CHAPTER 4

Developing Low-Carbon Cities in China: Local Governance, Municipal Finance, and Land-Use Planning—The Key Underlying Drivers

Zhi Liu and Andrew Salzberg

Overview

This chapter addresses three important topics related to the development of low-carbon cities—local governance, municipal finance, and urban land-use planning. In China, the interaction of these three systems creates dramatic, unique challenges for the low-carbon city agenda. Crucially, the system of municipal finance developed over the last 15 years—where land concessions form an important source of off-budget revenues—has created strong financial incentives for local governments to develop excessive quantities of scattered urban land, at low densities, exceeding the level justified by demand. Addressing these challenges will form an essential element of any successful low-carbon city agenda in China.

Introduction

The three topics described in this chapter are closely interrelated, and all contribute in shaping China’s urban form. Consequently, this chapter
treats these three topics together, focusing on their interrelationships and their crucial links to the development of low-carbon cities in China.

The first topic is local governance. Low-carbon cities are a global public good, but they also have the potential to generate significant public benefits at the local level, in the form of increased energy efficiency, reduced environmental degradation, and improved quality of urban life. The role, responsibilities, and effectiveness of local public institutions are indispensable to achieving these outcomes. These institutions work by setting objectives; building consensus; making policy; developing, financing, and implementing strategies and plans; enabling the beneficial activities of the free market; coordinating with stakeholders; managing risks; safeguarding public interests; and monitoring the achievement of objectives.

Municipal finance—the second topic—is also significant, in that it underpins the institutional capacity for public policy implementation. The development of low-carbon cities will require extensive long-term public interventions. However, this will not be possible without sustainable municipal finance mechanisms. In China, municipal finance has over the last 15 years interacted with urban development in a unique and sometimes dramatic fashion. The conversion of farmland to urban use has been driven by more than simply rapid urbanization; this process has also served as a crucial extrabudgetary source of municipal revenues. As a result, farmland conversion through land concessions has created strong financial incentives for local governments to develop excessive quantities of scattered urban land, at low densities, well beyond the level justified by demand.

Finally, the third topic, urban land-use planning, also plays an important role. Planning practice in China today is often overwhelmed by the rapid pace of development: approval of a master plan can take many years, by which time it is already well out of date. In addition, the existing system of checks and balances is generally insufficient to ensure that master plans, when approved, are not arbitrarily modified by local government officials.

The interaction of these three factors has major consequences for China in a number of areas, especially the effect on the development of urban form. This is crucial to the low-carbon city agenda. Empirical evidence from international and domestic studies suggests that differing urban forms (measured in terms of residential densities, job concentration, and mix of land uses) require different amounts of land for accommodating similar levels of population and activities, result in different
levels of energy consumption, and generate widely varying CO$_2$ emissions per capita. Overall, our analysis argues that the existing system of Chinese municipal governance, finance, and planning has a detrimental effect on the development of low-carbon urban form. A successful low-carbon city agenda in China will need to include reform of this system.

**Municipal Governance, Finance, and Planning in Chinese Cities**

*The Role of Governments*

A low-carbon city involves a range of choices: what economic goods and services a city produces, what municipal infrastructure services are provided, and what goods and services are consumed by urban households. While businesses, households, and individuals are all involved, governments will play a major role in guiding the process.

The role of the Chinese central government is to establish broad national policies and targets. National policies for urbanization, rural-to-urban land conversion, energy saving, and CO$_2$ emission reduction all are relevant to the development of low-carbon cities.

The central government also has crucial review and guidance roles essential to support this development. The central government reviews and approves urban master plans for major cities, mega-investment projects, and applications for rural-to-urban land conversion. Moreover, the central government provides technical guidelines and standards for cities in specific areas such as public transport and public utility services. Direct financial support is limited to intergovernmental transfers to provincial and municipal governments, primarily in less-developed provinces.

At the local level, municipal governments are all-purpose governments. Unlike traditional Western local governments, they are responsible for the local economy and employment, as well as the provision and management of municipal services. Their wide-ranging responsibilities make them well positioned to lead the development of low-carbon cities, although obstacles remain. The past two decades of urban development experience have demonstrated that most Chinese cities have the capacity to make decisions and implement them quickly. However, a number of institutional deficiencies have also been exposed in the difficult trade-offs between short-term economic growth and long-term environmental sustainability. Experience to date demonstrates that short-term economic growth is often given priority over long-term environmental sustainability. Developing low-carbon cities in China will pose a major challenge for China’s urban institutions.
Some critical questions need to be addressed. Do cities have the right incentives to make strategic decisions that do not compromise the long-term interests of their citizens, the country as a whole, and the international community? Is there an adequate governance mechanism to ensure that strategic decisions that are aligned with these interests are made and implemented? Are the available financial means adequate and sustainable in the long term? Is current city planning practice adequate for addressing the issues stemming from rapid urbanization in a low-carbon framework? The following sections will examine these questions in the context of China’s decentralized government framework.

**Decentralization, Local Incentives, and Accountability**

China’s urbanization over the last 30 years, during which hundreds of millions of people migrated to cities, is unprecedented in human history. During this same period, demand for urban services has grown rapidly with the increase in personal income of urban dwellers. Overall, most municipal governments have accommodated the new urban population and met this rapidly increasing demand for urban services. Almost all cities—large and small—have gone through a dramatic transformation and modernization of their cityscape within the short span of only a generation. High-rise office buildings, industrial parks, modern residential compounds, shopping malls, wide boulevards, landmark structures, ecological parks, artificial lakes, and wastewater treatment plants are now common urban landscapes across the country. However, many problems have also emerged throughout the process—wasteful investment, excessive conversion of agricultural land for urban construction, degradation of the environment, and neglect of adverse social impacts, to name only the most prominent. All of these will have to be addressed if cities are ultimately to transfer to a low-carbon development path.

Both China’s spectacular achievements and significant challenges in the area of urban development are closely connected to the country’s decentralized governance structure, which has devolved a range of functional and fiscal responsibilities from the national to subnational governments, particularly municipalities. Decentralization was essential to China’s economic reform as it progressed from its formerly rigid centralized management system. Under the decentralized system, urban development is considered a local concern, and municipal governments assume primary responsibility—both functional and fiscal—for it.

The responsibilities of the national government are limited to the review and approval of urban master plans and large urban infrastructure
Local Governance, Municipal Finance, and Land-Use Planning

investment projects, setting technical standards and policy guidance, promoting knowledge exchange, and facilitating capacity building. However, the increasingly rapid economic and spatial changes at the local level are making it increasingly difficult for the national government to exercise guidance and control in a timely manner. The effectiveness of the national government in policy management is seriously compromised by the limited national budget available for urban development. Given the large number of localities, central monitoring and supervision is often inadequate at the local level where policy implementation is carried out. To some extent, this situation creates an institutional void in addressing the spillover effects of urban development, such as energy security and CO₂ emissions, which are largely national and even international concerns more than they are strictly local.

The existence and growth of these spillover effects justify a reconsideration of the role of the national government in urban development. The development of low-carbon cities forms part of a national agenda. The co-benefits at the local level alone—such as energy saving, reduced environmental degradation, and better quality of urban life—will not be sufficient to warrant cities taking action on their own to develop low-carbon cities. Given the extra effort required at the city level to mitigate CO₂ emissions, additional momentum from the central government will be required. The central government has a strong track record for leading national policy implementation on other issues, but its role will have to be strengthened to fill this institutional void.

Significantly more will also have to be achieved at the municipal level. Decentralization is a long process and remains largely unfinished. Due to their transitional nature, municipal governments face a number of unprecedented management problems. Unlike mayors in many other countries, Chinese mayors are held accountable not only for the provision of urban public services, but also for the performance of the urban economy, investment, and employment. They all face difficult choices between rapid GDP growth and a more balanced, sustainable urban development.

Until very recently, the performance of mayors has been judged almost exclusively by annual urban GDP growth (see box 4.1). Since its economic reform that started in 1978, China’s economic growth has relied heavily on exports and investment. As a result, cities compete fiercely for foreign direct investment (FDI) by improving urban infrastructure and offering land concessions. The incentive to rapidly improve urban infrastructure conditions is so strong that consideration of environmental
sustainability and other long-term interests of city residents are seriously compromised. It is now well understood that the single-minded pursuit of GDP growth has caused substantial damage to the environment. A case in point is the excessive conversion of farmland that contributes to excessive urban sprawl, which will be discussed later in this chapter. Fortunately, this is beginning to change, due in part to the “green GDP” and “people-centered development” concepts recently promoted by the central government. Nonetheless, with the expected continuing pressure for GDP growth, there will be a time lag before cities incorporate these new concepts into on-the-ground practice.

**Municipal Finance and Land Concessions**
Over the last 15 years, China has experienced explosive urban growth and rapid increases in the demand for urban services. At the same time,

---

**Box 4.1**

**Incentives for the Performance of Municipal Leaders**

At the top of the leadership in every Chinese municipality are the municipal Communist Party secretary and the mayor. Both are mostly technocrats, rising to their positions through a merit-based promotion system. The party secretary is often appointed by the higher-level party organizations, and the mayor is nominated, elected, and confirmed by the local People’s Congress. In general, the party secretary oversees the implementation of broad policy directions and intervenes when necessary, while the mayor is responsible for day-to-day executive functions. They are often drawn from technical and managerial backgrounds and have experience in line departments. Due to their technical competence, the publicity associated with good performance, and the opportunity for further promotion based on performance and tangible results, there is a strong sense and culture of competition—between leaders in a province or a region as well as across time. Mayors experience pressure to perform better than both preceding mayors and neighboring mayors. Successful municipal leaders are promoted quickly to positions of higher responsibility and seniority, creating strong incentives for performance. When performance is mainly measured by GDP growth, these incentives have led to a single-minded focus on GDP growth—a focus which is only now slowly beginning to change.

Source: Authors.
decentralization has shifted much of the responsibility for providing these services to local governments. In 1994 China adopted a Tax Sharing System that provides separate tax-collection powers for the central government and subnational governments over certain categories of taxes. Crucially, two main sources of municipal fiscal revenues for many countries—residential property tax and land value incremental tax—have not yet been widely imposed in China.³

The system is asymmetrically designed in the assignment of fiscal power and expenditures. The ratio of subnational revenues to the total revenues has averaged around 50 percent, while the ratio of local fiscal expenditures to the total remains high at about 70 percent. Local governments increasingly face the burden of rapidly growing expenditures without the power to raise tax revenues on the required scale.

This gap between limited municipal budgetary revenues and growing expenditures is generally filled by two sources of funds, depending on the economic status of the localities. One source of funds is fiscal transfers from the central government. One category of these transfers is general purpose transfers including revenue-sharing transfers and tax rebates (Shah and Shen 2006). These transfers are normally predictable by the localities. Another category is specific-purpose transfers mainly provided to a limited number of designated poor and rural localities. For most localities, all local revenues including central transfers are not sufficient to meet the expenditure needs, especially capital expenditures needed for urbanization and industrial development. The estimated needs for these capital expenditures could be excessive as they are mainly aimed at attracting business investments and jobs. The gap is then filled using off-budget funds. These include revenues from land concessions, borrowing through a municipal government-owned urban development investment corporation (UDIC), municipality-imposed surcharges, and, to a much lesser extent, public-private partnership (PPP) financing arrangements, or build-operate-transfer (BOT) schemes.

Under the Chinese Budget Law, municipal governments are allowed to borrow from commercial banks or raise funds from the capital market only under tightly controlled and limited circumstances.⁴ To bypass this legal constraint, municipal governments establish UDICs, which are legally permitted to borrow. Many UDICs are given parcels of public land as starting assets. With these as collateral, UDICs are able to borrow on behalf of the municipal governments for infrastructure investments, some with revenue flows (such as tolled roads) and others without (such as urban streets). Some UDICs are created as a majority shareholder com-
pany for several municipally owned urban utility companies (that provide services such as water supply, district heating, and cooking gas supply) and thus generate cash flows. Others are simply fiscally backed, “empty-shell” companies that borrow for the municipal governments. The UDICs obtain commercial loans from commercial banks or policy loans from the China Development Bank. To date, banks have been more than willing to lend, as UDICs represent a large stream of business and municipal governments are assumed to be providing an implicit guarantee.

These off-budget funds have been instrumental in financing urban infrastructure and urban development over the last decade. However, rapid urbanization and income growth, compounded with market speculation, continue to drive up demand for housing and land. The municipal governments are increasingly under tremendous pressure to mobilize extra resources for the delivery of urban services. To meet financing needs, municipal governments mainly rely on the only sizable local resource available to them for appropriation—rural land within municipal boundaries.

Most Chinese municipalities cover a sizable geographic area, within which much of the land is rural. A typical municipality consists of a central city built-up area along with several suburban districts or suburban counties. Given that urban development is occurring so rapidly, these suburban districts and counties are a source of rural land for urban development needed to meet growing demand. Viewed from a different perspective, however, this land represents an enormous opportunity for municipal governments to generate off-budget revenues from land concessions under the guise of addressing urban development needs.

There are two ways to convert farmland into urban use. Both are related to the structure of land ownership in China. Urban land is state owned, with land-use rights transferrable through the market. Rural land is collectively owned by the villages and can be leased to other users.

One method of converting farmland into urban land is through land acquisition as part of a land acquisition plan based on an urban master plan. This process is closely monitored and supervised by the national government through the central Ministry of State Land and Resources. Municipal governments acquire rural land at low prices set by the state based on agricultural revenues and relocations costs, improve the land with urban infrastructure, and then sell or auction the serviced land to developers for property development. The revenues from land concessions are considerable, as the financial costs of land acquisition are low and the sale prices of serviced land-use rights are high. According to the
Ministry of Land and Resources, total revenues from land concessions nationwide amounted to RMB 2.7 trillion in 2010, or RMB 2,000 (or US$300) per capita. This sizable revenue stream creates an enormous incentive for municipal governments to develop land, often on a scale that far outpaces real demand. This imbalance is far worse for smaller cities as they are not closely monitored by the central government (see also box 4.2). Recent media reports demonstrate the results of this with astounding pictures of ghost towns—completed but empty apartments and office complexes—built by some smaller municipalities (see figure 4.1).

The inflated expectation of property developers and investors in future increases in the value of developed land and properties—which fuels land development and concessions—also contributes to this process. It is understandable that developers become optimistic when they have witnessed sustained rapid growth in urban population, incomes, and property prices over the last two decades. Although the topic is still actively debated, a consensus is emerging that this has led to a significant bubble in Chinese real estate prices. The optimism is also mirrored by the city master plans: the previous round of master plans of 99 major cities developed 10 years ago together had projected a total urban population of 2 billion by 2010 and 3 billion in 2020 (Wang and Tang 2005).

Box 4.2

Land Purchase and Disposal Cost Differentials

Compensation for land purchases from farmers is not provided at market values and is often much lower than the expected value and the income of local governments from the disposal price. Estimates based on the World Bank’s “Sustainable Development on the Urban Fringe” study (World Bank 2007) suggest land is disposed, on average, at six to eight times the compensation cost, although multiples of 20–30 are not unusual and the number can be as high as 75. The report highlighted the specific case of Ganjingzi, which was to be incorporated into the Dalian urban boundaries. The land was resold between 1.2 and 7 times the compensation cost given to farmers. With the differential potentially so large, it is no coincidence that in many cities, land release provides a major part of municipal governmental incomes (around 30–60 percent or even more in some rapidly developing regions).

This phenomenon is also driven by the fact that the performance of mayors is primarily measured by the rate of annual urban GDP growth, which in turn creates perverse incentives for land development. Due to the drive for GDP growth, the primary concern for mayors is attracting investment (especially FDI) and creating jobs. Every mayor has the same goal, and competition for FDI among cities is fierce. Cities race for infrastructure investment and provide various local incentives to investors. Infrastructure development is perceived by nearly every city as a win-win strategy. A good business environment for FDI requires quality infrastructure, and infrastructure development can be profitable for cities, not through direct revenues (such as user fees) but through associated land transactions and concessions. Enticed by improved infrastructure, FDI in manufacturing leads to new factories, industrial parks, and development zones, all requiring land.

It is now well understood that the widespread combination of land concessions and infrastructure investments through UDICs has helped generate significant amounts of local debt. These outstanding debts were estimated to be RMB 7 trillion in 2009. This has caused serious concern
about the potential impact of local debt to lead to financial crises, and prompted the central government to put a halt to the operations of the fiscally backed UDICs. Local debt management capacity is being developed in an increasing number of cities, some of which is supported by World Bank–funded technical assistance. It is hoped that UDIC reform and better local debt management can at least help to cool down wasteful land concessions and infrastructure investment.

The second method of converting rural land into urban land is through leasing rural land directly by suburban villages for residential or industrial development. Many villages are located in the peripheries of urban built-up areas but outside planned and approved development zones (see box 4.3). With high demand for industrial and residential land, these villages become willing to lease their farmland for industrial and residential development. This development occurs outside of the urban land acquisition plan and outside of the supervision and monitoring of the municipal government. As such, the development is often fragmented and mostly unregulated. According to the analysis of the government, this type of farmland conversion contributes significantly to excessive, inefficient land use (Qiu 2008). This is a serious issue that needs to be addressed through broad land policy reform.

In summary, local governments’ excessive reliance on off-budget funds is creating a wide range of problems. Lack of transparency and the resultant hidden financial liabilities are a major concern to the national gov-

---

**Box 4.3**

**In-Situ Urbanization**

Evidence of the “leapfrog” nature of urban development is the degree to which people become “urbanized” without relocating—known as “in-situ” urbanization. This occurs when existing villages are absorbed into expanding municipal boundaries. Estimates based on the World Bank’s “Sustainable Development on the Urban Fringe” study (World Bank 2007) suggest that in-situ urbanization accounted for almost 40 percent of the growth in China’s urban population during the 1990s. Given that the natural population increase in cities (the amount by which births exceed deaths) accounted for around 33 percent of this growth, “true” rural-urban migration accounted for only around 27 percent of the increase in urban population in the past decade.

ernment. In addition, for local governments, relying on off-budget funds such as land concessions is clearly not sustainable—the current rate of urban expansion that sustains this process cannot continue indefinitely. New and more stable sources of local revenues are needed. Unfortunately, property taxes, betterment charges, and municipal borrowing—important sources of funding for infrastructure in many developed cities—are either in their infancy or not permitted by law. In addition, private sector participation in infrastructure financing is still limited and is present in only a few sectors including water supply, wastewater treatment, and solid waste disposal.

Given the dramatic impact of this financing system on the nature of urban development in China, addressing these issues is essential to the ultimate creation of a planning and implementation framework that can support low-carbon growth in Chinese cities. The World Bank is currently providing technical assistance for local debt management. Clearly, however, this issue is national in scope and has an impact on many core aspects of Chinese urban policy. As such, addressing the issue of municipal finance goes beyond the scope of any single project, whether World Bank financed or otherwise. The current system of municipal finance is hindering efforts aimed at supporting low-carbon development, in both the short and long term.

**Chinese Urban Planning Practice and Implementation**

Compared with many developing countries, China has, in theory, a relatively rigorous urban planning process. However, it is far looser in implementation. Most master plans are not fully implemented within the time frame of the plan, which is usually 20 years. This is caused by two issues, both specific to China. First, cities have been growing at an unprecedented rate and most face major challenges in overcoming the inherent rigidity of the urban master plan to provide the flexibility necessary to accommodate the rapid population growth as well as the demand for urban services. Currently, the urban planning process produces a 20-year urban master plan, a 5-year implementation plan, and a number of associated sectoral master plans and implementation plans for a given planning area, defined by jurisdiction. But urbanization has occurred so rapidly that the actual urban population often exceeds the planned population target for the entire time horizon of the master plan (that is, 20 years), and the actual urban functional area expands beyond jurisdictional boundaries. Amendments to the approved master plan are often needed just a few years after the initial approval, but they are usually lengthy to
prepare and take even longer for review and approval. In addition, despite the effort and time required, many newly inaugurated mayors seek to amend master plans to serve their new priorities.

This search for flexibility raises a second major issue—the lack of effective checks and balances to ensure municipal decisions take into consideration the long-term interests of urban residents and the national interest in low-carbon development. Currently, there is no viable system to hold decision makers responsible for the social and environmental consequences of their decisions. While planners diligently carry out their work, mayors often use the rapid pace of urban growth as a reason to deviate from the master plan to accommodate additional urban GDP growth. Rapidly growing demand for urban services invariably creates a sense of urgency, encouraging municipal governments to make decisions and take action quickly. Due to the lack of effective checks and balances, they often succeed in deviating from the master plan.

In theory, the urban planning and implementation process in China is kept in check by higher levels of government and the People’s Congress of the city. However, higher level authorities—especially provincial governments—often share the cities’ interest in GDP growth and the same sense of urgency for urban development, as provincial GDP comes mostly from cities. It is rare that the higher level authority directly confronts deviations from the master plan, especially in decisions related to business investment. The People’s Congresses in many cities are increasingly fulfilling a supervisory role by checking the actions of the municipal government against plans, but they have neither sufficient technical capacity nor sufficient representation from all stakeholders to intervene. There is also no existing procedure for expert witness testimony over issues relating to the public interest in urban planning.

In recent years, the planning and implementation process has increasingly been opened up for inquiry and monitoring by the general public. This has helped, but more openness is critical. Increased transparency will not only help safeguard the interests of society, but also prevent uncontrolled rent-seeking behavior that frequently occurs in urban land use and real estate markets with undesirable consequences such as overspeculation and wasted resources. In short, it is essential to improve the current system of checks and balances to ensure sensible decisions are made on a broadly informed, transparent basis, and that sound plans are duly implemented. These challenges need to be addressed before low-carbon development can effectively be mainstreamed into the Chinese urban master planning process.
**CO₂ Implications of Inefficiencies in China’s Urban Land Use**

As has been widely documented, the configuration of urban form can have a considerable impact on the generation of greenhouse gases (see figure 4.2 and box 4.4). In general terms, evidence suggests that urban sprawl—the rapid growth of low-density areas at the urban periphery—can lead to larger emissions through a variety of different mechanisms. First, low-density development tends to increase CO₂ emissions from urban transport through longer trip distances and a higher proportion of private motorized trips.\(^9\) Second, low-density areas tend to provide a higher amount of living space per person, leading to higher emissions from home heating, cooling, and general power consumption (Norman MacLean, and Kennedy 2006). Finally, low-density development tends to produce infrastructure that is less intensively used than in dense urban cores, for example suburban highway access roads, thereby raising emissions per capita.

To a degree, this description of “sprawl” describes the economic aspirations of urban dwellers in developing countries, and the economic reality for many living in developed countries: a private home and the freedom of movement provided by a private automobile. However, large gaps between the emission profiles of cities in developed countries—Hong Kong SAR, London, New York, and Houston—suggest that high incomes

---

**Figure 4.2 Urban Density and per Capita CO₂ Emissions from Transport**

![Figure 4.2 Urban Density and per Capita CO₂ Emissions from Transport](image-url)


*Note: The figure does not correct for income because a regression of transport emissions on density and income reveals that density, not income, is a key factor. Data are for 1995.*
Box 4.4

Empirical Evidence Regarding Urban Forms and CO₂ Emissions

A growing number of empirical studies on urban form (including density, land-use mix, public transport supply, and commuting distance, among other variables) and CO₂ emissions have been carried out. Although debate continues on some important points, a broad consensus is emerging that urban form can play a key role in mitigating GHG emissions. The findings of several studies are highlighted below.

According to an OECD study report edited by Kamal-Chaoui and Robert (2009), global city data show that a higher urban density (population per square kilometer) is generally associated with lower per capita electricity consumption.

Using a different city data set from the one used for figure 4.2, the same OECD study shows the similar pattern that higher urban density is associated with lower per capita transport CO₂ emissions.

A study by Brown and Logan (2008) examines the residential energy and carbon footprints of the 100 largest U.S. metropolitan areas and found that relatively more compact metropolitan areas have lower per capita residential carbon footprints.

A study by Magalhaes and Duran-Ortiz (2009) compares the fuel consumption and light vehicle carbon footprints between Brasilia and Curitiba. Brasilia was planned as a symbolic capital, with low densities, segregated land use, spatial stratification, and satellite towns. Curitiba is perhaps the world’s best-known transit-oriented city. The study shows, unsurprisingly, that Curitiba has significantly lower annual average CO₂ emissions from light vehicles than Brasilia.

Evidence has also been produced comparing different neighborhoods within a given city. Evidence from Toronto (VandeWeghe and Kennedy 2007) suggests that residential emissions per capita in Toronto vary by as much as an order of magnitude between urban and suburban areas.

There remains some debate about the effect of moving from a monocentric to polycentric employment pattern on overall commute length and hence overall emissions. This debate is notably summarized in Jencks et al. (1996). In China, while there is clear evidence that peripheral employment locations have the potential to reduce commute times overall, they also induce a mode shift away from public transport. These effects have opposite effects on emissions—but the likely combined effect, in the opinion of the authors, is markedly increased emissions. Further research is needed on this topic in the Chinese context.

(continued next page)
and economic opportunity do not necessarily lead to uniform outcomes as measured by greenhouse gas (GHG) emissions per person.

The large difference in emissions between these cities certainly does not suggest that Houston can ever be transformed into Hong Kong SAR (or that its citizens would support such a change). Indeed, the largely fixed and irreversible nature of urban development suggests that increasing the density of new development in cities in the United States would have only a marginal impact on their overall energy consumption and emissions (TRB 2009). This evidence from U.S. cities, however, does not diminish the argument for dense development in Chinese cities. If anything, it argues for immediate action, while urban development is occurring rapidly and patterns are being set that will endure for the foreseeable future.

Indeed, Chinese cities are growing at an unprecedented rate, and how these cities are built now will have a long-lasting impact. Many cities have more than doubled their built-up area between 1990 and 2000, and the trend continued strongly in the 2000s. This expansion is likely to continue as the level of urbanization is projected to increase from 43 percent in 2005 to almost 60 percent by 2030. This translates into the addition of over 300 million people to the urban population in 25 years.

Unfortunately, urban growth in Chinese cities is occurring in a haphazard, inefficient, and unsustainable way, particularly at the urban periph-
Several factors are leading to rapid growth at the Chinese urban periphery. First, a large number of urban migrants are moving to cities and settling at the urban fringe, where housing prices are more affordable than in central locations. Second, living standards are increasing rapidly and residential floor space per person has increased dramatically in large Chinese cities, forcing development outward. Third, the restructuring of the urban economy in response to globalization has broken down the self-contained danwei—live-work unit—creating a modern central business district and separate residential areas. Fourth, a rapid change from non-motorized and public transport modes to the private vehicle has pushed development outward. Finally, many industries have relocated from central districts to economic zones located at the fringe of urban areas.

Box 4.5

**Urban Design Regulations in Chinese Cities: Taking a New Look**

Chinese municipalities and the Chinese national government would benefit from a fresh but critical review of the urban land-use and design regulations at the municipal level, to identify practices that are not consistent with, or even detrimental to, low-carbon city development. In many Western countries, debates around sustainable land-use planning typically revolve around increasing densities (residents per square kilometer). In general, in Chinese cities, densities remain higher than all but the densest Western cities, even for new development. The primary issues then are related to design. The width and density of streets; the layout of buildings, lots, and sidewalks; and the design of other key features tend to reinforce a move away from walking as a convenient way for getting around, hampering efforts to lower overall carbon emissions.

One notable example of this type of regulation is building setback requirements. The setback is the required distance from the edge of a transport right-of-way (ROW) to the front edge of a permanent structure, such as an office, an apartment, or a retail building, outside of ROW. Different setbacks have been justified

(continued next page)
Box 4.5 (continued)

at different times for different purposes. Some early incarnations in the United States were designed to allow sufficient light and air into dense city blocks. In modern China, setbacks are often mandated in order to maintain a sufficient safety buffer zone from the transport infrastructure in case of natural disasters such as earthquakes, although most planners agree that there are engineering solutions to overcome these problems. In general, there are no clear technical guidelines for setting the size of setbacks. Municipal governments determine what is appropriate for their cities and specify the setback requirements in local regulations.

In the past, Chinese cities generally mandated setbacks ranging from 5 to 15 meters. In recent years, however, some cities have proposed setback requirements as large as 40 meters or more for primary arterial roads. There is no doubt about the kind of urban design that a setback of 40 meters creates: an urban environment that favors private car driving and that is unfriendly to public and non-motorized transport. As a point of reference, a typical Beijing hutong, many of which serve as thriving modern commercial arteries today, are no more than 5 to 6 meters across—from building face to building face. The comparable number for a large street with 40-meter setbacks would be well over 120 meters, a 20-fold increase. A critical examination of such land-use regulations is necessary and urgent at a time when high-density compact city development is much desired in China. Indeed, many American cities are beginning to eliminate their setback requirements altogether and replace them with "build-to" lines—where buildings are required to be close to the sidewalk to favor active streets and promote walking and cycling.

Figure B4.5.1 Setback Examples

Source: Wikimedia Commons, Geoff McKim.
Commerical street in Beijing with very small setbacks.

Source: Wikimedia Commons, Chen Si Yuan.
Successful American shopping street with very minimal setbacks.

Source: Authors.
In addition to these trends, a series of current policies is also hindering the efficient development of cities. They include the rigid protection of basic farmland (despite the policy’s good intentions), incentives for municipalities to convert land to urban uses, limits on building intensity in central cities, and a lack of coordination between transport and land-use planning (see box 4.5). Each of these factors was examined in greater detail by the World Bank in the 2009 work (World Bank 2009a) and is summarized below.

- **Rigid protection of basic farmland:** This first factor relates to a key national government policy. The Chinese national government has strictly enforced a national policy on the preservation of basic farmland, designed to prevent the rapid loss of agricultural land. Unfortunately, this policy does not adequately distinguish between land contiguous to existing urban areas and isolated agricultural areas. As a result, farmland is converted in a haphazard manner, with leapfrog development often leaving large swaths of agricultural land between high-density urbanized pockets (see figure 4.3).

- **Incentives for converting land to urban uses:** As described above, the system of municipal finance provides strong incentives for cities to con-

![Figure 4.3 Fragmented Urban Land Use at Zhengzhou Periphery](image)

vert agricultural to urban land. This creates substantial perverse incentives in terms of over-requisitioning. For example, a 2006 World Bank report concluded that the area of economic development zones in 2004 exceeded the total existing built-up area of the country (World Bank 2006). Industrial zones, which allow land to be taxed, are often provided in amounts far greater than what an efficient land market would supply—sometimes two to three times the industrial land area of cities with comparable economic bases. These sprawling land claims rapidly expand the urban periphery.

- **Limits on building intensity:** Contemporary Chinese planning practice also contributes to land-use inefficiencies. Density regulations have not been used effectively or to their full potential by most Chinese municipalities to encourage the efficient development of urban areas. In general, floor area ratio (FAR)—a measure of building density—is applied at the individual block or parcel level but often lacks a clear strategic policy direction. In general, density restrictions are too rigid in center cities, forcing development to the urban periphery and reinforcing the trends described above.

- **Lack of coordination between transport and land-use planning:** Planning practice also suffers from insufficient integration between land use and transport planning. Most noticeably, municipalities do not vary land-use density allocations in relation to infrastructure. For example, a rational land-use policy would ideally allow for higher density development near transit nodes, allowing the land market to capture the benefit of reduced travel times. This is not yet generally the case in China, although some cities are beginning to move in this direction.

These trends suggest that Chinese cities are currently on a path that does not support the overall goals of a low-carbon city. These policies are mutually reinforcing and move the city toward a more dispersed and less efficient urban spatial structure. Given that built form is highly durable, largely irreversible, or very costly to modify, existing trends could generate unsustainable costs in the future.

**Agenda for Reforms**

As the above diagnostic analysis indicates, China’s cities are generally able to mobilize resources for urban development, but the emerging complexities of the urban economy and related demand for low-carbon development require forward-looking institutions that are adaptive to changes
and capable of managing a sustainability and low-carbon agenda for their cities. At this stage of rapid development and social transformation, institutions are paramount. The issues analyzed above are, in general, well known to the Chinese central government. The institutional weaknesses—namely the institutional gulf between the national and municipal levels, and the inadequacies of incentives, accountability, municipal financing, and land-use planning at the local level—have been long recognized, but have not been systematically addressed through policy and institutional reforms. All these issues will need to be addressed if China is to succeed in accelerating low-carbon city development. Each is discussed below.

**Strengthening the Role of Central Government**

Within the decentralization framework, the central government may wish to strengthen its role in low-carbon city development to provide policy direction and reward good practice. This is an essential step to realign the incentives of municipal governments so that the long-term interests of the urban dwellers and the country as a whole are appropriately considered in the local decision-making process. While urban development should remain the primary responsibility of the local government, national budget support should be considered to encourage and reward best practices at the local level. Rewards from the central government—either moral or financial—can be a powerful tool for realigning the incentives of the municipal governments. In relation to the incentives created by the central government, a benchmarking and evaluation system for low-carbon urban development among cities should be established to monitor how cities are performing in urban development.

The central government could initiate and guide the deepening of municipal finance reform (especially the expansion of the local revenue base) and help create supportive conditions for municipal borrowing. Moreover, the national government has the opportunity to play a stronger role in creating and overseeing a low-carbon city planning process (content, procedure, consultation, and so forth) that is fully integrated into the existing urban master planning process. The national budget support proposed in this section should be linked to the successful implementation of the agreed planning process.

The central government may also consider developing a national low-carbon city development strategy, as a vehicle to finalize the details of the above recommendations and build a nationwide consensus on policy directions. It should be formulated in line with the national land, environ-
ment, and energy strategies. The strategy should be comprehensive, clarifying the key elements of low-carbon urban development and addressing issues relating to the roles and responsibilities, incentives, financing, implementation, monitoring, and enforcement mechanisms. It should also suggest specific policy directions for related urban development issues, including urban planning, land conservation, energy efficiency, building codes, urban transport, and motor vehicle CO₂ emission standards. The policy directions and the strategy could then be formally adopted after wide consultation, especially with a variety of municipal governments.

For the central government to assume a more effective role, it might consider supporting pilot demonstration programs at the local level. The program would be based on a central/local partnership. The national government may develop technical guidelines for low-carbon cities under the framework set by the national low-carbon urban development strategy. A few cities could be selected to develop and implement their city-specific strategy, institutional reforms, and development projects in line with the national low-carbon city development strategy and policy directions. The program would be a test ground to demonstrate how low-carbon results can be achieved at the local level. National budget support for the program will be an important lever to encourage buy-in from the selected cities.

Improving Incentives and Accountability of Municipal Governments

Clearly, there is scope for improving the incentive structure of municipal governments. The performance of a city should be evaluated more comprehensively, not only in terms of GDP, FDI, and employment growth, but also in terms of environmental quality, urban livability, local capacity building, and level of CO₂ emission reduction. Existing national reward programs such as the Human Settlement Environment Award are helping to realign incentives to some extent, but a deeper improvement of the local governance structure is the foundation for aligning incentives. An effective system of checks and balances must be in place.

A comprehensive set of performance indicators should be adopted at the city level. In addition, the performance of the municipal government should be monitored not only by higher level authorities, but also by a local institution that represents the long-term interests of city residents and that is empowered to safeguard the due procedures for conflict resolution. Under the current political structure of local governance in China, the local People’s Congress is well positioned to assume this role. Some local People’s Congresses are already actively involved in the develop-
ment and enforcement of local laws and the review and approval of key municipal appointments.

The openness of the municipal decision-making process through public participation, consultation, and monitoring is another important element of the local governance structure for low-carbon city development. Public participation throughout the decision-making process should be made mandatory and ensured by law. It would be desirable if public participation is organized by the local People’s Congress, instead of the municipal government and its associated agencies. Independent expert witness testimony should be introduced into the process. Other channels for direct feedback from the public to the municipal government and local People’s Congress, such as the mayor’s hotline, the Internet, town hall meetings, and local mass media, are being increasingly adopted by cities, and should be further encouraged.12

**Developing Sustainable Municipal Finance Mechanisms**

As analyzed earlier, the lack of sustainable financing mechanisms does more than simply financially constrain China’s cities; it also creates perverse incentives that result in adverse social and environmental consequences. After more than a decade of rapid growth in off-budget financing for urban development, cities need to develop sustainable municipal finance mechanisms that move away from a reliance on land concessions. This should commence with a clear municipal infrastructure finance framework. The self-financing discipline of the public entities such as UDICs that provide infrastructure services should be emphasized and strengthened. Infrastructure assets are designed and built to last for the long term, often 30 years or more. Clearly, long-term debt instruments are needed to help ensure that infrastructure with a long lifespan is paid for by users over its entire useful life.

Municipal governments are taking on debt via UDICs, with highly mixed results. Local debt enables municipalities to finance needed infrastructure, but also creates debt management problems. While it is unclear if municipal governments will be allowed to borrow directly in the near future, short- to medium-term actions should focus on reforming the UDICs to improve transparency and introduce mandatory rating of credit worthiness. With assistance from the World Bank, credit rating has been piloted for some UDICs. This should be introduced as a common practice for all UDICs as soon as possible. Perhaps more importantly, given the presence of a number of fiscally backed UDICs, credit rating for municipal governments has become necessary and should be intro-
duced and piloted. Local debt management capacity should also be developed in every city.

Moreover, comprehensive actions should be started immediately to introduce more stable local revenue bases (such as a property tax and land-value incremental tax), improve the quality of municipal financial management, harden budget constraints, make municipal finance transparent, and build up creditworthiness. As the extra-budgetary fund process is expected to continue in infrastructure financing, it should be formalized and made transparent. It should be made an integral part of the municipal financing plans.

It is also expected that off-budget funds from land concessions will become increasingly restricted. Given limited resources, cities have to prioritize their urban development expenditures. This should be based on careful assessment of the demand for funds. It is first necessary to understand the magnitude of urban development that a local government will require and how it can fund them. Cities should adopt a planning process that establishes funding priorities and rations them in favor of the most cost-effective investments. One of the most critical steps is the capital improvement plan (CIP), which is used in some developed countries but not yet implemented rigorously in China. Such a plan prioritizes urban improvements by sector (for example, transport, water and sewerage, power, recreation, education). It is necessary to determine resource allocation priorities among sectors, while maintaining the city’s fiscal integrity and the hard budget constraint.

The cities should also produce a multiyear financial plan that demonstrates how it will fund the priority development investments, and what sources of revenue are available for these improvements. The plan—consisting of the multiyear operating plan and multiyear capital improvement plan—will demonstrate to lenders how the city expects to maintain its creditworthiness in the period matching the likely duration of commercial bank loans (that is, over 5–10 years). Each year the city will revise the multiyear financial plan based on annual outcomes: the actual level of revenues received versus forecasted revenues and operating and capital expenditures. The multiyear financial plan can also be used in the annual budgeting process in an iterative fashion to confirm that sufficient operating and capital revenues are available in the medium term to maintain city services and expand its infrastructure base while protecting its fiscal health.

To prevent aggregate overspending by local governments, the national government has long controlled the size of local investment through its
review and approval process. However, this control has proven to be ineffective as overspending has tended to occur periodically. This is partly because the approval process has applied to megaprojects only, instead of each city’s whole CIP. The introduction of CIP, along with the hardening of the budget constraint at the local level, would help the national government keep the potential risk of local financial liabilities in check.

**Strengthening Physical Planning to Improve the Efficiency of Urban Land Use**

This chapter suggests that China’s land planning and development system still contains many significant elements that lead to inefficient spatial development. World Bank analysis on Chinese land development suggests at least two lessons from international experience that could be applied to the Chinese case to address these inefficiencies.

The first is that density regulations should be used to enable positive outcomes rather than attempting to prevent negative outcomes. Experience from Seoul and Tokyo summarized in the World Bank (2009a) report suggests that placing barriers such as greenbelts in the path of development tends only to push development farther to the edges of urban areas. A better approach is to enable the land market to create efficient development patterns by encouraging development where it best serves efficiency objectives, notably near transit stations. Additional focus is also needed at the level of neighborhood design (see box 4.6).

A second lesson is that the sequencing of urban development can play a major role in determining final outcomes. Urban development at the fringe of large cities developed in advance of public transport infrastructure can precipitate patterns of urban commuting that are hard to break, even if high-quality infrastructure is later provided. Chinese cities currently investing billions in metro systems in areas that were poorly served by public transport for many years are witnessing this issue firsthand.

Preliminary estimates from World Bank work conducted in 2009 indicate that progress in these areas could yield significant benefits. This work estimated that average carbon emissions per person could be as much as 10 percent lower with feasible increases in density. Chinese cities have grown rapidly over the last 25 years, but the urban boom is far from complete. The World Bank remains committed to working with client cities in China to address these issues in all urban development projects, seeking wherever possible to employ best practice on efficient and low-carbon growth now and into the future.
Box 4.6

Low-Carbon Neighborhood Design in China

Most Chinese urban dwellers have not yet locked in patterns of consumption with high-carbon emission implications, as is the case in many Western countries. This provides China with a possible advantage in pursuing low-carbon development.

To take advantage of this opportunity, China must support innovations in urban land-use and transport planning to help shape a low-carbon urban lifestyle. As described above, allowing density regulations to vary to support transit accessibility and central city growth is an excellent macro-level strategy. Micro-level design is also an area worthy of further examination. Neighborhood design to support environmentally friendly growth has long been a goal of many groups in developed countries (notably the New Urbanists in the United States) and some of the principles of ecologically friendly neighborhood planning were recently codified in the Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) guidelines by the U.S. Green Building Council.

![Figure B4.6.1 Traditional Grid of Back Bay, Boston (left), Compared with a Cul-de-sac Layout](source:Wikimedia Commons 2011, Rick Berk)

As in other countries, in-home energy use and personal travel are the two main forms of household energy consumption in China. With income growth and urban expansion, households demand bigger homes, more appliances, and private cars. Neighborhood design can help mitigate these effects, though it acts in complex ways. Residents of neighborhoods arrive in new neighborhoods with their own habits and desires, and their behavior is impacted by their surroundings,

(continued next page)
The institutional and financial elements of urban planning in Chinese cities must be addressed systematically before the conditions for true low-carbon physical planning can be enabled. These reforms will not by themselves ensure low-carbon development—as the experience of many developed countries shows. However, without reform of the current financing and institutional reward structures of municipalities, true low-carbon development is not likely to occur. In the interim, a variety of efforts, including those described in this section, can improve the efficiency of urban land use at the margin—and these have been and will continue to be supported by the World Bank.

**Political Commitment to Reform Actions**

Political commitment to reform is key to success. Implementation of the above recommended actions will not be easy. In addition to the continuing pressure for income growth, there are various powerful business interests (such as the automobile, real estate, and banking industries) supporting the current urban land-use and consumption patterns, which could make the development of low-carbon, compact cities difficult. Reforms of fiscal systems and intergovernmental fiscal relations to harden the local budget constraint are urgent but will also be difficult. Capacity development for city planning and financial planning to serve low-carbon city development will take time. All of the above point to a need for a strong political commitment to take immediate action.
Conclusion

This chapter discussed the closely interrelated topics of local governance, municipal finance, and urban land-use planning and their influence on the potential for the development of low-carbon urban form in China. Municipal finance is a crucial element of this story and its reform—in particular, shifting away from inefficient and wasteful farmland conversion—will be integral in developing a system of long-term financing that can support low-carbon growth.

Urban form locks in long-term consequences. Careful planning and effective implementation are therefore vital. This chapter demonstrates that for the low-carbon city agenda to succeed, a comprehensive reform of China’s existing system of local governance, municipal finance, and urban planning is needed.

Notes

1. Although this paper focuses on the Chinese master plan which governs land use, China has three separate processes that cover different yet interrelated aspects of planning. In addition to master plans, they include socioeconomic development five-year plans and state land resource utilization plans, which require approval by the higher level governments. The three plans are interrelated. In practice, these plans are developed by three different agencies and can sometimes set targets and goals that are inconsistent or even contradictory. Nevertheless, these plans are considered necessary by Chinese officials for guiding local socioeconomic and spatial development while safeguarding the national interest in land resources.

2. Green GDP is a concept proposed in China in 2004 that attempts to factor the environmental consequences of economic growth in the accounting of national GDP. Although it is not yet formalized in national accounting, the idea reflects a new policy emphasis that more environmentally friendly GDP growth is needed to replace the single-minded pursuit of GDP growth at the cost of the environment. People-centered development is another concept that emphasizes the ultimate goal of GDP growth as the real improvement of the well-being of the people instead of merely the expansion of material wealth. It was first proposed as a development approach by the Central Committee of the Chinese Communist Party in 2003.

3. In a potential sign of things to come elsewhere, residential property tax collection was piloted in Shanghai and Chongqing in early 2011.

4. In recent years, the Ministry of Finance has issued local government bonds on behalf of a limited number of local governments. The total size of the bonds is tightly controlled by the central government.
5. The number was revealed in the speech of the Minister of Land and Resources in the National Land and Resources Working Conference held on January 7, 2011. It was then widely reported by the Chinese mass media. According to the Ministry data, the revenues from land concessions amounted to RMB 0.7 trillion in 2006, RMB 1.3 trillion in 2007, RMB 0.96 trillion in 2008, and RMB 1.59 trillion in 2009 (http://cq.people.com.cn/news/201118/20111885626.htm).

6. The degree to which Chinese real estate is overvalued is a topic of much recent debate. A survey published in a report on the housing market in China, recently released by the Chinese Academy of Social Sciences (CASS), estimated the average “bubble” (the percent by which the current market price of real estate exceeds its estimated underlying value) in 35 major Chinese cities at 29.5 percent—with some major cities reaching 50 percent (Jia 2010).

7. The number was from the China Banking Regulation Commission and widely reported by the media in May 2009.

8. Officially, villages are not allowed to develop or lease land for nonvillage-based uses. However, villages are able to develop land for industrial or commercial purposes for local township and village enterprises (TVEs). The process of village urbanization described in this chapter has often occurred “informally” through the unofficial lease of TVE land to outside groups. Given its informal nature, only limited information is available on this process.

9. One or both of these effects may be present. In some cases, low-density areas may have shorter average commutes than areas with dense urban cores—for example, Houston has a shorter average commute than New York—but the overwhelming dominance of the private automobile in these areas leads to overall higher emissions per trip. In many cases, sprawling areas experience both longer commutes and increased use of private motorization—with both effects increasing emissions.

10. The unpublished analysis is based on case studies in Tianjin, Zhengzhou, and Shanghai.

11. See chapter 2 on China’s eco- and low-carbon cities for an overview of pilot programs.

12. As can be seen in some high-income countries, government transparency is by no means guaranteed to encourage low-carbon development. This is especially the case when households are already locked into a high-carbon lifestyle. In China, however, households have not yet attained a locked-in high-carbon lifestyle. Aside from the need to support greater government openness for its own substantial merits, the authors believe greater transparency can also support the low-carbon agenda in China.


**Bibliography**


