2	162 KM^2
CARBON EMISSIONS: TONNES CO_2 PER PERSON (PUBLIC + PRIVATE TRANSPORT)	7.5	0.7

Source: Bertaud and Richardson, 2004.[12]

boost resource productivity and reduce GHG emissions through economically attractive investments in the buildings, transport and waste sectors. However, without broader structural shifts in urban design and transport systems, the benefits of those measures would quickly be overwhelmed by the impacts of sustained economic and population expansion under business-as-usual patterns. In fast-growing Emerging Cities in particular, the evidence suggests energy savings and emission reductions could be erased within seven years or less.[11]

Thus, to unlock a new wave of sustained, long-term urban productivity improvements, we need a systemic shift to more compact, connected and coordinated development. Cities that meet these criteria are more productive, socially inclusive, resilient, cleaner, quieter and safer. They also have lower GHG emissions – a good example of the benefits of pursuing economic growth and climate change mitigation together. Figure 6, for example, contrasts the land use and GHG implications of urban development patterns followed in the US city of Atlanta and in Barcelona, Spain.

1.1 A better model for urban development

The alternative to unplanned, unstructured urban expansion is a more efficient urban development model,

based on managed growth which encourages higher densities, mixed-use neighbourhoods, walkable local environments, and – in Global Megacities and Mature Cities – the revitalisation and redevelopment of urban centres and brownfield sites, complemented by green spaces. This model prioritises high-quality public transport systems to make the most of compact urban forms and to reduce car dependence and congestion. It also boosts resource efficiency through "smarter" utilities and buildings. It has the potential to reduce urban infrastructure capital requirements by more than US$3 trillion over the next 15 years.[13] Fast-growing Emerging Cities and small urban areas have a particularly important opportunity to adopt this model from the outset, learning from others' experience.

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Shifting towards this alternative model would unlock significant medium- to long-term economic and social benefits. It would boost infrastructure productivity through the agglomeration effects of greater density, improve air quality, and deliver substantial cost savings in the transport sector. Estimates for the United States suggest that transit-oriented urban development could reduce per capita car use by 50%, reducing household expenditures by 20%.[14] At significantly lower fuel prices, sprawling Houston spends about 14% of its GDP on transport compared with 4% in Copenhagen and about 7% in many Western European cities. (Notably, Houston is now making ambitious efforts to overcome the legacy of sprawl through urban renewal and sustained investment in public transport systems.)[15]

Adopting a compact, transit-oriented model in the world's largest 724 cities, new analysis for the Commission shows, could reduce GHG emissions by up to 1.5 billion tonnes CO_2e per year by 2030, mostly by reducing personal vehicle use in favour of more efficient transport modes. While achieving such savings would require transformative change, it would lay the foundation for even greater, sustained resource savings and emission reductions over the following decades.

In fact, such a shift is already happening. Re-densification is taking place in cities as diverse as London, Brussels, Tokyo, Hamburg, Nagoya and Beijing. More than 160 cities have implemented bus rapid transit (BRT) systems, which can carry large numbers of passengers per day at less than 15% of the cost of a metro.[16] The BRT in Bogotá, Colombia, for example, carries up to 2.1 million passengers per day, complemented by a citywide network of bicycle paths that connect residents to public transport, community spaces and parks.[17] China will have 3,000km of urban rail networks by 2015.[18] Nearly 700 cities had bike-sharing schemes at the end of 2013, up from five in 2000.[19]

From Copenhagen, to Hong Kong, to Portland, Oregon, in the US, cities are also showing how they can build prosperity, improve air quality, reduce GHG emissions all at once through more compact, connected and coordinated urban growth models. Stockholm reduced emissions by 35% from 1993 to 2010 while growing its economy by 41%, one of the highest growth rates in Europe.[20] Curitiba is one of the most affluent cities in Brazil, but has 25% lower per capita GHG emissions and 30% lower fuel consumption than the national average due to its groundbreaking approach to integrated land use and transport planning.[21]

1.2 A strategic approach to managing urban growth at national level

Countries need to prioritise better-managed urban development and increased urban productivity as key drivers of growth and climate goals. This is especially the case for countries with rapidly urbanising populations, as current institutional arrangements often result in urban development being driven by other national priorities. Here, coordination and cooperation between national and regional governments and city leaders is essential.

Several countries are already making major policy changes to promote more compact, mixed-use land development, contain urban sprawl, maximise resource efficiency, and curtail the negative externalities of pollution, congestion and CO_2 emissions. A high-profile example is China's New National Urbanisation Plan, which places urban policy at the heart of Chinese decision-making.[22]

The Commission urges all countries to develop national urbanisation strategies in conjunction with city governments, with cross-departmental representation and assigned budgets, overseen by the centre of government and/or Ministry of Finance. They should also provide greater fiscal autonomy for cities, potentially linked to economic, social and environmental performance benchmarks, and consider setting up a special-purpose financing vehicle at the national level to support cities' efforts to become more compact, connected and coordinated, with appropriate private-sector participation. Existing infrastructure funding should be redirected to support this transition.

1.3 Stronger policies and institutions to drive compact, connected and coordinated urban development

Building better, more productive cities is a long-term journey. It requires persistence in several key areas to shift away from business-as-usual urban expansion, with countries, regions and cities working together. As a first step, cities should seize some of the numerous

opportunities available to boost resource productivity in the short- to medium term, in sectors as diverse as buildings, transport and waste management. The evidence suggests that these smaller steps could build momentum for broader, longer-term reform, especially in capacity-constrained cities.

To drive the broader structural transformation of cities, governments should prioritise strengthening strategic planning at the city, regional and national levels, with a focus on improved land use and integrated multi-modal transport infrastructure. Only about 20% of the world's 150 largest cities have even the basic analytics needed for low-carbon planning.[23] These efforts should be supported by regulatory reform to promote higher-density, mixed-use, infill development, and new measures such as efficient parking practices.

It is also crucial to change transport incentives. **The Commission recommends that governments reform fuel subsidies and introduce new pricing mechanisms such as road user charges to reduce and eventually eliminate incentives to fossil-fuelled vehicle use.** They should also consider charges on land conversion and dispersed development, and measures that place a higher price on land than on buildings such as land taxes and development taxes. These reforms can raise revenue to invest in public transport and transit-oriented development.

In addition, there is a need for new mechanisms to finance upfront investments in smarter urban infrastructure and technology, such as greater use of land value capture, municipal bond financing, and investment platforms to prepare and package investments to attract private-sector capital. This should be complemented by more effective and accountable city-level institutions. The chapter discusses these topics in detail.

1.4 The role of the international community

The international community also has a key role to play in fostering better-managed urban growth, both by building and sharing knowledge about best practices, and by steering finance towards compact, connected and coordinated urbanisation, and away from sprawl.

The Commission recommends developing a Global Urban Productivity Initiative to promote and assist in the development of best practices in boosting urban productivity and support countries' and cities' own efforts. The initiative should: build on the existing work of key international organisations already working in this field, including city networks such as C40 and ICLEI – Local Governments for Sustainability,[24] and involve rapidly urbanising countries, mayors and business leaders. Key activities could include reviewing institutional options for systematic collection of city-level data, developing urbanisation scenarios and best practice guidance, creating an international standard for integrated municipal accounting, and targeted capacity-building.

In addition, a global city creditworthiness facility should be set up to help cities develop strategies to improve their "own source" revenues and, where sovereign governments allow it, increase their access to private capital markets. Only 4% of the 500 largest cities in developing countries are now deemed creditworthy in international financial markets; every US$1 spent to correct this can leverage more than US$100 in private-sector finance.[25] The new facility should build on and scale-up the existing programme of the World Bank, and assist cities in both developing and developed countries.

Finally, it is crucial that multilateral development banks (MDBs) rapidly phase out the financing of investments that lock in unstructured, unconnected urban expansion. The banks should work with client and donor countries to redirect overseas development assistance and concessional finance towards supporting integrated citywide urban strategies and investment in smarter infrastructure and new technology. Greater consideration should also be given to redirecting overall MDB funding to account for the growing importance of cities in economic development in rapidly urbanising countries, as well as the scaling-up of support to help cities prepare and package urban infrastructure investments.

2. Land use

Rapid global population growth, urbanisation, rising incomes and resource constraints are putting enormous pressure on land and water resources used by agriculture and forests, which are crucial to food security and livelihoods. Roughly a quarter of the world's agricultural land is severely degraded,[26] and forests continue to be cleared for timber and charcoal, and to use the land for crops and pasture.[27] Key ecosystem services are being compromised, and the natural resource base is becoming less productive. At the same time, climate change is posing enormous challenges, increasing both flood and drought risk in many places, and altering hydrological systems and seasonal weather patterns.

Agriculture, forestry and other land use (AFOLU) also account for a quarter of global GHG emissions.[28] Deforestation and forest degradation are responsible for about 11% of global GHGs, net of reforestation;[29] the world's total forest land decreased by an average of 5.2 million ha per year over 2000-2010.[30] Emissions from agriculture include methane from livestock, nitrous oxide from fertiliser use, and carbon dioxide (CO_2) from tractors and fertiliser production (see Figure 7).

Those factors combined make agriculture and forests top-priority sectors for climate policy, particularly in tropical countries, which often include substantial areas