



# Financing Sustainable Urban Transport in China

## Discussion Paper

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## Background and introduction

China has proven to be capable of implementing massive urban transport systems of high complexity in a very short period of time. In the last decade, cities have been able to develop innovative strategies to implement successful SUT systems. However, the needs for sustainable mobility in the highly dynamic context of Chinese cities require maintaining the current development pace and implementing adequate mechanisms to ensure the long-term financial viability of transport systems. In particular, it is necessary to develop permanent and reliable sources of funding, and to establish planning and monitoring tools for proper integration of transport systems into the urban environment.

This paper continues the work by GIZ and EMBARQ on Sustainable Urban Transport (SUT) financing that started with a workshop held in China in November 2012, followed by a more thorough review on International Experiences (see next page). This work is guided by four key questions regarding the way countries and cities finance, plan, and operate sustainable urban transport systems:

## Acknowledgment

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- What is the most adequate institutional arrangement in order to carry out a national policy of sustainable urban transport?
- What can the national government do to establish a financing framework to ensure a more sustainable development of urban transport?
- What are suitable procedures and criteria for national-level funding of urban transport (construction, operation and maintenance)?
- How to develop technical capacities in transport and urban planning at the local level?

## Context

The Sino-German Climate Change Programme implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) includes a component on development of mitigation strategies for the transport sector, which aims to support national institutions in developing a climate protection strategy in the transport sector and to implement measures and incentive structures with a special focus on urban transport.

More information: [www.sustainabletransport.org](http://www.sustainabletransport.org)

The discussion paper expands the ideas on how to start addressing different elements of a comprehensive national urban transport policy and illustrates options by case studies from other countries. The adoption of models that have been successful in other countries does, however, not necessarily mean that they are suitable for the Chinese system as they are. Factors related to scale, legal and institutional framework, and cultural characteristics of planners, operators and users of the different transport systems need to be taken into account when assessing the feasibility of implementing international practices in the Chinese context.

As a consequence, the purpose of this discussion paper is not to establish prescriptions for direct application in the Chinese context, but rather to explore starting points in more detail and identify gaps as a basis for further discussion with the expert community in China. At the international

expert workshop held in Mutianyu, China in November 2012 participants concluded that developing sustainable urban transport systems is only possible when the legal, financial and institutional frameworks are considered together.

Based on this and a deeper review of international experience in Brazil, Colombia, France, Germany, India, Mexico, the United Kingdom and the United States, this discussion paper suggests eight institutional and financial strategies to build an integrated national system for planning, funding, implementation and operation of SUT projects:

1. Institutional reform: Unifying all responsibilities for SUT
2. Establishing a Chinese national or provincial sustainable low-carbon urban transport fund
3. Strengthening local debt management
4. Creating new forms of revenues for SUT policies at the local level
5. Promoting public-private-partnerships
6. Integrating policy guidance under a single comprehensive framework for SUT
7. Developing urban mobility plans linked to urban development plans
8. Setting up capacity building programmes

Case studies are provided to illustrate each strategy. Since central-local relations depend on institutional and constitutional settings that are only to a limited extent transferable between countries, these case studies can serve as illustrations but not as a blueprint.

China is already advancing urban transport, so the introduction of mobility policy reforms must be accompanied by an assessment of how systems already operating in Chinese cities work and how they can be complemented. The following sections therefore first provide a short assessment of the current situation and then discuss possible options for improvement.

## Further Reading

- GIZ's [Final Workshop Summary Report on Financing Sustainable Urban Transport](#).
- GIZ's [International Review of National Urban Transport Policies and Programmes](#).

# Eight strategies for China to consider

## Strategy 1

### Institutional reform: Unifying all responsibilities for SUT

#### Current Situation

Need for improved institutional coordination across multiple institutions.

At present, a number of different public institutions, both at the national and local levels, are involved in guiding diverse aspects of urban transport development, implementation, operation and monitoring. Under the current institutional framework, Chinese cities are responsible for financing the development, operation and maintenance of transport infrastructure and services within their jurisdictions. The role of national level institutions is mainly to set major goals and objectives and to formulate transport and urban development policies and strategies to achieve them. According to this framework, the Ministry of Transport (MoT) is in charge of developing national transport policies and is responsible for all national transport infrastructures. At the city level the Transport Commission or Bureau is responsible for the supervision of public transport, while the Ministry of Housing and Urban-Rural Development (MoHURD) and its local subsidiaries are in charge of overseeing urban and transport planning, as well as the construction of urban transport infrastructure. Nevertheless, the National Development and Reform Commission (NDRC) still has to approve urban rail network plans and urban rail investment projects. For transport projects, local and provincial governments are responsible of reviewing and authorizing proposals. Finally, traffic operation and road safety belong to the administrative jurisdiction of the Ministry of Public Security, whereas transport pricing, e.g. of public transit fares, taxis or parking spaces is usually set by local dependencies of NDRC or the Price Authority. The Ministry of Finance (MoF), the Ministry of Science and Technology (MoST) and the Ministry of Industry and Infor-

mation Technology (MIIT) also play a role in promoting new energy vehicles in cities. The distribution of responsibilities at national level is mirrored in departments at the local level. Such a multi-institutional arrangement usually results in overlaps that diminish the coherence and effectiveness of the planning, financing, implementation, and operation processes of SUT systems. It also leads to tensions between NDRC and the central line ministries MoT and MoHURD who would prefer more autonomy to manage their responsibilities.

Institutional overlap is a challenge not unique to China. In transport programmes in most of the countries examined a number of agencies are responsible for a single aspect of transport systems (financing, planning, operation or maintenance), but none is exclusively responsible for it. Integrated policies across different sectors require institutional support that transcends administrative boundaries, while respecting the authorities' mandate (Mehndiratta and Salzberg, 2012). The traditionally compartmentalised structures of government tend to hinder coordinated action and to limit information flows among different authorities.

#### Option for Improvement

Undertake an institutional reform that unifies, aligns and coordinates all national responsibilities related to sustainable urban transport under a single central authority and local responsibilities.

The institutional reform for the unification of all national responsibilities for SUT under a single authority – especially integrating urban and transport planning – would result in an improved alignment between administrative structures and functional urban areas, so that one agency would coordinate transport policy within urban regions. Unifying responsibilities at national level would not only promote coherence and efficiency in national urban transport policy, but also spur setting up equally unified authorities at city level. Such comprehensive transport authorities would

be much better placed to develop truly integrated urban mobility plans (see strategy 7).

The establishment of a single national authority responsible for public transport and urban mobility has implications for reform regarding three main policy areas: inter-institutional coordination, financial support, and capacity building (see also box 1).

Since the institutional capacity of local governments to adequately address mobility issues of increasing size and complexity by themselves is often limited, a national authority could assume a helping role to coordinate and oversee the processes of planning and financing SUT projects, while at the same time improving local technical capacities. This might include activities related to project identification, evaluation of alternatives, development and coordination of technical projects, and system monitoring, where these cannot be performed by city authorities themselves.

On the one hand, national programmes under a single institutional guidance can provide an appropriate umbrella for communication and coordination between the different levels of government involved in the development of urban transport projects, especially those that are normally spread across different administrative jurisdictions. This should aid in overcoming the challenge of split responsibilities and gaps in planning, financing and implementing sustainable urban transport (Mehndiratta and Salzberg, 2012). Such an institutional arrangement also facilitates the accomplishment of national goals and objectives, at the same time reducing technical and financial risks for local governments.

However, the concentration of national responsibilities in one single institution does not by itself guarantee adequate communication and coordination. A flexible and simple administrative structure, with clear channels for coordination and communication between the different divisions is crucial in order to reach an adequate level of internal efficiency and avoid choking the newly gained alignment with internal bureaucracy.

Clearly, such institutional reform is easier said than done. China has long tried to find the right institutional structure for urban transport. The Ministry of Transport took over its current responsibilities for urban transport from MoHURD in 2008, but MoHURD still remains responsible for non-motorised transport and urban infrastructure construction. Also the work force responsible for urban transport policy within the MoT has stayed small up to this day, compared to MoT's traditional responsibilities, such as highway and waterway construction. In 2013, MoT also took on responsibilities for rail transport, further broadening its scope of influence and finally allowing MoT to include suburban rail in its policy making. These are positive steps towards better integration of urban transport policy and developments. Nonetheless, the remaining split of responsibilities, especially between MoT and MoHURD, constitutes a striking impediment for the construction of efficient public transport systems and intermodal interchange at city level.

But is it likely that MoHURD will be stripped of its remaining urban transport responsibilities? – Probably not in the short run. Before a total shift of responsibilities may become possible, the coherence of national policies related to urban transport could improve through stronger requirements for coordination and consultation between MoT and MoHURD and their counterparts at city level. At the city level, unifying the responsibilities for urban transport planning and management under one single authority is possible even without an alignment at the national level, as has been successfully demonstrated in China by the city of Shenzhen.

## Box 1 Case Study for Unified Responsibilities at National Level

### Brazil: Ministry of Cities

The creation of the Ministry of Cities of Brazil established a National Policy for Urban Development, looking to coordinate and integrate investment and policymaking in Brazilian cities. The structure of the Ministry of Cities involves a paradigm shift, as it integrates the policy areas of housing, sanitation, urban transport and transit. Thus, by unifying transport policy under a single national authority, the Ministry of Cities is responsible for funding actions and decisions; for activities related to the coordination of the different national, state and local authorities involved in urban development; and for providing capacity building and technical assistance to local authorities regarding planning, construction and development of urban projects.

Therefore, while the national government is responsible for establishing the general guidelines for National Policy for Urban Development, the local government is responsible for planning and developing urban and metropolitan management.

The Ministry of Cities is structured into five Secretariats in order to provide funding; coordinate policymaking; and provide technical assistance related to the different urban policy areas, namely: Housing, Urban Programmes, Sanitation, Transport and Urban Mobility, and Capacity Building. While in the past a fund called PROMOB served to finance the projects, today, the most important source of financial support to infrastructure projects in Brazil is the PAC – Plano de Aceleração de Crescimento (Plan of Acceleration of Economic Growth). The PAC was set up in 2008 with three stages:

- PAC 1 (2008 – 2010)
- PAC Copa (with projects related to the FIFA World Cup 2014)
- PAC 2 (2010, ongoing, split into several branches for financing energy, transport, housing and further projects).

The PAC is coordinated by the Ministry of Planning, but the Ministry of Cities has the technical responsibility. It provides 46 billion USD<sup>1</sup> funding for cities to develop sustainable transport projects and urban mobility plans. While a big and important improvement, some say, the amount of funding remains far below the actual demand in urban transport.<sup>2</sup>

Besides PAC 2 there is a rather small Transport and Mobility Infrastructure Programme called “Pro-Transporte”, which provides financial support for public and private projects related to improving public transport and mobility systems, such as the construction, enlargement and modernization of new or existing infrastructure; signalling; the acquisition of vehicles for public transport systems; and the construction and additional services and equipment for universal accessibility.

Cities apply to these funds. To be able to apply, they have to comply with a list of planning, financial and technical requirements (Ministerio das Cidades, 2010):

- Updated urban development plan in which expansion areas are clearly identified
- Transportation and transit plan (adequately coordinated with the urban development plan)<sup>3</sup>
- Financial plan
- Technical aspects regarding technical characteristics of vehicles

<sup>1</sup> <http://www.embarq.org/news/brazilian-cities-seek-new-paths-sustainable-urban-mobility-plans>

<sup>2</sup> <http://www.brazilinvestmentguide.com/blog/2012/01/brazil-infrastructure-growth/>

<sup>3</sup> While obvious in theory, this not always happen in practice. The development plan and the mobility plan are separate documents not necessarily connected.



## Strategy 2

### Establishing a Chinese national or provincial sustainable low-carbon urban transport fund

#### Current Situation

Cities are mainly responsible for financing, developing and operating urban transport infrastructure and services. Due to the increasing demand for both infrastructure and maintenance, this situation is not sustainable in the long term.

At present there is no specific national fund or financing mechanism to support mass transit and the development of non-motorised transport initiatives throughout Chinese cities. Although there are a number of national pilot programmes related to SUT (Low-Carbon Transit Pilot Programme, Transit Metropolis Programme), they are not meant to cover the growing financial needs of cities over time. Subsequently, and given the high financial resources required to plan, implement, operate and maintain SUT systems of increasing complexity, local governments and cities face serious difficulties in order to keep the required pace of investments in transport improvements. As a result, cities have opted for land leases to generate revenue, in most cases only exacerbating urban sprawl.

#### Option for Improvement

**Establishing a National or Provincial level Sustainable Low-Carbon Urban Transport Fund.**

Through the creation of a national or several provincial Sustainable Low-Carbon Urban Transport Fund (SUT fund from here on), resources could be mobilised toward cities in order to finance the process of planning, project development and implementation, local capacity-building and data monitoring. Consequently, the establishment of an integrated fund or funds could also foster the development of integrated approaches to SUT. Project finance could be

made dependable on the achievement of pre-defined planning and other quality criteria.

The allocation of funding from this single fund should prioritise the development of integrated SUT systems, such as high capacity rail transit and BRT; last mile connectivity using public bus services; and non-motorised transport, pedestrian and bicycle facilities. Accordingly, the SUT fund could be fed by shifting a portion of the – as yet – national fuel and vehicle purchase tax revenues, as well as general revenues, towards the new fund. The reallocation of existing funding has a double purpose: increase sustainable funding of SUT and reduce the role of road expansion as the only means to achieve urban mobility needs. In addition, competitive grants could be made available for innovative public transport projects and non-motorised transport developments, provided they meet the required planning criteria.

In fact, as part of the Chinese fiscal reform, it is currently being discussed whether to stop collecting the fuel and vehicle purchase taxes at the national level and to keep the revenues at the provincial level instead, where they would form part of the general provincial budget. While parts of these “newly acquired” provincial revenues would most likely still be spent on road construction and maintenance, the chances of additional funds being invested in sustainable urban transport appear rather slim. They would be entirely at the will of provincial governments who might be more inclined to use the new revenues to pay off part of their debt. So, instead of making fuel and vehicle tax revenues part of the general budget, earmarking at least parts thereof for feeding into provincial SUT funds could provide a real window of opportunity to establish permanent and sustained funding for SUT developments in China.

Regarding the distributional aspects of SUT, the establishment of a financing tool at the central level may help to shorten the development gap between rich and poor cities. This effect may be smaller when establishing funds at the provincial level. On the other hand, provincial authorities may be best placed to invest available funds where they are most needed.

## Box 2 Case Study for National Transport Fund

### Mexico: National Fund for Public Transport (PROTRAM)

The National Government of Mexico created the National Infrastructure Fund (FONADIN), intended as a mechanism to coordinate federal public investment in infrastructure, focusing on the areas of Communications, Transport, Sanitation, the Environment and Tourism. FONADIN was formally established as a financial mechanism to support the implementation of the National Infrastructure Plan; with the National Works and Public Services Bank (BANOBRAS) acting as the trustee institution. In order to fund the operation of FONADIN, the Mexican government transferred resources from two different sources. The first one, originated from highway tolls; and the second one from a previously existing fund, intended to support infrastructure projects. Through the combination of these resources, FONADIN's role is to provide financial support and to encourage the participation of public and private actors in the process of planning, financing, developing, maintaining and operating infrastructure projects.

Regarding the development of urban transport projects, FONADIN established the Federal Mass Transit Programme (PROTRAM), focused on providing financial support to mass transit projects in the form of grants and loans. These projects need to follow Integrated Plan for Sustainable Urban Mobility (PIMUS) for cities with populations above 500,000. These grants and loans require that the state and/or local governments co-fund the projects, and encourage the participation of the private sector.

Additionally, PROTRAM supports capacity building. The programme provides technical consultants to state and local governments, which aims to create synergies between local knowledge and sophisticated technical capabilities available at national agencies. This element allows local governments with relatively small financial and human resources to undertake long-term transport and mobility projects presenting a high degree of complexity, which would otherwise be extremely difficult for local agencies to realise by themselves.

One potential risk to manage when setting up a national or provincial SUT fund lies in making cities and local governments relatively more reliant on higher level funding sources. This could also result in local administrators relaxing their efficiency criteria, as there would then exist comparatively lesser incentives toward improving management skills and locating additional local sources for funding urban development projects. Both risks could, however be alleviated by establishing clear funding criteria and an obligation for local co-funding (see table 1 for national-local funding shares).

It should also be avoided to administer resources for transport projects exclusively based on national criteria without the necessary adaptation of SUT systems to the specific characteristics of cities. Instead, decision-making processes could require the consideration of local points of view, and clear procedures for technical analysis of projects could be implemented. For instance, the US Federal Government only funds the locally preferred alternatives after completing several studies for alternatives analysis and environmental impact assessments and all require public participation.

**Table 1: Maximum national funding share**

Brazil	Colombia	France	Germany	India	Mexico	UK	US
95%	40% (min) – 70% (max)	20-25% (varies by mode)	60-90%	35-90%	Up to 50%	No maximum national funding share, although local authorities are strongly advised to contribute with own financial resources.	80% but for many large scale public transport projects, match is in principle only 50%.

Source: Bongardt and Diaz 2013, p. 28



## Strategy 3

### Strengthening local debt management

#### Current Situation

Chinese cities largely depend on revenues obtained from land concessions in order to finance SUT projects, making the system unsustainable over the mid- and long-term.

Rapid rates of urbanisation have increased the need for investments in urban infrastructure in general, and SUT in particular. For a long time, local governments have not been allowed to issue government bonds and take up debt officially. In the absence of other revenue streams, Chinese cities have financed their transport systems largely through land lease. Obtaining resources to finance SUT projects from land concessions on the urban fringe have, however, proven to be a perverse policy. While in theory it seems an appropriate means to raise revenues, in practice it has helped to boost the process of explosive urban expansion, requiring even more investments in transport infrastructure because the land is not developed sustainably. The new real estate developments use large blocks, single use, ill-connected and low density patterns. Expansion and fragmentation of those developments have increased commuting distances and thus lowered overall accessibility within cities (more travels to access less destinations).

This pattern of urban development typically produces car dependency, hampering the development of SUT projects on the one hand, but requiring larger public transport networks on the other. Sustainable urban transport systems are more feasible to implement under a pattern of Transit Oriented Development (TOD), characterised by mid- and high urban densities, mixed land uses, and high street connectivity, elements that are absent in the current model of Chinese urban sprawl (Cervero, 1998). In such a scenario, it is expected that funding will be insufficient to provide the required amount of SUT development and operation.

Chinese leadership has recognised public transit and to some extent TOD as important development practice and has made the construction of public transit a national priority. However, urban development practice is slow to change and land lease continues to drive urban sprawl.

At the same time, as land prices begin to fall as a consequence of overdevelopment and macro policies, land concessions begin to lose value (Fan and Lü, 2012).

#### Option for Improvement

Use parts of newly authorised debt at city level to finance sustainable transport developments.

Until now, local governments had no right to issue debt officially. As a consequence, local governments set up special financing vehicles or platforms to borrow from commercial banks via government-owned enterprises, often using land as collateral. However, there are no risk management mechanisms to prevent local governments from driving up indebtedness in this informal borrowing regime and the risk of insolvency is rather high (Fan and Lü, 2012).

A viable alternative for local authorities would be to issue debt directly under the supervision of the central government. In 2011 the State Council already approved a pilot programme that authorised four local governments (Shanghai, Zhejiang, Guangdong, and Shenzhen) to carry out their own bonds pilot.<sup>1</sup> Soon, all cities will be allowed to issue debt officially as part of the Chinese fiscal reform.

Part of this new debt ability can be used to invest in sustainable transport infrastructure and limit the lease of land to break out of the vicious circle of land concessions. In addition, local loan financing may serve as an incentive for improved cost-recovery mechanisms through a more efficient use of user charges (discussed thereafter).

<sup>1</sup> <http://news.hexun.com/2011/sdzw/>

### Box 3 Setting up a risk management system for local debt management

The development of a market-oriented local government credit system requires the establishment of regulations from the central government, including:

- Imposing total local borrowing ceilings based on macroeconomic conditions.
- Establishing a local government credit-rating system and independent rating agency, in order to provide information on the credit worthiness of the local governments to potential lenders.
- Monitoring local debts and establishing adequate risk-warning mechanisms to prevent against local debt default.
- Establishing central government guidelines, applicable for local debt-management strategies and written-debt policies.
- Financing local infrastructure projects through borrowing needs to be accompanied by debt management capability and capacity at the local level, which clearly establishes capital needs, expected rate of growth, economic trends, and stability of overall local finances.

Establishing the required regulatory mechanisms for issuing debt at the local level would result in uniformity of terms and rules of access for local debt management across regions and local authorities, which could also act as a vehicle to limit irregular financing from the special financing vehicles.



Figure 1: Public transport needs sustainable funding  
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## Strategy 4

### Creating new forms of revenues for SUT policies at the local level

#### Current Situation

Chinese cities have serious difficulties with financing the implementation and operation of public transport systems because resources are not enough to adequately satisfy a situation of high demand and increasing complexity.

If the current trend of urban expansion continues, the resources available from national and local sources will be insufficient to fund the development and operation of new SUT systems and maintenance of the existing ones. In particular, revenues from land concessions (non-renewable resources) are not sustainable throughout the long-term, especially because they fuel the process of urban expansion described above.

With the exception of land-value recapture schemes implemented in Shenzhen, most cities are not taking economic advantage from the benefits generated through SUT programmes, such as increased land value along transit corridors (Bongardt and Díaz, 2013).

#### Further Reading:

GlZ's Sustainable Urban Transport Sourcebook Module 1f on The Role of Transport for Urban Development, Financing Urban Transport and Parking (Ko Sakamoto, TRL)



<http://www.sutp.org/en-dn-th1>

#### Option for Improvement

Obtaining new sources of local revenue, based on innovative mechanisms, to complement funds provided by the national or provincial government.

Local governments, under national guidance and authorisation, can develop new sources of funding, which may be found in a diverse array of policies, such as:

1. Transport Demand Management policies:
  - a. Parking fees
  - b. Road charging/Toll revenues
  - c. Congestion and pollution charges
2. Company tax to support public transport
3. Earmarked fuel taxes for SUT
4. Value capture policies (land value taxes, tax increment financing, air rights, development, impact fees, etc.).
5. Advertising

#### Transport Demand Management

Transport Demand Management (TDM) relates to policy initiatives which were originally focused on improving the efficiency of the urban transport systems through operational improvements, and then incorporated concerns such as air quality and energy conservation into the transport planning process (Meyer, 1999). The objective is to avoid lengthy or unnecessary motorised travel.

Nowadays, TDM policies include traffic control, travel information, parking charges, park-and-ride schemes, route guidance, green transport plans, car sharing, teleworking, improved public transport, cycle, bus lanes, pedestrian zones, workplace parking charges, and access controls (Walker, 2011). Some TDM strategies, like vehicle quotas tied to licensing auction mechanisms, parking management and congestion charging, offer cities the possibility to raise revenues that can in turn be used to finance SUT projects (see Broaddus, 2009).

## Box 4 Case Studies for Parking Management

Income obtained from parking meters can be destined to different uses within cities or administrations. For example, the public bicycle system in Barcelona is financed by the money collected by parking meters throughout the city. In Berkeley, California, parking meter income funds a city-wide police programme to eradicate bad parking practices.

Another interesting case is EcoParq in the Federal District of Mexico City, which distinguishes different types of income, with various end uses:

- Parking rights income. Distributed between the parking operator and the Public Space Authority to improve public areas and use for security programmes.
- Income from ticketing. Destined to the treasury and to financing the Department of Public Safety of the Federal District (in charge of enforcement and supporting traffic management and transit security)

### Parking Management

It has been widely recognized that parking policy is a powerful and efficient tool in transport management. It has been employed extensively in many cities around the world, given that the implementation of parking policies requires relatively low investments and it is not technologically sophisticated (Díaz, 2013).

The implementation of parking policies contributes to the promotion of a more efficient use of a scarce resource – parking – in highly populated cities. They provide a disincentive to use private cars in zones with high concentrations of activities, favour a high rotation of on-street parking spots, and help to impede illegal parking (Shoup, 2005). The revenues obtained from parking fees are used by many cities to finance SUT projects and for the improvement and maintenance of public space (see Rye, 2010 for a comprehensive introduction to parking management).

Although parking meters have been implemented in many Chinese cities, most of these systems are loosely controlled. Illegal parking is common, and resources obtained from fees and fines are small and are channelled to operating companies. To date, funding from these schemes is not used to finance SUT projects or public space improvements.

### Congestion Charging

In order to contain the growth in traffic congestion<sup>2</sup>, some jurisdictions have introduced congestion charging as part of the reform of road pricing. The aim of a congestion toll is to reduce the use of passenger cars in areas with concentrated trip demand, sometimes also differentiated by peak and off-peak hours.

The rationale of the system is that through more efficient pricing, automobile users with lower values of travel time savings would change their travel mode, route or departure time to avoid a charge. However, the acceptability of a congestion charging scheme is often linked to the allocation of the revenue raised, especially to public transport (Henshner and Li, 2013).

The first congestion charging scheme was introduced in Singapore in 1975, with the Area Licensing Scheme (ALS). This manual cordon pricing scheme was replaced in the late 1990s by the Electronic Road Pricing (ERP) system, which is a form of congestion charging, with vehicles being automatically charged based on time and location-specific point charges for passing a set of gantries ringing the city centre and a number of other locations (Toh and Phang, 1997).

The Singapore congestion charging initiative was followed by many cities around the world, beginning with Bergen in 1986, Oslo in 1990, Trondheim in 1991, Durham in 2002, London in 2003, and Valletta and Stockholm in 2007 and Goetheburg in 2013. In January 16, 2012, Milan

<sup>2</sup> Chatterjee and Gordon, 2006, define congestion as lost time (difference in time spent travelling compared to time spent in free flow conditions) in seconds per kilometer.

## Box 5 Case Study for Congestion Charge

### United Kingdom: Congestion charge in London

Congestion charge in London was implemented in February 2003. It is a fee charged on most motor vehicles operating within the Congestion Charge Zone (CCZ) between 7 AM and 6 PM from Monday to Friday. The charge aims to reduce congestion in Central London, and to collect funds to finance the city's transport system. Transport for London (TfL) –the local transport agency – is responsible for the charge, which is operated by a private company since 2009. After ten years of operation, the system is evaluated as successful regarding the objective to reduce traffic levels. Thus, there has been an increase of 6% in bus passengers during charging hours; bike trips in the zone also increased by 79% between 2001 and 2011 (TfL, 2010). Revenues collected in this way (235 million dollars a year) have offered a constant and reliable source of financing for different projects to improve transport in the city.

replaced the EcoPass (an emission charge, introduced in 2008) with a cordon congestion charge called AreaC.

Aside from the benefits of raising additional revenue for local authorities, and in addition to general benefits of congestion pricing, proponents often point out that the commonly built ring roads could make it easy and convenient for Chinese cities to implement the cordon pricing scheme (Wang, 2011). In fact, the implementation of congestion charging schemes is currently being discussed in Chinese cities like Beijing and Hangzhou. However, they have faced fierce resistant from drivers who refuse to pay for something which has always been offered for free, and by public officials who use thousands of government owned cars. The latter expect to be exempted from this payment.<sup>3</sup>

### Company Tax

Companies play an important role in the mobility debate as they can be considered the primary 'cause' of commuting traffic. As sources of home-to-work journeys, they generate repeated and concentrated traffic. The amount of daily commuting traffic becomes obvious by taking a look at the time spent in commuting, which is increasing in Chinese cities: a report by the Chinese Academy of Social Sciences<sup>4</sup> calculated that people who live in the 50 most populated cities spent an average of 39 minutes travelling to work. In Beijing, the city with the worst commuting, a daily trip to work takes 52 minutes. The volume of commuting traffic is often too

large for the road capacity and clogs up cities, with the consequent congestion threatening the economic competitiveness of cities. Thus, and according to the report mentioned above, commuters in Beijing, Guangzhou and Shanghai waste an average of 14, 12 and 11 minutes in traffic jams. This situation is getting worse since many commuters are shifting from public transport and bicycle to private cars.

Thus, involving companies as part of the financing schemes for public transport seems adequate (see Box 6. France: Transport Tax for Companies). Furthermore, a separate source of revenues may be found in the establishment of Work Place Parking Levies (WPPL), which are levies allowing local authorities to charge companies and organizations for each commuter car parking space provided in a specified work place (Brannigan and Paulley, 2008).

### Earmarked Fuel Taxes for SUT

Many countries and cities have established specific fuel taxes targeted to finance transport systems. A fuel tax has many benefits: it is easy to collect and is mostly paid by the population with the highest income. It also provides a disincentive to use private cars and favours an improvement of the fleet of motor vehicles towards more energy efficient models.

After years of discussion, a fuel tax was established in China in 2009; depending on the type of oil product, it ranges from 0.12 USD per litre (fuel oil) to 0.21 USD per litre (leaded gasoline). Its revenues have so far been centrally collected and used by the Ministry of Transport mainly for road construction and maintenance (ADB, 2012).

<sup>3</sup> "Drivers in spin over Beijing congestion charge". South China Morning Post, September 13, 2013

<sup>4</sup> China's New Urbanization Report, quoted by China.org.cn [http://www.china.org.cn/top10/2012-11/02/content\\_26980425.htm](http://www.china.org.cn/top10/2012-11/02/content_26980425.htm)

## Box 6 Case Study for Taxation

### France: Transport Tax for Companies

A special Transport Tax (*Versement Transport*) was created in France. It is a local tax levied on the total gross salaries of all employees of companies of more than nine employees intended to raise capital for investment in local public transport infrastructure, and to finance operation expenses of public transport services. The tax is levied on the employer, not the employee directly. The money is directed to the Urban Regional Transport Authority (AOT in French), the local authority responsible for planning and operating public transport. A digressive system is applied to companies whose staff number grows over nine employees: they pay nothing during the first three years and the three following years the amount is reduced by 75%, 50% and then 25%.<sup>1</sup> This source of funding typically represents about 40% of urban public transport budgets in France. The tax rate varies by location, with people who are more likely to be able to take advantage of public transportation – those who work in rich areas – paying more. Poorer *départements* (counties) are taxed at a lower rate, as an attempt to encourage investment in economically deprived areas<sup>2</sup>. Thus, in the case of Ile de France the tax varies from 2.6% in Paris and the *département* of Hauts-de-Seine, to 1.4% in the peripheral *départements* of Essone, Yvelines, Val d'Oise and Seine-et-Marne.

### Colombia: Local Fuel Tax in Bogotá

46% of the financial resources from the public sector for the initial investment in the BRT system in Bogotá (TransMilenio) came from a local fuel tax. In addition, half of the 25% gasoline tax levied in Bogotá is used for the continued expansion of the system. This tax was implemented initially as part of the mass transit regulation, to support the payment of the debt of Metro de Medellín, and start mass transit in Bogotá. Initially the tax was optional (the city council would approve it), and was 16%. Later it became mandatory and is a source of revenue for all municipalities in the country (20%) and state governments (5%). There is also a tax on Diesel.

Administration of the tax payment is very easy (at the central distribution point). It provides a continued source of revenue to support current and future investment and maintenance of transport systems. Nevertheless, its acceptance is limited as consumers want to reduce their expenditures. There have been legislative initiatives to reduce the tax; which have not been approved by Congress.

<sup>1</sup> Capital Regions Integrating Collective Transport for Increased Energy Efficiency (CAPRICE). "The example of the French tax "Versement Transport": a key resource of public transport funding in Ile de-France" <http://www.caprice-project.info/spip.php?article30>

<sup>2</sup> Freemark, Yonah, "How to Fix Transit Financing". The Transport Politic, March 4, 2009

In China, local governments are generally restricted to levy any kind of taxes or fees to raise revenues. At the moment, however, it is being discussed whether to stop collecting the fuel tax (as well as the vehicle purchase tax) at central level and make its revenue part of provincial general budgets instead. Since the price of fuel is controlled by the National Development and Reform Commission (NDRC) local governments could still not simply change the level of existing fuel taxes, but they would gain a significant additional revenue stream. Nonetheless, just feeding them into provincial general budgets is unlikely to benefit sustainable transport in cities. Earmarking a portion of the existing tax for financing SUT projects within provincial jurisdictions, however, could go a long way in securing

permanent funding for SUT at local levels (see also strategy 2).

### Value Capture Policies

Value capture is a means to realise as public revenue some portion of the increase in value of private properties due to investment in public infrastructure or modifications in zoning or building codes (Ingram and Hong, 2012). Since transport improvements are a public investment with a positive impact on surrounding property values (Mojica and Rodríguez, 2008), many cities use this situation as an opportunity to obtain funding to finance SUT systems through value capture policies. These policies include (Johns et al., 2012):



## Box 7 Case Studies for Value Capture Policies

### Hong Kong: Mass Transit Railway Corporation

The Mass Transit Railway Corporation (MTRC) system in Hong Kong is fully constructed, operated, and maintained without a financial subsidy from the government. In fact, the MTRC is a publicly traded corporation that earns profits for its shareholders, chief among them the government of Hong Kong (Salon and Shewmake, 2010).

Hong Kong's MTRC model is known as Rail + Property (R+P) whereby the corporation is both an operator of the transport system and a real estate developer that builds in lands located in its area of influence. To make this possible, the Hong Kong government provides land to MTRC at favourable rates that not consider in their value the positive impact of future transit investments. It is calculated that almost half of the operation costs of MTRC are covered by revenues from real estate activities (Salon and Shewmake, 2010).

### United Kingdom: Tax Increment Financing (TIF)

In 2010, the national government decided to allow local authorities to use Tax Increment Financing (TIF): "Local authorities borrow the funds to deliver infrastructure vital for development and repay the borrowing from the increase (the 'increment') in business rates generated by the new economic activity"<sup>1</sup> The policy is under implementation and several pilot cities are running it.

### San Francisco: Transit Impact Development Fee

The Transit Impact Development Fee (TIDF) is an impact fee levied on non-residential new development citywide to offset new development's impacts on the transit system. Although it is not strictly a value capture mechanism (it is not a charge for the benefits that a SUT project can generate in the surrounding properties, but a tax to pay the marginal costs to move additional transit riders to and from newly constructed buildings), the procedure to collect resources is basically the same.

Revenue generated by the fee is directed to the San Francisco Municipal Transport Agency (SFMTA) and is used to fund SUT capital investments and operations. Development projects may be given a credit against the fee for a prior use so long as the prior use was active on the site within five years of the new development's application. When a new development project constitutes a change of use, the new development is charged the difference between the TIDF rate for Office and the TIDF rate for the proposed use, when such a difference exists.<sup>2</sup>

The TIDF is a stable and reliable source of revenue that has generated more than \$100 million dollars since its inception in 1981 (Metropolitan Planning Council, 2012).

<sup>1</sup> <http://www.parliament.uk/briefing-papers/sn05735.pdf>

<sup>2</sup> Taken from San Francisco Planning Department

[http://www.sf-planning.org/ftp/files/legislative\\_changes/new\\_code\\_summaries/120523\\_TIDF\\_Transport\\_Impact\\_Development\\_Fee\\_Update.pdf](http://www.sf-planning.org/ftp/files/legislative_changes/new_code_summaries/120523_TIDF_Transport_Impact_Development_Fee_Update.pdf)

- Land Value Taxes. Taxes on the value of a piece of land. It requires only a valuation of the land.
- Tax Increment Financing. A method to use future gains in taxes to subsidise current improvements, which are projected to create the conditions for said gains.
- Special Assessments Tax. A unique charge that government units can assess against real estate parcels for certain public projects.
- Transport Utility Fees. A financing mechanism for transport that treats the network as a utility and bills properties in proportion to their use of public transport services, rather than their value as with the property tax.
- Development Impact Fees. Fees imposed on a new development project to pay for all or a portion of the costs of providing public services it will require.
- Negotiated Exactions. A mechanism in which transit agencies and developers negotiate a

payment for service or capital improvements.

- **Joint Development.** A new, private development of transit-agency owned property to help fund improvements or operations.<sup>5</sup>
- **Air Rights.** A right to control, occupy, or use the vertical space (air space) above a property. Air rights can be bought, leased, sold, and transferred.<sup>6</sup>

Planners and officials promote value capture mechanisms because they can offer an effective way toward the financial self-sustainability of SUT projects. There are two prerequisites to being able to finance a public transport system using value capture. First, the system must actually generate sufficient value to be captured. Second, the institutional context must enable the local government or the public transport authority to capture this generated value (Salon and Shewmake, 2010). Clearly, some of the above-mentioned value capture mechanisms, such as air rights are less likely than others to be implemented in China. But the list serves to illustrate that several different options exist, that can be considered to improve local government budgets.

The most common value capture mechanism in the whole world is the real property tax, which is determined according to the regular assessment of market value. It is relatively easy to implement, provides a stable source of revenue, and only requires a periodical update of the assessment of real estate values in the zone where SUT projects will be developed.

So far, property taxes are not common in China. In fact, only two cities – Shanghai and Chongqing – have introduced a pilot tax on some upmarket properties. This tax has been levied at a low rate, and only affects a few thousand homes in each city, but opens the door to a broader implementation in the rest of the country.<sup>7</sup>

Although effective, some other mechanisms, like joint development and air rights, are more complicated and time consuming to implement, because they require the existence of highly skilled personnel in the public sector who can

maximize the benefits for the city when negotiating with private developers.

Some of the most successful strategies for financing SUT combine fiscal mechanisms for value capture, like land value taxes, with other financial tools, like joint development, in which the public sector has an active role in maximizing the real estate potential generated by the improvements in transport systems. That is why this strategy is particularly attractive and relatively easy to implement in countries or cities where the government controls urban land, like in China (Salon and Shewmake, 2010).

However, and since the government is directly involved in real estate activities with the potential to generate enormous economic resources, it is necessary to implement methods to guarantee transparency and accountability of these processes! The creation of a public access database for the transparent assessment of land value and the development of institutions in charge of monitoring financial results are fundamental to provide a high level of legitimacy to this strategy, not least in the eyes of the public.

## Advertising

An alternative source of revenue is found in the establishment of advertising contracts. The aim would be to create local sources of revenue by providing advertising space at transport stations, bus shelters and public transport vehicles.

Although advertising is common in public transport services in China, there is still room to develop new schemes to obtain funding for SUT projects from this source. In this sense, some bike-sharing programmes implemented in Chinese cities have demonstrated that this type of solution can be offered even for free when a good financial strategy – based on advertising stations and bicycles – is implemented. It is a permanent source of revenue, but the amount is usually not large.

One interesting use of advertisement spaces is that authorities might reserve a fraction of the advertisement surfaces for community education and promotion of SUT.

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<sup>5</sup> Rothman, Eric, Op. Cit.

<sup>6</sup> Business Dictionary

<sup>7</sup> "Time for a Property Tax". The Economist, February 4, 2012.  
<http://www.economist.com/node/21546014>

## Box 8 Case Studies for Advertising

### Public Bicycles in Paris, France

The Velib public bicycle system in Paris, France is financed by JCDecaux, an advertising company, in exchange for a significant portion of city-controlled advertising spaces. JCDecaux paid the start-up costs, and administers the teams working on system maintenance for the duration of a ten year contract. The city receives all income from bicycle renting, as well as a yearly fee. In exchange, JCDecaux receives exclusive control of over 1,600 billboards, which are property of the city.

### Public Bicycles in Wuhan, China

This system – the world’s largest bike-sharing programme – was developed by a private company, which is also in charge of its operation and maintenance. In the scheme implemented in Wuhan, the government grants the station advertising and development rights to the operators, and the operators obtain revenues from advertisements to pay for the construction and management of 90,000 public bicycles, which offer 60 minutes of free access to their almost 500,000 daily users (Zeng 2012).

## Strategy 5

### Promoting public-private-partnerships

#### Current Situation

The private sector has limited access to participate in the implementation and operation of SUT systems in Chinese cities. Although some PPP already exist in China, in most cases adequate incentives and security about property rights to get private investors involved in these projects are missing.

Cities face serious problems to finance the construction of infrastructure and operation of SUT systems. As mentioned above, their main source of resources comes from land sales or concessions concentrated in the periphery. Many countries have diversified their funding strategy by incorporating private funds. Since China’s 1994 tax reform, financial pressure has pushed local governments to seek private financing for the development of public infrastructure. However, China’s institutional and legal frameworks make it difficult –multiple institutions with differing mandates (Cheng and Wang, 2009) on the one hand, insufficient transparency and uncertainty about the long-term protection of ensuing property rights on the other. Although some pilot projects have been implemented, private participation in SUT remains largely unattractive for investors in China. Private companies usually feel that they are not competing on fair

ground; in fact defects with PPP like close-door deals prevail in many cities.

#### Option for Improvement

Enhancing the framework conditions for public-private partnerships for the implementation and operation of SUT systems.

The supply of public transport systems typically requires very large amounts of capital investment for construction. Instead of the traditional public procurement methods, the establishment of Public-Private Partnerships (PPP) has become an effective instrument for financing the development and operation of infrastructure projects around the world<sup>8</sup>.

A PPP is a long-term contractual agreement between a public agency and a private sector party to secure funding, construction or refurbishment, operation and maintenance of an infrastructure project and the delivery of a service that was traditionally provided by the public sector (Sung Jick, 2007). Recently, there has been a global trend for financing infrastructure development through PPP mechanisms. One contributing factor in the emergence of PPPs is its capability to harness the innovative capability and capital of the private sector. Thus, PPPs

<sup>8</sup> The *Private Participation in Infrastructure Database* shows that 139 developing countries are currently pursuing private participation in infrastructure projects. The trend is also evident in developed countries such as the United States, the United Kingdom, Canada and Japan. World Bank, 2011.

## Box 9 Case Study for Public-Private Partnerships

### Mexico: Federal Support Programme for Mass Transit (PROTRAM)

In Mexico, financial responsibilities for transport are divided amongst the national government, state and municipal governments and the private sector. The latter is in charge of the operation of systems and has to provide – through public-private partnerships – at least 34% of the resources to finance capital costs. This model has been successful in its goal of fostering greater commitment from the local parties. Funds for financing the national government contribution, which are channelled through the Federal Support Programme for Mass Transit (PROTRAM in Spanish), come from toll revenues collected in federal highways. Private operation of transport systems is also in use in United Kingdom, Australia, Brazil, Colombia, Chile, India and Germany.

need to be seriously considered as alternative financing and management mechanisms for public transport and mobility systems, as they have been successfully implemented in transport<sup>9</sup> as well as in other infrastructure sectors, including energy, telecommunications and water facilities.

Establishing PPPs has the advantage to minimise the public financial deficit incurred for developing major infrastructure projects. The attractiveness of PPPs, from a funding perspective, lies in making projects affordable when public authorities are unable, or unwilling to increase public borrowing levels. However, they should not be (mis-)used to anticipate spending: As Engel and Galetovic (2014: 6) put it “contrary to misconceptions [PPPs], do not free up public funds. Indeed, they affect the intertemporal government budget in much the same way as public provision.” Through PPPs, governments can save the initial up-front investment, but at the same time, they commit to use either future user charges or future tax revenue (depending on how the PPP is financed) to pay out the private investor.

If used responsibly, PPPs can thus alleviate high infrastructure investment costs, by stretching the payment over a longer period of time and at the same time exploit efficiency gains through private management. In order to guarantee infrastructure and service quality, PPPs can make payments contingent on adequate maintenance and service standards that must be fulfilled by private firms.

To increase the attractiveness of PPPs to private investors in China, government will need to create an environment in which firms know that revenue streams will not be expropriated, that property rights will be protected and contractual agreements guaranteed. At the same time, contracts should be carefully designed so that the government retains flexibility, e.g. to buy back the concession if circumstances change, while protecting the concessionaire against arbitrary takings by the government and ensure adequate compensation (see Engel and Galetovic, 2014).

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<sup>9</sup> Examples include: Manchester, Croydon and Nottingham LRTs; New Jersey transit; London Transport; Copenhagen Metro; Sao Paulo Metro; St. Petersburg Nadzemniy Express; Astana light rail in Kazakhstan.

## Strategy 6

### Integrating policy guidance under a single comprehensive framework for SUT

#### Current Situation

Large number of separate policies and programmes related to SUT systems.

A wide array of policies made by different agencies are typically dominated by diverse and often conflicting interests, which often result in overlapping mandates and functions. As mentioned above, China has developed an impressive number of policies and programmes for SUT. In fact, the country has already declared a so-called “transit priority” for urban transport development, set by the “State Council Opinion 46” in 2012. However, this national agenda lacks adequate tools of coordination and integration between the different agencies involved in the development of the different plans and programmes. In addition, a number of the targeted goals or lines of action are outside of MoT’s jurisdiction.

#### Option for Improvement

Developing a strong and comprehensive national urban transport policy framework that concentrates national policies and programmes for the promotion of SUT.

By establishing a coherent set of integrated policy guidelines, it is possible to eliminate the wasteful use of resources derived from the discontinuity of fragmented policy actions and programmes. In this respect, actions regarding the development and operation of SUT systems at the local and regional levels need to be aligned to national policy frameworks and objectives. Establishing a strategic policy framework helps to ensure that individual policies are consistent with national goals and priorities. This should also provide for mechanisms to anticipate, detect and resolve policy conflicts in the early stages of planning processes, and to help to identify and reduce inconsistencies and overlaps in the development of projects.

National level programmes developed under a single institutional responsibility may provide an appropriate framework for communication and coordination across the other national agencies involved in the planning, development, financing, construction and operation of SUT systems, but also among the different levels of government (national, regional, and local) involved in projects which usually cover different administrative territories. Furthermore, the existence of a central overview and coordination capacity is essential to ensure horizontal consistency among policies, both across policy areas, as well as over territorially-defined administrative agencies. It also allows for balancing the economic and technical differences that exist between different cities through the orientation of resources to the most deprived areas of the country.

The enactment of a single comprehensive national policy directive regarding urban mobility allows for the incorporation of national environmental and sustainability concerns into local SUT policy initiatives and programmes, which may not be currently present in the diverse policy documents. In addition, the pursuit of clearly established goals and objectives at the national level may increase transparency and clarity in planning for SUT initiatives.

Building on the existing “transit priority” that is now merely a guiding document, stronger requirements and regulations could be introduced to develop a strong, comprehensive and clear national sustainable urban transport policy for China.

Establishing national benchmarking performance indicators and a national database as part of a national urban transport policy, where cities’ indicators can be compared, provides an effective tool for planning future projects and to decide the best allocation of public resources. In addition, access to better data may result in increased levels of public accountability over the performance of local authorities regarding SUT management and operation. In fact, the China Academy of Transportation Sciences (CATS) is currently working on the China Urban Transport Database (CUTD), which will be used to monitor for instance the 30 pilot cities considered in the National Transit Metropolis Programme (Jiang Yulin, 2013).



Since any national policy would have to be authorised and incorporated into the Central Government's policy guidelines, a national policy should offer enough flexibility to allow local institutions to develop ad hoc SUT solutions. In this sense, a strong national sustainable urban transport policy will be a compromise between being too vague and being descriptive. A comprehensive national framework should not prescribe rigid one-size-fits-all solutions, but provide real guidance to cities by setting the objectives and goals to reach, and establishing minimum quality criteria.

## Box 10 Case Study for the Integration of National SUT Policies

### India: National Urban Transport Policy

In order to address mobility needs resulting from the fast rate of economic growth and its corresponding increase in economic activity around urban centres, the government of India considered that it was necessary to establish a Central Policy for Urban Transport. Although the State governments are responsible for management and operation of urban areas, including public transport, the national government established a *National Urban Transport Policy*, aimed at ensuring affordable, fast, comfortable, reliable and sustainable access to public transport for citizens in urban areas. The policy intends to achieve these objectives through the following initiatives:

- Incorporating urban transport as a parameter at the urban planning stage
- Encouraging the integrated development of land use and urban transport planning to minimize travel distances
- Promoting a more equitable use of road space
- Encouraging greater use of non-motorized transport and public transport by providing national financial assistance
- Establishing effective regulatory and enforcement mechanisms
- Establishing demand management mechanisms, such as paid parking in cities
- Managing conditions for freight traffic
- Capacity building for planning SUT systems
- Use of cleaner technologies
- Fundraising through innovative mechanisms to invest in urban infrastructure
- Public awareness and cooperation campaigns

The Indian programme has changed the way cities advance transport. The connection between planning, capacity building and land use has been established; yet there is still a preference in Indian cities to advance road expansion and flyovers over public and non-motorized transport. The policy is being revised to strengthen the provisions in the new round of funding 2014–2019 (Hidalgo et al., 2012).



## Strategy 7

### Developing urban mobility plans linked to urban development plans

#### Current Situation

Planning processes of urban development and transport are not developed in a truly integrated manner.

Urban fabric is a complex network of systems (infrastructure, land uses, energy, and transport) that interact in an integrated way, influencing one another. Nonetheless, the traditional urban planning process is often concentrated on just a few parts of the system. In China, strategic policies at the national level have favoured an integrated approach between urban development and transport and mobility policies. However, at the local level, the lack of strategic planning, and the fact that the current urban infrastructure financing mechanism still relies heavily on land sales, has resulted in a pattern of urban development that has led to urban sprawl.

In addition, current urban and road planning guidelines, including mega block structures and multi-lane roads together with urban development patterns have led to the construction of urban infrastructure oriented towards private car use. The pattern of mega blocks – common in many Chinese cities – is a major impediment, because the lack of smaller artery roads increases vehicles kilometres travelled (VKT), concentrating traffic in few and highly congested structural roads (Mehndiratta and Salzberg, 2012).

Furthermore, important sources of funding for transport, namely the fuel consumption tax and vehicle purchase tax, have so far been earmarked for the construction of highways as opposed to public transport (see discussion under strategy 2 and strategy 4).

Even though transport planning is a mandatory element of city master planning in China since 2009, there is little cooperation and coordination between different departments. One example is the planning of metro networks under the authority of MoHURD and its local offices, which are often not very well coordinated with

existing bus networks that are under the authority of MoT.

Accordingly, planning for urban development and transport in a coordinated and integrated manner is essential to ensure that a series of complementary policies and programmes are implemented. Typically, the lack of coordination regarding urban mobility and land-use policies among adjacent administrative authorities in metropolitan areas can produce either overlaps or unattended areas, leading to serious logistical problems and inefficiencies.

#### Option for Improvement

Strengthen integrated mobility planning (e.g. comprehensive mobility plans) and coordinate with Land Master Plans at the local and regional level to frame and guide the development of SUT projects.

The patterns of urban development and transport infrastructure are closely linked. Establishing a policy for mandatory comprehensive mobility plans for cities which meet national planning requirements and standards could result in an important instrument for linking urban development to transport needs. Comprehensive transport plans are mandated in the urban master plans in China; however, both plans are often only loosely linked.

Considering the range of policy instruments and the scales at which they are implemented, the design of effective, strategically integrated plans and programmes can be a highly complex task. While considering the establishment of comprehensive policy mechanisms, various types of policy integration can be distinguished, all of which are important to promote more sustainable land use planning, transport and sustainability policies. Examples of different types of policy integration include:

- **Vertical integration:** Refers to policy integration between different levels of government.
- **Horizontal integration:** Refers to policy integration between different sectors within one organization.

## **Box 11 Case Studies for the Integration of Transport and Urban Development Policies**

### **USA: Metropolitan Planning Organizations (MPO's)**

In the United States, projects eligible to receive financial support from the FTA need to be a part of a Metropolitan Transport Plan (MTP). This requires the existence of a Metropolitan Planning Organization (MPO), composed of local and state representatives, as well as transport operators.

There are five core functions of an MPO (FTA, 2007):

- **Establish a setting:** Establish and manage a fair and impartial setting for effective regional decision making in the metropolitan area.
- **Identify and evaluate alternative transport improvement options:** Use data and planning methods to generate and evaluate alternatives.
- **Prepare and maintain a Metropolitan Transport Plan (MTP):** Develop and update a long-range transport plan for the metropolitan area covering a planning horizon of at least twenty years.
- **Develop a Transport Improvement Programme (TIP):** Develop a short-range (four-year) programme of transport improvements based on the long-range transport plan; the TIP should be designed to achieve the area's goals, using spending, regulating, operating, management, and financial tools.
- **Involve the public:** Involve the general public and other affected constituencies in the planning and implementation processes of urban transport systems

### **France: Comprehensive Urban Mobility Plans**

Comprehensive Urban Mobility Plans for cities in France have to comply with pre-established national criteria, such as safety, reduction of car traffic, development of public transport and non-motorized transport, management of road networks within the functional urban area, parking, rationalizing the movement and delivery of freight traffic, facilitation of company mobility plans, unified ticketing of public transport, etc.

### **Mexico: Comprehensive Plans for Sustainable Urban Mobility (PIMUS)**

In Mexico, transport projects eligible to be financed through PROTRAM are required to be a part of the Comprehensive Plan for Sustainable Urban Mobility (PIMUS). The PIMUS is developed by states and local governments, with technical assistance from the national government, and they must consider the interaction between public transport networks and urban development plans and strategies.

### **Brazil: Mobility Master Plans**

In order to promote urban mobility at the city level in Brazil, every city with a population exceeding 20,000 inhabitants is required to develop a Mobility Master Plan, in coordination with its Urban Development Plan.

### **Germany: Comprehensive Transport Development Plans**

In Germany, comprehensive transport development plans (including road construction, maintenance and management) are recommended for cities in order to provide a long-term planning framework. In the case of public transport development, "local transport plans" are compulsory in most Länder (provinces/states). Such plans are often conducted for city clusters and coordinated by regional transport associations instead of only one city. In addition, many Länder have a planning procedure in order to identify the most beneficial regional projects and to coordinate activities in the field of transport.

- **Inter-territorial integration:** Refers to policy integration between neighbouring authorities or authorities with some shared interest in infrastructure and/or resources.
- **Intra-sectorial integration:** Refers to policy integration between different sections or professions within one department (integration between different transport sectors such as roads, public transport, cycling or walking).

From the transport perspective, strategic planning which encourages integrated land use and urban planning tends to increase accessibility by decreasing travel distances. Focusing on accessibility as opposed to just mobility leads to different planning strategies, based on density, mixed-use land use, and connectivity in order to reduce the spatial separation of activities (Sarmiento and Clerc, 2013).

Therefore, a crucial element of the planning process is to define city-wide objectives on some key performance indicators, such as<sup>10</sup>:

- Modal split: tending to increase the percentage of trips realised by walking, cycling and public transport.
- Travel time: tending to maintain or decrease average and travel time dispersion (minutes per trip, average and standard deviation.)
- Road safety: tending to reduce the number and severity of traffic incidents (traffic injuries and deaths per year per 100,000 inhabitants.)
- Emissions: tending to reduce harmful emissions volume (kg of particle material PM10 per day, CO2 kg equivalent per day.)
- Equity: tending to reduce income percentage destined to transport in the lower income population.

While individual transport projects may be assessed on their own merit, it is crucial to evaluate and monitor the overall urban development process. In this regard, the existence of a comprehensive mobility plan makes the planning and financing of SUT systems more predictable and transparent.

Nonetheless, the development of integrated urban planning and mobility schemes require some degree of flexibility to adapt to the changing conditions experienced under rapid urban growth processes. The implementation of public transport projects integrated to broader urban development plans have a tendency to develop at a much slower rate than the demands produced by explosive urbanisation and motorization processes. In addition, urban development plans and transport and mobility plans are not normally integrated into long-term financial plans, creating financial uncertainty regarding the future sources of funding for transport and mobility projects.

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<sup>10</sup> The Chinese Transit Metropolis Programme 2012 defined the following goals (Jiang Yulin, 2013):

- Public transport share rate: over 45%
- Public transport stop coverage in downtown area: within 300 meters, 95%
- Bus speed above 20 km/hour
- Punctuality rate: 2% increased annually
- Accidents: 2% decreased annually
- Bus depots entering: over 90%
- IC Card: Over 80%

## Strategy 8

### Setting up capacity building programmes

#### Current Situation

Planning, implementing and operating sustainable mobility is a complex task that requires specialized technical capacities in transport and urban planning, which often are not available locally.

A crucial element present in most national level programmes relates to the creation of local capacity. It is generally recognised that limited capacities at local levels of government may act as a barrier to the realisation of SUT systems, both in terms of technical knowledge, as well as in terms of the overall manpower required for implementation. Regarding technical capacity, situation in China is unbalanced: while some cities, like Shanghai, Beijing and Guangzhou, but also smaller cities, such as Wuhan, Hangzhou, Kunming or Fuzhou already count with highly skilled professionals, others suffer from insufficient expertise.

#### Option for Improvement

Developing national level programmes to support local governments in ensuring enough local technical capacity.

National programmes focused on capacity building should be implemented in order to create or reinforce technical and managerial skills of professionals in charge of SUT projects of increasing size and complexity. These programmes should be focused on knowledge updating, and on the dissemination of best practices, technologies and procedures, and they have to facilitate the exchange of experiences and knowledge between peers. It is important for programmes not to focus exclusively on the technical aspects of the implementation and development of projects, but also on the training of leadership, negotiation and conflict resolution skills which are key aspects to long-term initia-

tives that involve the participation of a large number of actors with different interests.<sup>11</sup>

In this sense, it is not just capacity what it is needed to be built, but also the institutional arrangement allowing these capacities to be specifically devoted to the success of the projects. In such a scheme, it is important to generate the opportunities for the professional development within public entities enhancing the retention of qualified professional and local work teams' consolidation

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<sup>11</sup> In countries like Colombia and Mexico, which base its service operation in the formalization of thousands of small private entrepreneurs (many of them informal,) training should extend beyond government officials including also system operators.

## Box 12 Case Studies for Capacity Building

### Mexico

PROTRAM in Mexico, apart from a contribution of up to 50% to finance technical studies, also provides technical consultants to states and municipalities. This approach brings together local knowledge with national level technical capabilities. A scheme of this type provides a good incentive to those local governments with little economic and human capital and enables them to embark on long-term projects with high complexity.

### India

In India there is a provision for resources to hire expert consultants who work with local governments to identify the best transport solutions for each city. These consultants are in charge of the development of the technical projects, which are then subject to assessment prior to decision making whether to finance their implementation.

### USA: Transport Planning Capacity Building (TPCB) Programme

The Department of Transport has implemented the Transport Planning Capacity Building (TPCB) Programme, designed to “help decision makers, transport officials, and staff resolve the increasingly complex issues they face when addressing transport needs in their communities. This comprehensive programme for training, technical assistance, and support targets State, local, regional, and tribal governments, transit operators, and community leaders” (TPCB, 2013).

The TPCB has four broad goals:

- Enhance professionals' understanding of the federally-defined transport planning process, their role within the process and the relationship between the planning process and community goals.
- Strengthen understanding and build skills in planning, consensus building, policy guidance and regulations.
- Disseminate commendable examples of effective transport planning practices.
- Equip new Metropolitan Planning Organisations and areas newly designated as air quality non-attainment areas with skills and knowledge needed for effective transport planning.

According to these goals, the TPCB works on eleven focus areas:

- Bicycle and pedestrian planning
- Public land planning
- Congestion and transport demand management
- State-wide planning
- Fiscal constraint and financial planning
- Public engagement
- Metropolitan transport planning
- Performance-based planning
- Rural and small community planning
- Tribal planning
- Transit at the table (ways for transit agencies to participate in metropolitan and state-wide transport planning)

### Germany: Cycling Academy

With funding from the Federal Ministry of Transport, Building and Urban Development (BMVBS) and the support of the German Association of Cities (DST), the German Association of Administrative Districts (DLT) and the German Association of Towns and Municipalities (DSTGB), the German Institute of Urban Affairs (DIFU) operates the Bicycle Academy<sup>1</sup>. It is one of the pillars of Germany's Cycling Plan, a national strategy focused on noninvestment projects to promote cycling. The Cycling Academy provides training to municipal administrations and planners, and informs participants on latest technical developments and changes to the legal framework for cycling (Bongardt, 2013). Training topics are:<sup>1</sup>

- Structural issues related to cycle path construction;
- Traffic safety and cycling;
- Legal issues related to cycling;
- Communication and cooperation to promote cycling

## Conclusion

China is experiencing a process of explosive urban development that forces a thorough review of its urban mobility policies to ensure the sustainability of already implemented transport systems as well as those to come. In spite of the significant steps already taken towards the construction of thousands of kilometres of public transport networks, it will become difficult to maintain the current pace if regulatory, financial and institutional adjustments are not introduced. In addition, better integration of public transport with non-motorised transport and general city developments are still warranted.

China's challenge is to develop a coherent national sustainable urban transport policy that sets clear standards and quality requirements, gives effective guidance and orientation to cities, provides capacity development where it is needed and puts in place stable and sustainable funding for the development of SUT systems.

Several options and approaches to develop such a national sustainable urban transport policy and related funding options have been discussed in this paper and are summarised in the table 2 on page 27. These elements must be adapted to the unique characteristics of China, where explosive urbanisation demands institutional and financial changes without slowing the pace of urban development. The eight strategies identified interlink and mutually reinforce each other as illustrated in Figure 2.

More research may be necessary to better understand how – in detail – the above sketched approaches can be put in practice in a Chinese context.

One central concern for further work on financing urban transport in China is to investigate possible implications of the current structural and fiscal reforms that have yet to fully unfold. How to make best use of them to ensure that sustainable urban transport will benefit from stronger local governments? Will decentralisation help to overcome the problem of split responsibilities or make cooperation even more difficult? How can national or provincial SUT funds be best set up and stable funding secured?

If decentralisation is combined with ambitious planning, process and quality requirements as well as adequate guidance, the achievement of national objectives can be ensured, while leaving innovation and concrete project design to the discretion of local governments.

It is necessary to preserve the strengths of an institutional apparatus that has been able to put forth stable high level technical teams in cities like Shanghai, Beijing, and others, which already have extensive expertise in the rapid development of large and complex public transport projects. Therefore, more than radically changing existing administrative structures, they must be strengthened to retain the created human talent and for it to be spread to those cities and regions that do not yet have the appropriate technical capacity to successfully implement SUT programmes and policies. In this sense, a good strategy needs to acknowledge the existing differences amongst cities. Central government intervention may be more direct in those cities where there is a greater financial and technical backwardness whilst those cities which have more consolidated systems can be given a greater degree of autonomy.

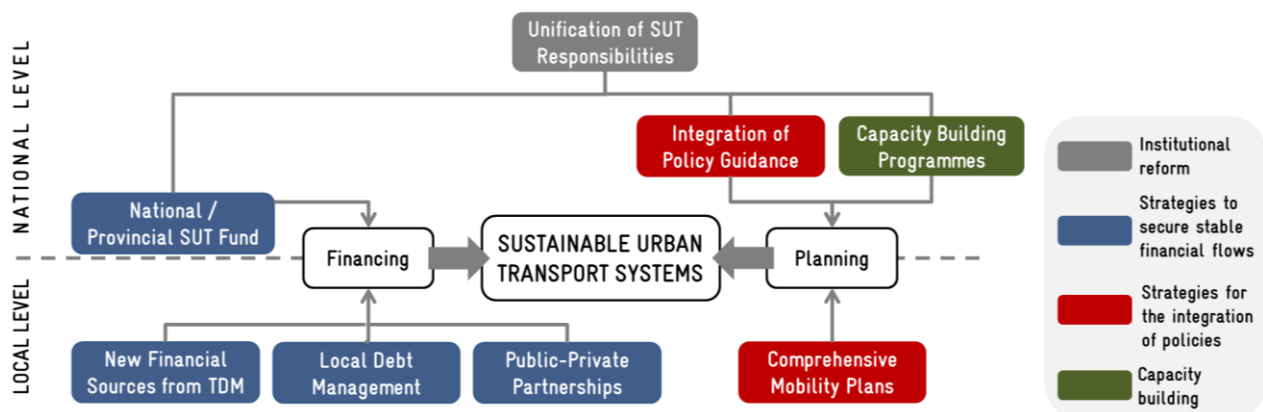


Figure 2 Strategies to Improve Planning and Financing SUT projects



China is providing examples of extraordinary leadership and evolution in urban transport, but faces challenges that need attention before they jeopardise prosperity and quality of life. Especially the integration of transport with urban planning needs to be addressed. Suggestions in this paper, adequately adapted to the diverse

context of Chinese cities, may help in advancing policies and avoid difficulties in the medium and long term.

**Table 2: Overview of options for improvement**

Strategy	Current Situation	Option for Improvement
1 Unifying responsibilities for sustainable urban transport (institutional reform)	Need for improved institutional coordination across multiple institutions.	Undertake an institutional reform that unifies, aligns and coordinates all national responsibilities related to SUT under a single central authority and local responsibilities.
2 Establishing a national or provincial sustainable low-carbon urban transport fund	Cities are mainly responsible for financing, developing and operating urban transport infrastructure and services. But fuel and vehicle taxes are collected at the national level. Due to the increasing demand for both infrastructure and maintenance, this situation is not sustainable.	Establish a national or provincial level fund to finance sustainable urban transport developments.
3 Strengthening local debt management	Chinese cities largely depend on revenues obtained from land concessions in order to finance SUT projects, making the system unsustainable over the mid- and long-term.	Use parts of newly authorised debt at city level to finance sustainable transport developments and stop land lease induced urban sprawl.
4 Creating new forms of revenues at the local level	Chinese cities have serious difficulties with financing the implementation and operation of public transport systems because resources are not enough to adequately satisfy a situation of high demand and increasing complexity.	Obtain new sources of local revenue, based on innovative mechanisms, such as land value capture or transport demand management measures to complement funds provided by the national or provincial government.
5 Promoting public-private-partnerships	The private sector has limited access to participate in the implementation and operation of SUT systems in Chinese cities. Although some PPP already exist in China, in most cases adequate incentives and security about property rights to get private investors involved in these projects are missing.	Enhance the framework conditions for public-private partnerships for the implementation and operation of SUT systems, including contractual security.
6 Integrating policy guidance under a single framework	A large number of separate policies and programmes related to SUT systems characterise the transport sector.	Develop a strong and comprehensive national urban transport policy framework that concentrates national policies and programmes for the promotion of SUT.
7 Developing comprehensive urban mobility plans	Planning processes of urban development and transport are not developed in a truly integrated manner.	Strengthen integrated mobility planning (e.g. comprehensive mobility plans) and coordinate with Land Master Plans at the local and regional level to frame and guide the development of SUT projects.
8 Setting up capacity building programmes	Planning, implementing and operating sustainable mobility is a complex task that requires specialized technical capacities in transport and urban planning, which often are not available locally.	Develop national level programmes to support local governments in ensuring enough local technical capacity.

## List of Acronyms

BRT:	Bus Rapid Transit	PPP:	Public-Private Partnership
CCZ:	Congestion Charge Zone	PROTRAM:	National fund for Public Transport (Programa Federal de Apoyo al Transporte Masivo in Spanish)
MoHURD:	Ministry of Housing and Urban-Rural Development	SUT:	Sustainable Urban Transport
MoT:	Ministry of Transport	TfL:	Transport for London
MPO:	Metropolitan Planning Organization	TIDF:	Transit Impact Development Fee
MTP:	Metropolitan Transport Plan	TIF:	Tax Increment Financing
MTRC:	Mass Transit Railway Corporation	TIP:	Transport Improvement Programme
NDRC:	National Development and Reform Commission	TDM:	Transport Demand Management
NSLCUTF:	National Sustainable Low-Carbon Urban Transport Fund	TOD:	Transit Oriented Development
PIMUS:	Plan for Sustainable Urban Mobility (Plan Integral de Movilidad Urbana Sustentable in Spanish)	TPCB:	Transport Planning Capacity Building

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