

# City Making as Climate Policy

How well-designed cities play a crucial role in de-linking increasing living standards and resource consumption

*Philipp Rode*

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In 1986, the German news magazine 'Der Spiegel' chose for one of its weekly editions a cover with a severe warning. It pictured Cologne's famous gothic cathedral half under water with not a single other structure emerging from an endless sea. It was titled 'the climate catastrophe' and linked the global environmental crisis not only to the great aspirations of mankind – in 1880, the Cologne cathedral was the tallest structure in the world – but also to the disappearance of a city, exposing its vulnerability when confronted with the force of nature.

The cover, of course, was an extreme exaggeration at a time when the general public knew little about carbon emissions, climate change and sea level rise. It also roughly coincided with the moment in history, when, during the mid 1980s humanity's ecological footprint surpassed the earth's capacity. Since then, we have built-up massive ecological debt that continues to increase from year to year. The term 'sustainable development' was coined not until one year later in 1987 by the Brundtland Report and the first binding international agreement on climate change policy, the Kyoto Protocol, came as late as 1997 while global CO<sub>2</sub> emissions increased by 16 per cent. Since Kyoto they have shot up by yet another 26 per cent<sup>7</sup> and following last week's preparation conference for the all decisive Copenhagen climate summit in December 2009, we are once again back to sea level rise. Around one metre by 2100 is the adjusted number for now<sup>1</sup> – not enough to drown Cologne but certainly a severe threat to cities as diverse as New York, Mumbai and Hamburg.

Over recent years, the climate change debate and related policy have gained momentum and a series of events and publications have lifted the environmental crisis back to where it belongs in the public perception: the number one global threat.<sup>22</sup> Among the cataclysmic factors that brought climate change back to table are arguably the tragic events in New Orleans following Hurricane Katrina in August 2005 as much as the far reaching climate awareness

generated by Al Gore's documentary film 'An Inconvenient Truth' released in 2006. The same year, the publication of the 'Stern Review on the Economics of Climate Change' commissioned by the British Government looked at the costs of climate change. Stern concluded that the potential damage could be equivalent of 5 to 20 percent of the gross world product while appropriate mitigation and adaptation policy would only require around one per cent.<sup>32</sup> These were powerful arguments for both political leaders and the business community. Not surprisingly, in 2007, climate change featured as the single most important issue at the World Economic Forum in Davos. Finally and for international policy the most relevant factor was the International Panel of Climate Change's update on related research that concluded that climate change is 90 per cent likely to be man-made.<sup>18</sup>

Regardless these major changes in attitude with regards to the environmental challenge, it is widely acknowledged that, so far, little more has happened than addressing 'wallpaper' around infrastructures that continue to maintain highly unsustainable lifestyles. In Thomas Freedman's words, so far we seem to enjoy a 'green celebration' but what is really needed is a 'green revolution'.<sup>12</sup>

The recent developments with regards to climate change coincided with another not unrelated transformation in the structure of global settlements, the symbolic shift from a majority rural to a majority urban global population. In 2007, for the first time in history people living in urban areas outnumbered those living in the countryside.<sup>36</sup> While the late 20th century was undoubtedly the age of economic globalization, the first part of the 21st century promises to be the age of the city, the 'Urban Age'.

Yet, the current change of rural to urban lifestyles is less noticeable in Europe and North America where the move to cities already peaked in the first half of the last century. Here, the dominance of cities was established well before 1950. However, the current global shift towards cities generates both,

opportunities and challenges significant also for established and mature cities of the West. Our cities share – arguably at a different scale – the confrontation with globalisation, migration, social inclusion and sustainability with the emerging urban world in Asia, Africa and Latin America. A look at the environmental challenge and how cities have started to respond to climate change offers a particularly important insight.

Cities are vulnerable to a whole range of effects resulting from climate change of which sea level rise, freak weather conditions and water shortages are just among the most prominent. In particular with regards to flooding, both, the formal urban structures in cities such as Shanghai, New York and Rio de Janeiro<sup>18</sup> and in particular the informal settlements of mega cities such as Mumbai, Manila and Lagos are exposed to great risks. Here, development choices all follow the logic of locating close to the sea and rivers with their traditionally strategic advantage for transport access. As a consequence, the UN estimates that almost 400 million urban dwellers are exposed to risks emerging from sea level rise.<sup>35</sup>

For two main reasons, cities today find themselves in a unique position to add to national and supra-national agendas to battle climate change. On the one hand, cities challenge the planet with a disproportionate hunger for development and consumption while on the other hand, urban living in well-designed cities might offer the most viable answer to a more sustainable lifestyle.

### **Unsustainable agglomerations**

Most of today's urban development is highly unsustainable. In particular, global cities stand for the problematic aspects of current socio-economic trends combining high material consumption based on energy intensive food and goods supply with high levels of social inequality. A first look at what happened to carbon emissions over the last 50 years while the world became predominantly urban confirms the problem. The increase of the global urbanisation level from 29 per cent in 1950 to 49 per cent in 2005<sup>36</sup> at least coincided with a jump of global CO2 emissions from 1,630 to 7,985 million metric tonnes.<sup>39</sup> Obviously, to suggest a direct causality between the two would be highly problematic. Instead a reference to two widely accepted links assists with an explanation: The

correlation between national urbanisation level and average wealth as well as average wealth and energy consumption.

With regards to environmental damage, it is often stated that urbanised areas globally emit around 75 per cent of all CO2 emissions while only housing 50 per cent of the world's population.<sup>31</sup> Again, such statements are problematic and fail to recognize the complexity of territorialising CO2 emissions. When including only settlement related CO2 emissions and recognising the large contribution of agriculture and forestry, cities might produce around 40 per cent.<sup>31</sup> Nevertheless, it is understood that cities are part of the problem and at least when including embedded and exported emissions as well as all consequences of current consumption patterns of urban residents, they are far from being sustainable and at least in the developing world perform worse than rural areas. This, of course, is more related to higher levels of affluence in cities and therefore higher overall consumption.

There are three basic categories of how cities contribute to global CO2 emissions: locally produced, exported and embedded emissions. The first and most obvious category is locally emitted CO2 typically occurring as a result of operating gas, coal and oil based heating systems, running fuel powered vehicles and of industrial production including construction. The second category of exported carbon emissions refer mainly to the consumption of energy for which emissions are produced elsewhere. A good example being the use of electricity generated in fossil fuel power plants located outside the city proper. The last and most complex category of embedded carbon includes a wide range of how CO2 emissions can be linked to the city. The carbon emitted outside the city for producing and transporting food and consumer items; for enabling travel intensive economies including tourism, conventions and conferencing; for constructing the city's buildings and infrastructure are among the most prominent examples.

It is a simple task to recognize the embedded carbon of a newly created cityscape such as Shanghai's – in particular as a result of cement production – where about 10,000 high rise buildings were built over the last 25 years.<sup>5</sup> This is more than today's total amount of buildings of similar height along the entire west coast of the United States. More difficult to grasp are the hidden carbon

emissions of older, de-industrialised cities of the global North. A recent study by the Stockholm Environment Institute (SEI) for the United Kingdom highlights the effect of de-industrialisation at national level and allows for analogous insights at the city scale. Tracing the UK's CO<sub>2</sub> emissions according to the UN convention between 1992 and 2004 results in a drop by 5 per cent. However, including not only UK related international aviation and container transport but the full carbon footprint of all goods consumed within Britain but produced elsewhere means an increase of 18 per cent.<sup>33</sup> Rather than becoming green, Britain is simply exporting its emissions while becoming a service economy hungry for consumer products which include millions of tonnes of unaccounted embedded carbon – just like mature cities with their dominating tertiary industry sectors.

Finally, a look at sectoral trends of carbon emissions points towards the central challenge of reversing the current growth. This is particularly insightful when looking at a context where active climate policy has been dominating for over a decade. Amongst all world regions, the European Union has been such a context and has led to significant improvements in all sectors but one. Within the EU's 27 member states, emissions from industries, energy production and households have been declining while transport has increased by a staggering 36 per cent between 1990 and 2006.<sup>9</sup> Emissions from transport remain a massive concern even in countries with the most progressive climate policies. When it comes to cities, motorisation continues to be among the biggest polluter. Metropolitan regions such as Sao Paulo today have a private vehicle fleet of more than 6 million cars, the same amount of cars that were operating in entire India in 2005.<sup>27</sup> This has produced the landscape of the endless city – clearly the least sustainable urban structure. Worldwide, trends for commuting trips are on the sharp rise. While the average daily commute in the UK increased 6% since 1995/97,<sup>26</sup> travel distances in Shanghai increased by 50% over the last ten years.<sup>30</sup>

But cities have also become unsustainable as a consequence of their great need for being connected to other cities often over great distances. Air travel is the fastest growing transport sector and airports are often seen as new anchors for urban development. In fact, entire new cities emerge around airport hubs as currently happening throughout the Gulf region.

In Dubai, the city's second airport currently under construction is planned for 120 million persons per year – more than the current levels of all five London airports together. In 2007, a study commissioned by the Mayor of London suggested that when including the emission of air travel to and from London, the city's largest single source of CO<sub>2</sub> comes from aviation with about 34 per cent.<sup>15</sup>

### **Well-designed cities**

A look at the performance of individual countries illustrates the core challenge of sustainable development. When combining environmental indicators such as the national ecological footprint per capita and the human development index published by the United Nations only two countries – Albania and Cuba – display both socially and environmentally sustainable patterns.<sup>37 14</sup> The majority of countries in Africa and Asia and about half of Latin America have a small ecological footprint per capita which remains below the earth's capacity but at the same time are below acceptable levels with regards to human development. On the other hand, almost all OECD countries and some countries in Latin America are well above the alert line of the human development index but are running at unsustainable levels far beyond the world's ecological capacity. The world, it seems, lacks a development model where the reduction of poverty does not result in exploiting the planet beyond its means.

Yet, it has frequently been argued that urban development can in fact offer such a perspective and that well-designed cities can be pioneers for green lifestyles. They are the best bet so far for any strategy aiming to de-link higher living standards and the consumption of natural resources.<sup>31</sup> The signs of opportunity point towards facts such as that already today the average Londoner produces only 40 per cent of the CO<sub>2</sub> emissions compared to the average British person while offering at least the same living standards.<sup>17</sup> Similarly, New York City produces only 1 per cent of the US greenhouse gases but is home to 3.7 per cent of its population.<sup>23</sup> Even when considering all exported and embedded carbon emissions, urban living outperforms suburban and rural lifestyles in the UK. An analysis by SEI mapping total household carbon emissions that include direct household, transport and consumption related emissions at the lowest

statistical unit for all of Britain allows to directly identify urban cores as the least polluting throughout the country. At the same time though, it is the larger metropolitan belt surrounding the city that is performing worst.<sup>33</sup>

There are also enormous differences between cities: Most US cities have three to five times the gasoline consumption of European cities while surely the quality of life in US cities does not differ that greatly from the one in their European counterparts. A closer look at specific factors of carbon efficiency reveals the dynamics of how certain urban territory outperforms its hinterland or more sprawling developments. The two decisive factors are buildings and transport related energy consumption.

With regards to buildings, the amount of energy per square metre needed for heating and cooling differs greatly depending on the basic building configuration. Preliminary results of a joint study by the London School of Economics and the European Institute for Energy Research suggests for the case of Paris that the very basic urban morphology, the arrangement of buildings and the building typology, already results in a factor three difference in heating related energy consumption between the extremes. At the same insulation standard, the least energy efficient typology, detached houses, required 268 kWh per square meter per year while the most efficient, seven- to nine-story city blocks, only require 81 kWh/sqm/a. The US Energy Information Administration confirms similar observations at the household level with single-family homes requiring more than twice the energy for cooling/heating and electricity than apartments in buildings with more than five sub-units.<sup>39</sup>

With regards to transport, the positive 'urban effect' is two-fold and deserves a more detailed explanation. It includes first, the production of proximity and second, the shift towards more environmentally friendly transport modes. With regards to proximity, it has long been argued, that certain city configurations are more energy efficient than suburban and out-of-town developments by generating greater physical proximity between origins and destinations without compromising other urban qualities. Regarding personal transport the argument relies on reduced number of kilometres travelled for various purposes, ranging from work, education, leisure, shopping and service related trips. Energy and emission savings are then

generated directly by saving kilometres by motorised modes. Most cities in the developed world already offer greater proximities. The average commuting distance for residents of Greater London is 10.2 km compared with 14 km for the UK.<sup>34</sup>

Three key spatial factors – density, mixture and polycentricity – generate greater proximities in cities as long as they are backed by organisational strategies. More than any other indicator for the city's structure, population density has been linked to mobility patterns<sup>8</sup> with a general understanding that high densities generate fewer kilometres of travel per capita than do low densities. Trips become shorter as densities rise.<sup>11</sup> In turn, higher densities generate the demand for local facilities and services.<sup>38</sup> Some experts suggest that on balance, the per capita fuel consumption declines by one-half to two thirds when increasing density levels from 10 to 30 persons per hectare.<sup>20</sup> However, the positive impact of density alone is regularly challenged<sup>4</sup> and increasingly, the focus of planning praxis and theory has shifted towards highlighting the role of mix use. In fact, the strong relationship between density and mixture is the reason why transport effects are often credited to density rather than mixed uses. For indicating the degree of mixture, the workplaces/housing balance is the most prominent parameter and is regarded the best sole predictor of trip lengths.<sup>11</sup> The fact that in Mumbai, the world's most compact mega city, more than 40 per cent of the population is able to reach their daily destinations within less than two kilometres<sup>2</sup> is a direct result of combining uniquely high density levels of 50.000 persons per square kilometre with an entirely balanced housing/working relationship throughout the city.<sup>29</sup> Furthermore, it is a polycentric configuration of high density, mix use hubs across the city that needs to be considered.<sup>21 28</sup> Within the metropolitan region, over-centralisation of employment and services as it is still the case in London result in massive one-directional commuter flows. Instead, residential areas are more integrated with more dispersed clusters of employment and services in relatively compact urban subunits in cities such as Barcelona or Berlin. Finally, organisational strategies need to complement the potentials for greater proximity offered by a new spatial configuration – in particular for work-related trip.<sup>13</sup>

The greater share of environmentally friendly transport modes in cities are again facilitated by similar spatial and organisational configurations as those producing proximity. In fact, walking and cycling directly rely upon greater proximities between urban functions, while efficient public transport is made possible by high densities and concentrations of urban activities.<sup>19 3 16, 25 6</sup> A threshold density of 100 person per hectare is crucial for good bus service.<sup>38</sup> Higher public transport shares than the wider regional context is common in almost all cities. 50 per cent of New Yorkers use public transport to get to work and around 30 per cent of Londoners use its extensive underground and bus system, close to the 27 per cent of all Berliners rely on public transport. Average public transport use in the UK and Germany is only around 13 and 14 per cent respectively.<sup>10</sup> In the US, it is well below 2 per cent.<sup>24</sup> High shares of walking are furthermore characteristic for dense urban fabrics. 55 per cent of Mumbai's residents walk, so do 34 percent in Rio de Janeiro. Cities even make the most affluent residents move in a green manner: 40 per cent of midtown residents in New York's Manhattan walk to work and over 90 per cent of affluent business workers use public transport to reach to London's financial hub.

To conclude, the city's ability to accommodate more environmentally friendly lifestyles is primarily linked to a range of interrelated factors as a result of apartment living and low car dependency. But its real appeal derives from the fact that it is able to link the two through a range of public amenities with a quality of life unknown to territories that are characterised by the opposite.

## **Forward**

Cities have proved to be progressive environments with urban residents tending to be more open to individual behaviour change – a central precondition for more sustainable lifestyles. Furthermore, cities are well equipped to implement and test new approaches. The long list of transport innovations is most telling. Strategies such as congestion charging (London, Stockholm, Milan), urban cycling (Copenhagen, Bogota, Paris), bus rapid transit (Curitiba, Bogota, Delhi) and temporary street use (Rio de Janeiro, New York, Tokyo) have paved the ground for world-wide

application. Cities – and more generally local governments – are further closer to lives on the ground allowing for a better understanding of daily routines than state or national governments – critical for the implementation of change. The ability to suggest changes and receive immediate feedback from residents provides city governance with a responsive sounding board.

But throughout the world, urban policymakers continue to struggle in balancing the escalation of public and private investment in cities with more sustainable forms of urban development. Questions regarding the size, speed, shape, and spatial distributions of densities, land uses and morphologically differentiated areas of the city and their relationship to infrastructure have become increasingly complex and politicised. Two ambitious city programmes tackling climate change, London's Climate Change Action Plan and PlaNYC for a 'Greener and Greater New York' remind us that cities can be innovative but with their limited power so far rely on the support of the broader political system.

But cities can be helped by devolving power to the metropolitan scale and by rationalising urban governance structures. Cities further need to integrate urban planning, design and transport as one transparent and accountable process of city making addressing all scales from the metropolitan to the neighbourhood level. They also need to re-invent strategic planning as an essential component of what Anthony Giddens referred to as 'the politics of the long term' while avoiding going back to the unsuccessful models of the past.

It is then, that cities are in an even better position to add to carbon policies agreed by national governments with innovative networks such as the C40 Cities Climate Leadership Group or even a possible future 'Kyoto of Cities'. Sustainable urban development is by far the most promising option leading to a more sustainable future. The challenge will be about enabling cities to take full advantage of their transformative capacities.

*Philipp Rode is the Executive Director of the Urban Age Programme and is an Associate with the Cities Programme at the London School of Economics and Political Science.*

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