



LOCAL POLICIES AND BEST PRACTICES ON "GREENING" URBAN TRANSPORT IN CHINESE CITIES

Summary Profiles and Case Studies

Prepared for

**Division for Sustainable Development
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Introduction

A continuous economic development in China during recent years brings about a rapid urbanization and motorization, as well as a growing demand for mobility. Private car ownership is now accepted and practiced as a more convenient and personalized mode for transit. However, the accompanying issues like increasing traffic congestion, air pollution and GHG emissions, inefficient energy use and wasted time all exert negative impacts to the sustainable development. Hence, answers to address these issues are urgently needed from governments at various level and all authorities concerned.

Many city and other local governments in China have designed and implemented innovative policies and projects aimed at facilitating and improving mobility, whilst reducing energy intensity, fuel use and emissions per person-kilometer travelled. However, public information materials and other documentation on these policies and projects are often only available in Chinese language and thus remain largely inaccessible to non-Chinese audiences.

This booklet presents selected summary profiles in terms of local policies, best practices and case studies on "greening" urban transport taken or taking place in Chinese cities. It aims to inform a wider audience and authorities concerned and provides references to cities sharing the same concerns in other developing countries.

A comparatively wide range of topics are touched upon in this booklet, in terms of (a) the **improvement of a particular urban transport mode** like non-motorized transport (NMT), electric bikes and scooters, bus rapid transit (BRT), light rail transit, electric taxis and buses, Hainan eco-highway network, Qinghai-Tibet railway transit, and inland waterways; (b) a whole set of **measures taken by a city government to improve the overall traffic** like Beijing's initiatives in adjusting motor vehicle growth and Chongqing's experiences in alleviating traffic congestion, or to achieve sustainable urban transport network like the case of Guilin, ; (c) the national policy and regulation for fuel efficiency like *Motor Vehicle Fuel Efficiency Standards and Labelling* and for road safety; (d) the **promotion of alternative fuels** like compressed natural gas (CMG) and electric vehicles (EVs); (e) the **application of technology information in transport** like GPS; (f) **other topics** like barrier-free transport improvement, eco-community within 5-10 minutes walking distance, legacy from Shanghai EXPO and Shenzhen Universiade for sustainable urban transport.

Each profile begins with a brief analysis of the issue or problem, followed by a narrative description of the initiators/practitioners/participants, the decision making process, related policies or regulations, the financing mechanism, the time frame, and the assessed or expected benefits. Images or graphs are used for illustrations. It concludes with a brief elaboration on the rationale in selecting the particular city or project as example and an independent analysis by the author. Weblinks to sources or contacts (if available) with more detailed information are provided for further exploration.

The booklet aims to include the most innovative and representative cases taken or taking place in China. Due to limited scope of this publication, only a small number of project profiles could be selected. It also aims to achieve a geographical balance in selecting the cities to present, but still cities more urbanized and thus more initiative in taking measures to address transport issues locate more often than not more to the coastal area and the economic development circles. It is also notable that there is no "one-size-fits-all" solution. Each municipality needs to attend to their own specifications and make decisions accordingly.

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Alleviating Traffic Congestion in China

Chongqing's experiences in alleviating traffic congestion in the inner city area



Since the beginning of the 21st century, among the many concerns and ongoing issues resulting from China's accelerating urbanization and motorization, traffic congestion emerges as a very serious problem in most urban areas. The traffic congestion problem appeared first in mega cities like Beijing, Shanghai, Guangzhou and Chengdu, and later spread to all other big cities with a population of more than one million, as well as many medium and small sized cities. A survey conducted in October of 2010 by China Central Television (CCTV) shows that many white collar employees spend as much as 6 hours per day in commuting between home and work. It is also estimated that the average speed of motorized traffic can fall to less than 15 km per hour if no action is taken.

Air pollution and carbon dioxide emissions are caused due to incomplete fuel combustion. Wasted time and delays, stressed and frustrated motorists and passengers, blocked emergency service and many other indirect and spillover effects have pushed city governments and concerned authorities and citizens to analyse the multiple causes and to seek solutions to alleviate the congestion problem.

Located in South Western China and upstream of the Yangtze River, Chongqing is one of China's large municipalities under direct administration of the central government (like Beijing, Tianjin and Shanghai). By signing contract with Compal (the world 2nd largest notebook computer maker) this June, Chongqing has established its status as the world's largest notebook computer base. With growing economic activity, improving traffic congestion is now a primary concern.

Characterized by a physical landscape including many mountains and rivers in the urban area and thus many winding roads or roads on steep slopes and bridges or tunnels, Chongqing's urban transport is bus-based and taxi-supplemented, together with rail transit, cablecars, river cables and ferries. Statistics for 2002 show that the average motor speed in main city area was 27 km per hour, but the number of motor vehicle has since increased by 15 per cent per year. Several measures taken during the past few years have alleviated the congestion to some extent. Statistics for 2011 showed that the average motor speed in the main city area is now 28.5 km per hour. But with almost 3 million motor vehicles in total, and an average increase of some 2,600 vehicles per day, further action is urgently needed.

In June of 2011, the municipality decided on 10 actions against traffic congestion. Some are the continuation of the prior measures, and some are newly planned:

1	To speed up the completion of several important roads and tunnels to increase the road capacity ;
2	To adjust public transport layout to provide connections with the upcoming opening of new rail lines;
3	To apply restriction of trucks and motorcycles in several important roads and during peak hours;
4	To remove bus parking lots that are located at the core sections of the main city area;
5	To solve the sections with the most serious traffic congestions;
6	To build up series of parking lots in the main city area by transforming the unused buildings into stereo garages;
7	To continue the alternative working schedules;
8	To apply the intelligent traffic lights and to strengthen the patrolmen's command and management;
9	To further optimize bus lines and layout and infrastructure to enhance its traffic capacity;
10	To increase the number of the pedestrian and motor overpasses and to reduce the number of traffic circles.

The targets for 2015 are: (a) Urban periodic congestion and the number of congested roads to be decreased by 50 per cent compared with 2010; (b) The average motor speed to be increased to 30 km per



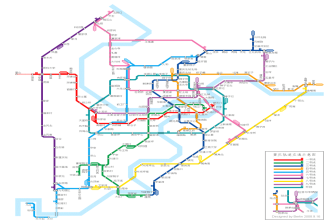
Traffic congestion



City rail transit Line 3



Big station express



City rail transit in plan

main roads during peak hours; (c) Rail transit have 50 per cent share in public transport; (d) Sufficient parking spaces be available in the main city area; (e) Bus transfer efficiency and the entire road traffic efficiency be significantly improved.

Accelerate the construction of rail transit and bus transfer hubs

China's first straddle type light rail, the Chongqing Line 2, was put into operation in June of 2005. Since then the light rail transit network has been continuously expanded. There are still 14 additional rail transit lines in planning. Accelerating the development of the city rail transit system is still needed to further alleviate the traffic congestion.

According to the municipality, more transfer hubs will also be constructed to realize efficient transfer between buses, city railways, long distance buses, and air and water transport. A series of transfer hubs with large park-and-ride places will also be built to encourage citizens to take rail transit for their commute to the central area. Bus stations, especially the first and last stops, will be further improved to reduce the queuing congestion. Integration of bus and rail ticket system and gradient charging system for parking will also be applied.

Prioritizing buses and big station express during peak hours

Chongqing began to prioritize buses in December of 2009 and introduced express bus services between major stations during peak hours. Buses can carry many more passengers and require less space than private cars. Longer buses were introduced initially on 6 main and busy bus lines, and later increased to 16 lines, only serving major stations. Furthermore, the number of buses operating after 10 pm were increased from 16 to 59 to better service commuters working late shifts.

Optimizing urban layout functions to ease traffic pressure at the central area

Controlled expansion of central area development may be considered in urban planning to further manage the traffic volume, and divert these urban functions which cause large volume traffic to the 2nd ring area will reduce the traffic pressure in central area.

Suggestion on applying congestion charge were also discussed as another option to alleviate traffic congestion in Chongqing, but the viability of this measure needs further studies and consideration. Chongqing has not yet begun motor vehicle registration restrictions, but these are under consideration, too. The case of Chongqing shows that taking multiple and comprehensive measures to alleviate traffic congestion can be effective. Similar measures will also be implemented in other cities.

For more information on the 10 actions to improve traffic congestion adopted recently in Chongqing, click: http://news.xinhuanet.com/local/2011-06/21/c_121561880.htm

Urban Transport of China published a special issue on urban transport congestion management, for more information, please refer to: <http://www.chinautc.com/TMagazize/mulu.asp?id=88&anclassid=1>

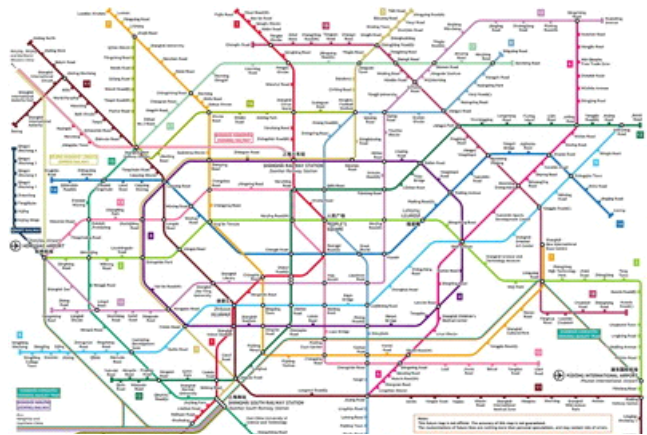
For more discussions on traffic congestion in China, please refer to: <http://bbs.qsttheory.cn/action-model-name-huati-itemid-35.html>

Expansion Plans for Shanghai Light Rail Transit Network

Lowering energy consumption per passenger/kilometer in public transport



Shanghai Light Rail Transit Network in 2011



Shanghai Light Rail Transit Network Planned for 2020

The priority of greening urban transport in Chinese cities is to improve the light rail transit system. Shanghai currently has a light rail network with 11 lines, 289 stations, and an operating length of some 450 kilometers, including a 30 km long magnetic levitation model line (Maglev). The average daily ridership is 5.5 million passengers. A ridership record of 7 million passengers per day was recorded on October 1, 2010, China's National Day holiday.

Shanghai is the third city in China to build a subway system (after Beijing and Tianjin). The Shanghai Metro launched its debut in December 1994 with 16 kilometers of tracks. Today Line 1 connects Shanghai Train Station, Xinzhuang Station and other busy stations, including Buyecheng (A City Without Darkness), Nanjing Road, People's Square, Huaihai Road and Xujiahui. Many of the modern subway stations are nicely decorated.

In September 1999, Metro Line 2 was completed. It runs from Zhongshan Park, through Jing'an Temple, People's Park, and then reaches Lujiazui where the Oriental Pearl is situated.

In December 2000, a 25 kilometer long new line called "*Dragon in the Air*" was built on the 80-year-old Songhu Railway roadbed. It was the first elevated railway line in China. People initially called it "Pearl Line", but it was later changed to "Line 3", in accordance with the uniform numbering system.

The Shanghai Metro brought many benefits and conveniences for urban commuters. It takes only about 2 minutes to travel from one station to another, and very seldom passengers encounter congestion. The fare is affordable. The base fare is 3 *yuan* for journeys under 6 km, then 1 *yuan* for each additional 10 km.

According to the sixth national census held in November 2010, Shanghai had 23 million inhabitants, including people with registered residency as well as migrant workers. Most people now choose to take the rail network for travelling, shopping or commuting.

The Shanghai Metro system is the one of the fastest growing light rail transit systems in the world. The map on right-hand side above shows the light rail transit network planned for 2020. Many additional lines are currently under construction or planned to be constructed in the near future. After the completion of these lines, the length of the Metro network will exceed 970 kilometers with 21 lines in operation.

The Shanghai Metro uses overhead wires for the power supply, providing 1500 volt DC system which is

twice the voltage generally used for the light rail system.

The Magnetic Levitation Model Line

The Maglev Model Line is also one of the major projects for green urban transport development. It is the first magnetic levitation line put into commercial operation, combining multiple functions, such as transportation, scientific demonstration, and tourist sightseeing. It runs from Longyang Road Station of Shanghai Metro Line 2 to Pudong International Airport. The line meets the passengers' demand of large-capacity and high-speed transportation between the Pudong Airport and downtown. The main line is about 30 kilometers in length with dual tracks. Maglev trains can travel at a speed of up to 430 kilometers per hour, whizzing passengers to their planes in less than eight minutes to cover the whole distance.

Details of the light rail transit network in Shanghai:

Line	Terminals	Opened	Length	Stations	Color
1	Fujin Road - Xinzhuang	1995	37.0 km	28	red
2	Xujingdong – Pudong International Airport	1999	68.0km	31	green
3	Shanghai South Railway Station - Jiangyang Road (North)	2000	40.5km	29	yellow
4	Loop line starting from Yishan Road	2005	33.6km	26	purple
5	Xinhang Development Zone -Xinzhuang	2003	17.0km	11	aubergine
6	Guangcheng Road – Oriental Sports Center	2007	36.0km	28	magenta
7	Meilan Lake – Huamu Road	2008	37.0km	32	orange
8	Shiguang Road –Aerospace Musium	2007	41.0km	30	blue
9	Songjiang Newcity – Yanggao (Middle) Road	2007	46.0km	23	baby blue
10	Hongqiao Railway Station – New Jiangwancheng	2008	36.0km	31	lavender
11	Jiading (North) – Jiangsu Road	2008	66.5 km	20	dark brown
Maglev	Longyang Road – Pudong International Airport	2003	30.0km		
	Total		488.6km	289	



Rail on Ground



Rail Underground



Rail on Overbridge



Maglev Model Line

For more information on Shanghai Rail Transit Network please visit:

<http://baike.baidu.com/view/70368.htm>;

Picture Credits: <http://image.baidu.com>

The Initiatives in Adjusting Motor Vehicle Growth

今天是 星期二 五环内7时至20时		尾号2和7停驶			
No driving	MON	TUE	WED	THU	FRI
Tail number	1&6	2&7	3&8	4&9	5&0
Tail number plate restriction: 7:00-20:00 within the 5th Ring Road for the period of 10/07/2011-08/10/2011					

Beijing's measures to improve the overall traffic

By 14 August 2011, the number of motor vehicles in Beijing had reached 4.937 million with 6.58 million registered drivers. With an average daily increase of 2,000 motor vehicles (more than 4,000 at peak days), it is estimated that the number of cars might reach 7 million by 2015. The average motor speed may then be less than 15 km per hour. At the same time, the maximum traffic capacity of central area road network is only 6.7 million. In terms of the public transport, some statistics show that currently, the average speed of small passenger cars is approximately 2 to 3 times that of buses and 1.6 times that of the metro.

A dedicated Beijing Traffic Congestion Index was introduced earlier and it is now updated every 15 minutes and provides information on the city traffic commission's official website since late May this year to inform the real time traffic situation within the 5th Ring Road and in the 6 central city districts. The index provides a general reference information of traffic in certain areas by digitizing the traffic congestion and describing the congestion rated on a scale from 0-10 to inform drivers and passengers in advance. The index is calculated based on GPS data obtained from more than 30,000 taxis.

The Municipality's answer: build up, regulate and restrict

At the end of 2010, Beijing Municipality launched a comprehensive scheme including 28 specific measures aimed at ensuring safe and smooth urban transport. Prior to deciding on the measures, the municipality consulted the public, asked for the public opinions and made revisions and amendments to the draft accordingly.

The measures combine three guidelines for improving the traffic: (a) to build up road network, rail lines and other facilities, (b) to regulate parking, non-Beijing motor vehicles and other operations, and (c) to restrict purchase and license registration of small passenger cars.

Efforts will be made to further improve and optimize the urban planning, to speed up the underground fast passage projects (pilot projects at the West & East 2nd Ring Roads and the Xishan tunnel), to extend several main streets in central city area by 200 km, to newly build 400 km microcirculation roads, to add 150 km bus lanes (open also to airport and other shuttle buses) and another 2 metro lines in 2011, to activate a public bicycle rental system of 1,000 stations and more than 50,000 rental bicycles, as well as park-and-ride places with more than 30,000 spaces.

The programme also aims to achieve "zero growth" in terms of government cars within the next 5 years. The regional restrictions of motor vehicles at peak time during workdays (as showed above in the figure) and restrictions of motor vehicles with yellow plate (issued to motor vehicles which failed to meet municipal emission stands and which are forbidden within the 6th Ring Road since October of 2009) continue to be valid. Passenger vehicles without a Beijing license need a pass and are forbidden within the 5th Ring Road at morning and evening peaks and follow the tail number plate restriction beyond the peak hours. The measure of odd-even number plate will be applied on occasions of bad weather, major public activities or other situations that might incur serious traffic congestion.



Crowded Metro station



Crowded passengers waiting for a bus



Beijing's new metro network



Cartoon for lottery system

Interim provisions regulating the number of small passenger cars

In December of 2010, Beijing issued *Interim Provisions Regulating the Number of Small Passenger Cars*. These measures restrict small passenger car purchases and implement a lottery system to limit new car registration to 240,000 plates every year (20,000 every month) from 2011 onward. 88 per cent of the licenses are given to individual applicants, 2 per cent to small passenger car operators and 10 per cent to other units/companies/organizations/associations. Electric vehicles are not affected by in the restriction.

The lottery takes place once per month for individual applicants and once every two months for companies or organizations. The preconditions for individual applicants to qualify are (a) Beijing residence, (b) no car ownership in Beijing and (c) a valid driver license. Companies paying sales tax and other taxes exceeding 50,000 RMB are eligible. A code is assigned upon application, and after reviewing of the eligibility of the applicants, the code goes to the lottery process, and upon winning, the new car registration should be completed within 6 months.

The pricing scheme for non-residential parking

To further curb traffic in the city, the municipal Development and Reform Commission published the new pricing scheme for daytime parking which came into effect in April this year. The new parking charges differentiate three areas: (a) within the 2nd Ring Road and several business districts, (b) from the 2nd Ring Road to the 5th Ring Road, and (c) outside the 5th Ring Road. The charge also differentiates different parking types like on road or underground parking.

Post the series of actions taken

One immediate effect of the regulations and the restrictions on private motor vehicle use is a dramatic increase in demand for public transport. According to Beijing metro operators, the new parking pricing resulted in an immediate increase in the average number of metro passengers per day reaching 6.55 million, an increase of 19.4 per cent compared with April. The passenger load factor on some lines at morning and evening peak hours even surpassed 130 per cent.

At the end of 2010, Beijing opened five new metro lines, which connect several suburban areas to the metro network. The new lines shorten the commute time between these suburban areas and the city center. The metro expansion enables better mobility and accelerates mode shift. However, in spite of the expansion of metro network, its capacity is still lagging behind the increasing passenger demand. Some experts suggest a gradient pricing system be also applied in the metro by differentiating peak hours and off-peak time. Further research still needs to be done to assess its viability and possible effects.

Traffic congestion charges are also under discussion and the authorities concerned are analyzing the options. There are, however, various concerns raised by the public in terms of access rights and rights of car ownership and driving. It is also to be noted that different regulations and restrictive measures can generate unintended reactions. Sophisticated planning and inclusive policy making is always needed.

For official statistics on Beijing transport, please refer to the website of Beijing Traffic Management Bureau: <http://www.bjjtgl.gov.cn/publish/portal0/>

For more information and discussions on the 28 measures, click here:

<http://www.jhtax.gov.cn/Articles/showarticle.aspx?id=C04520BA218192DD&menuid=308&type=311>

For more information on the *Interim Provisions Regulating the Number of Small Passenger Cars*, click here: <http://zhengwu.beijing.gov.cn/fggz/zfgz/t1146077.htm>

For more discussions on the effect of measures taken, please refer to:

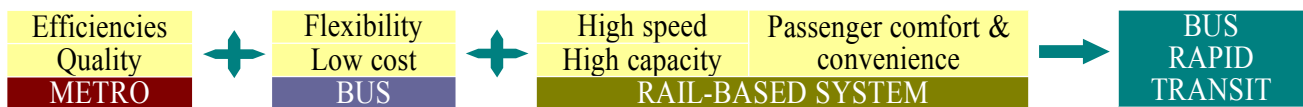
<http://news.sina.com.cn/c/2011-07-21/021222849037.shtml>



Gangding BRT station in Guangzhou

Guangzhou's initiatives in applying bus rapid transit system in urban transport

Bus Rapid Transit (BRT) has proven to be an effective public mass transit system. By making maximum use of existing facilities and infrastructures, it can be built and put into operation quickly. It is estimated that compared with light rail, BRT can cost 30 times less to construct and 3 times less to operate. All these characteristics also make it a pragmatic and affordable solution to urban public transport.



» Bus-only lane; » Passenger pay at stations; » Easy access to bus floor.

BRT system can also reduce air pollution and GHG emissions through increasing bus speeds, encouraging mobility mode shift and applying more fuel efficient buses. Some BRT systems are now approved to generate and sell carbon credits.

To keep pace with rapid urban growth, many mega or medium sized cities in China now have BRT operations or have BRT projects in plan or under construction. Guangzhou's BRT system began to operate in February 2010. It is currently the world second largest BRT system, the first being TransMilenio in Bogota of Colombia.

On average 800,000 passengers (not including trips involving transfers) are moved around by the BRT system per day-greater than any of the five metro lines in Guangzhou. A number of initiatives of the system is breaking many passenger records in China or in the world and revolutionizing perceptions of BRT in China. Major passenger records are:

Peak passenger flows per hour per direction	Passenger boardings per hour
26,900 per hour per direction	8,500 passengers at the biggest morning/evening peak station;
Daily ridership per day	Passenger boardings per day at a single station
Around 800,000 passenger-trips on BRT buses;	More than 55,000 passengers;
Longest BRT stations: around 260m including bridges;	Highest BRT bust volumes: 350 per hour in single direction-roughly 1 bus every 10 seconds.

Major Initiatives include:

- Bike parking at BRT stations (5,500 spaces);
- Bike sharing in vicinity of BRT stations (5,000 rental at 113 stations);
- Direct connecting tunnels from the BRT platform to the Guangzhou metro at three stations;



The longest Shidajida BRT station



LED display of the next services



BRT-metro connection at Shipaiqiao



Bike parking at Gangding Station

- BRT station bridges connecting directly to adjacent buildings. These various inter-modal connections (BRT, metro, bike parking and sharing, pedestrians, adjacent buildings) make the corridor a leading example of multi-modal transport integration.
- Bike lanes along the trunk line;
- Station size is determined based on passenger demand for all stations in the BRT system;
- Involving seven different bus companies from three corporate groups all operate BRT routes;
- Quality control oversight from an independent entity/agency.

The planning procedure of BRT system in Guangzhou is shown as below:

2003-2004	Preliminary BRT planning;
2005	Conceptual plan, demand analysis & corridor comparisons; <i>Memorandum of understanding</i> signed between ITDP and the Construction Commission of Guangzhou Municipality in April of 2005, working with Guangzhou Municipal Technology Development Corporation (GMTDC) and Guangzhou Municipal Engineering, Design and Research Institute (GMEDRI);
2006	Phase 2 planning: further traffic, operational and design planning & demand analysis;
2007-2008	Implementation planning & design; Final station & operational design involving BRT authority, architecture, engineering design, metro integration, NMT integration;
2009	BRT construction, regulatory set-up, refinement of operational plan, promotion & outreach, vehicle procurement;
2010	BRT operation in February;
Current	Phase II are under planning.

During the transformation of Zhongshan Avenue, a fully separated BRT corridor is integrated with the installation of a new greenway and high quality plazas and public spaces. detriment



The Guangzhou case study demonstrates a successful application of BRT system to meet passenger demand in urban transport. It also involves many good initiatives like intermodal integration and multiple operators. Many aspects in the planning process, including corridor selection, data collection and analysis, operational design, fare collection, traffic management, etc., are all critical to the project success. All these provide useful references to municipalities have BRT system in mind or in plan.

For a case study on Guangzhou BRT: High capacity BRT planning, implementation & operation, click: http://www.uncrd.or.jp/env/5th-regional-est-forum/doc/08_Breakout%20Session2-B/BS2-B-3_Guangzhou_BRT.pdf

For information on other BRT systems in China, please refer to: <http://www.chinabrt.org/defaulten.aspx>

Eco-City Models in China:

Spatial proximity of residences, workplaces, shops and services can reduce the need of motorized travel

Uncontrolled and unplanned urban development and motorization have led to “crawling” expansion of cities, which now poses growing environmental problems. It is high time that urban planners focused more on sustainable development. Urban planning for sustainable development is particularly important in China.

The UN Habitat Agenda pursues two goals: “adequate shelter for all” and “building sustainable cities and towns in the process of increasing urbanization”. The main objective is to make the cities more democratic, more sustainable and more adjusted to meet the need of city dwellers.

Can we build cities/communities where residents live, work, shop, and get all necessary services and even all creature comforts within walking distances? If functions of modern life are located in close proximity, one does not need to use a train, a bus, or a car. One just needs to take a few minutes walk, or maybe sometimes one needs to ride a bike to cover the distances between the home, the workplace, groceries, bio-parks, gyms, and other services needed. Some cities like Tianjin, Guangzhou, Kunming, and Guiyang have started to build these kinds of eco-communities as pilot project to serve as models for future development.

An “eco-community”, also called “neighborhood unit”, consists of structured areas, including 4 functional areas: residential, commercial, educational, and services. All buildings are connected and operated in accordance with proven and accepted standards for measuring and reporting carbon footprints and greenhouse gases, and in line with the concepts of energy saving, effective use of land, materials saving, water saving and environmental protection. In environment-friendly and livable communities, residents can live low-carbon lifestyles. Eco-communities attract people of all walks of life to enjoy the balanced and harmonious social life. Eco-communities can form a part of a system of “City Center-City Subcenter-Neighborhood Unit”.

Following are some examples reflecting the trend towards sustainable urban development:

The Sino-Singapore Eco-City in Tianjin



This is a comprehensive model of an eco-city, consisting of City Center, several subcenters and neighborhood units. The Eco-City covers 30 square kilometers, situated at the intersection of Ji Canal and Yongding New River, 45 kilometers away from Tianjin City. It is jointly developed by both the Chinese and Singaporean Governments. It was launched in September 2008, and Phase I Demonstration Community has already been accomplished. Reclaiming from saline and alkaline land, the ecological demonstration community features a 44 km long highway, more than 300,000 m² building area, more than 700 km of energy pipeline networks. 1.5 million m² saline and alkaline land has been ameliorated and turned into “green” landscape. Wind power and photovoltaic stations are built and 600,000 m²

eco-housing is now ready for sale. The total building area is 2.7 million m² and total investment amounts to 20 billion yuan. 130 companies and many residents have already registered for occupancy.

The Sino-Singapore Eco-city is operated by taking advantage of Singaporean advanced experience in economic planning, environmental protection, resource saving, ecological construction, renewable energy recycling, reclaimed water reuse. Indices are jointly formulated by the two countries to measure the carbon footprint. Buildings are 100 per cent “green” and so is the mobility system, with pedestrians as priority. Neighborhood Units are connected by clean energy powered public transport system. The community's expected residents are 350,000 when it is fully completed in 2020, and it will serve as a model for future development of Chinese cities.

The Sino-Singapore Eco-city is managed by an “Alliance Council” formed by Vice Premiers of the two countries and operated by an Alliance Working Committee of Ministerial Officials with its subordinate establishment of Sino-Singapore Joint Eco-City Investment Co., Ltd, a consortium of China Tianjin Teda and Singapore Keppel Group.

GFHS International Green Model City

This green model city is initiated by the Global Forum on Human Settlements (GFHS), in cooperation with the United Nations Environment Programme (UNEP). GFHS advances the idea and motivates forward-looking governments, enterprises and societal forces to jointly work together and invest for the construction while UNEP gives the guidance and organizes workshops of concerned experts to formulate general building principles, specifications and standards, and other technological support. The project is an amazing low-carbon town and will be launched in 2012. With pedestrian walk ways, greenways and clean energy public transport networks it encourages green mobility, and there's no car inside. The first proposed site will be in Guiyang City, Guizhou Province. Total land coverage: about 3.5 million m²; total building area: about 3 million m²; total investment: about 8 billion RMB; expected residents: 30,000; construction phases: to be completed in 5 years; containing 5 areas: residence, conference, leisure, business and services.

Jinshan Valley Eco-Garden in Guangzhou

The project was launched by China Merchants Property Development in 2010. It is located about 15-minute drive from Panyu, Guangzhou, with total land area of 8.3 million m², total building area 1.3 million m², integrating resort area, commercial center, apartment hotel, kindergarten, primary school, and middle school and supporting facilities. The project is technically supported by “One Planet Communities”, which use the Ecological Footprint method as the main metric. The residents' footprint is minimized as they can reach all urban functions and meet all regular daily needs within short walking distances.

For information on Sino-Singapore Eco-City, please visit:

http://www.ccots.com.cn/2009_4/11_3/jbjvg1kactx7_3_0.htm

http://www.chinadaily.com.cn/dfpd/tianjin/2011-08-12/content_3480450.html

Information on GFHS International Green Model City: <http://www.gfhsforum.org>;

Information on Jinshan Valley Eco-Garden: <http://baike.baidu.com/view/3626697.htm>

Information on One Planet Communities: <http://www.oneplanetcommunities.org>

Picture Credits: <http://image.baidu.com>

Hainan Builds “Eco-Highway” Networks

Connecting All Cities and Counties of the Province

Hainan Province was established in April 1988. Perching on a main island and some 200 small islands, Hainan covers a total land area of 35,354 square kilometers, and its coastline is over 1,600 kilometers. Hainan Province has 18 cities and counties under its jurisdiction, with a total population of about 8.6 million. Besides the Han people there are more than 30 other ethnic groups such as *Li*, *Miao*, *Zhuang*, and *Hui*. Each ethnic group still retains its own culture and customs. The provincial capital city is Haikou which is situated in the north of the island. Hainan has become a famous tourist destination for its landscape, seascape and diversity of ethnic culture. There are eight tourist regions: Haikou and neighboring areas (Haikou, Qionghai, Ding'an); the North East (Wenchang); the Central East Coast (Qionghai, Ding'an); the South East Coast; the South (Sanya); the West Coast (Ledong, Dongfang, Changjiang); the North West (Danzhou, Lingao, Chengmai); and the Central Highlands (Baisha, Qiongzhou, and Wuzhishan/Tongzha).



Hainan has two airports: Haikou Meilan Airport in the north and Sanya Phoenix Airport in the south, connecting 39 domestic cities; a Sanya-Haikou-Guangzhou railway line (with 30 km ferry in between), and three ferry routes to link with other parts of China. The main transport network in Hainan is the highway. With a total length of 1.4 million kilometers, the three-vertical and four-horizontal highway lines which form a grid-shaped network extends in all directions around the island connecting ports, cities, counties, and branch into 318 townships which consist of 3,133 villages as well as various tourist attractions.

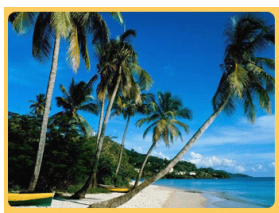
Hainan Government adopted innovative measures for building the highway networks:

Being a newly established province, Hainan has been wrought with sustainable development factors, and the transport networks servicing tourists as well as residents have been built in an ecological manner.

In January 1994, Hainan took the lead in levying “bunker adjustment surcharge” and later in December 2008, Hainan began to levy additional fees for motorized vehicles and used the money to finance the highway construction. In 2009, the provincial transport budgets increased to 1.9 billion yuan, 600 million yuan more than the previous year. In the fiscal year of 2009-2010, the transport fund increased to 9 billion yuan and in the next 5 years, namely during the 12th Five-Year Programme period, the transport funding will reach 30 billion yuan.

Hainan solved some highway management problems inherited from the previous provincial administration, and restored the institutional establishment for the highway substations in 18 cities and counties and allocated 3471 workers for the posts. The management system boosted the work mechanism of highway maintenance and enhanced the workers’ sense of responsibility of maintaining the highway network.

Another measure of reform was an open bidding for the margin system for public-operated tourist vehicles, and established in Hainan a dynamic management for highway building. Together with the coastal ports, the highway system helped Hainan Province form economic development zones, industrial bases, and efficient agricultural bases and promote fruit and vegetable planting for export.



Tropical Scenery in Hainan



Growing Trees and Flowers in the Green Belt



More E-Buses Put on the Streets

In 2010, Hainan launched the International Tourism Island Project, focusing on the principles of “Vehement Investment, Vigorous Promotion, Intense Management and Speedy Progress”. To keep abreast with the 12th Five-Year Programme, Hainan augmented the highway network by retrofitting them into “eco-highways”, with “green belts” along the main motor ways to form powerful fences to protect the road. In addition, more new energy vehicles are put on the streets for the public transport system. In September 2011 the first eco-buses and eco-taxis were put into use in Haikou. The first batch included 30 electric buses, 170 hybrid-electric buses and 27 electric taxis. According to a municipal development plan, Haikou will increase the number of eco-cars to 1,050 by 2012. Hainan's scheme is part of the country's new energy vehicle plan that aims to have more than 500,000 electric, hybrid and fuel-cell vehicles on the road by 2015 and 5 million by 2020.

With the principles of Fluent, Safe, Comfortable and Beautiful and the slogan of “Building Hainan into a four-season garden, a resort for people of all the country,” Hainan will focus on build up the “Green Belts” along the highways in the next few years to come. The major measures include:

- (a) Rules and regulations to streamline highway landscaping, construction and management.
- (b) Promote the “Green Belt” by societal means. Trees and flowers within the 2-meter area along the highway gutter are planted by the highway authorities as the base of the “Green Belt”, and the part beyond are widened by the civic.
- (c) “Green Belts” combine trees or flowers of visual quality with economic aspects. The precious and indigenous tree species in Hainan are jackfruit, litchi, longan, black pepper, oleander, etc. They are beautiful for tourists to see and they are financial rewarding for the growers.

The “Green Belt” is like a guard safeguarding the highway property by preventing from illegal construction at the roadside. It also moderate temperature on the road and shelter the road from wind and rain. It reduces noises and absorbs CO². It beautifies the environments and attracts more visitors to enjoy the ecological and natural scenery. The “Green Belt” along the road also plays a role in navigation, guiding the travelers along the way.

For more information about Hainan Province, please visit:

<http://en.hainan.gov.cn/englishgov/>

For report on Hainan green transport, please visit website of Ministry of Transport of China:

<http://www.moc.gov.cn>

Hainan puts on street over 200 green vehicles:

http://www.chinadaily.com.cn/china/2011-09/04/content_13614948.htm

Hainan highway building:

<http://www.chinahighway.com/news/2010/400466.php>

Picture Credits: <http://image.baidu.com>; www.ecotourchina.com

New Urban Transport Infrastructure for Walkers and Cyclists

The Guangdong Greenway Networks



Guangdong Province has been known for its rapid economic development over the past 30 years. In the process of urbanization, many cities have developed without paving sidewalks for pedestrians and building lanes for cyclists. In order to slow down the speed of urbanization and let citizens to “smell the roses”, Guangdong Province formulated an urban development strategical plan in January 2010, with the goal to build greenway networks in the province. According to the plan, by the end of 2013, a comprehensive greenway network will be built in the Pearl River Delta (PRD). By the end of 2015, an all-inclusive greenway network connecting communities of all cities will be completed in the province.

By April 2011, the greenway network in the Pearl River Delta was already accomplished, almost 2 years ahead of schedule. The total length of the Greenway Network is 2372 km, connecting 9 cities or 6 local regions, with more than 200 parkways, i.e. forest parks, nature reservation parks, scenic spots, country parks, waterfront parks and historic and cultural sites, linking three metropolitan areas: Guangzhou, Shenzhen and Zhuhai. The network also has 171 stations or rest areas, which provide bicycling leasing service, retail and simple catering services, as well as security offices along the way. As a result, commercial business and property development has boomed. More and more people choose riding bicycles to travel in their leisure time, as well as to commute. The greenway network benefits a population of about 25.65 million.

The Six Routes (as shown in the following *Map of Greenway Network in PRD*) from the *Master Plan for Greenway Network Building in the Pearl River Delta* by the Guangdong Provincial Housing and Urban-Rural Development Department are as follows:

Totally 2372 km long greenways in the Pearl River Delta built to network 9 cities or 6 local regions, and strategically communities/cities of the whole province will be intensively connected by greenways by 2015.



Map of Guangdong Province



Map of Greenway Network in PRD

Route I (orange) runs along the west bank of the Pearl River, featured with mountainous and sea scenery. It starts from the Double Dragon Lake Tourist Resort area in Zhaoqing City, to Foshan, Guangzhou and Zhongshan, and reaches the Guan’ao Viewing Pavilion in Zhuhai, connecting 50 development zones.

Route II (blue) runs along the eastern bank of the Pearl River, featuring mountains, rivers, fields and seas. It starts from Liuxihe National Forest Park in Guangzhou, through the cities of Zengcheng, Dongguan, Shenzhen, and reaches Xunkewan Bay Resort in Huizhou, connecting 50 development zones.

Route III (green) runs right across the entire Pearl River Delta, with the characteristic of leisure and culture. It starts at the Didu Hot Spring in Jiangmen, through Zhongshan, Guangzhou, Dongguan, and reaches Huangshatong Natural Reservation area in Huizhou, connecting more than 60 development zones.

Route IV (purple) runs right through the middle of PRD, with the characteristic of ecology and leisure. It starts from Furong Zhangshui Water Source and Forest Reservation Area in Guangzhou, and runs southward to Foshan, and reaches Haiyu Hot Spring Resort Area in Zhuhai, connecting 20 development zones.

Route V (blue) runs along the eastern side of the Pearl River with the characteristic of ecology and leisure. It starts from the Luofushan natural Reservation Area in Huizhou, through Dongguan, and reaches Yinhu Forest Park in Shenzhen, connecting 20 development zones.

Route VI (dark green) runs through the west part of PRD, with the characteristic of waterfront leisure. It starts with Zhenshan Mountain in Zhaoqing, and moves southwardly to Foshan, and reach Yihu Bay Wetland and Gudou Hot Spring in Jiangmen, connecting 16 development zones.



Separated Lanes



Lane for Pedestrians



Lane for Cyclists



Service Station

The walkway and bicycle lane network has proven to be popular, particularly during weekends and holiday periods. It is expected that similar projects will soon be implemented in other urban areas of China.

More information on greenways in Guangdong can be obtained from China Economic Weekly, Southern Metropolis Daily, Nanfang Daily, Yangcheng Evening Post, etc.

Websites:

<http://news.sina.com.cn/c/sd/2011-04-26/093622359323.shtml>;

<http://baike.baidu.com/view/3431727.htm>;

<http://www.ycwb.com/>;

<http://www.nfdaily.cn>

Map Credits:

Map of Guangdong Location in China: http://mapsof.net/uploads/static-maps/china_guangdong_location_map.png

Map of Guangdong: <http://www.inspectionchina.com/map/images/GUANGDONG.gif>

Map of Greenway Network in PRD: [http://www.huizhou.gov.cn/UserFiles/Image/1\(597\).jpg](http://www.huizhou.gov.cn/UserFiles/Image/1(597).jpg)

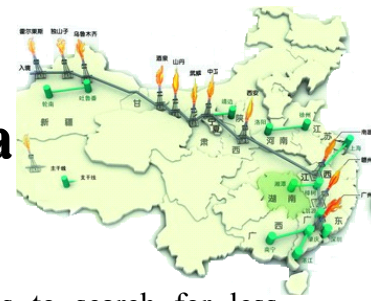
Picture Credits:

Separated Lanes; Lane for Cyclists: <http://www.nddaily.com/>

Lane for Pedestrians: <http://www.southcn.com>

Service Station: http://img.ycwb.com/news_special/attachement/jpg/site2/20110106/0021974080ad0e8f76c605.jpg

Increasing the Use of Alternative Transport Fuels in China



Applying natural gas for public transport in Dongguan, Guangdong Province

Volatile oil prices and deteriorating air quality have compelled many countries to search for less expensive and cleaner alternative fuels. This is particularly important for developing countries where the domestic oil production is insufficient to provide for rapid motorization and where heavy reliance on oil importation generates a big burden for the economic development.

Natural gas has proven to be a cost competitive alternative to petroleum. The advantages of natural gas are less cost, less pollution and higher safety. Natural gas can be used in motor vehicles in two forms with different mechanisms: Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG). It is estimated that motor vehicles powered by CNG cost 10-15 per cent less with 90 per cent reduced pollution compared with the traditional fuel.

Comparatively abundant natural gas resource and the West-to-East Natural Gas Transmission Project has enabled a great potential for the development and utilization of natural gas in China. Statistics of 2009 show total reserve of 47 trillion cubic metres of natural gas, with 14 trillion cubic metres easily recoverable. The West-to-East Natural Gas Transmission Project which was commenced in 2000 now provides natural gas to 260 cities. This provides the very precondition for the use of natural gas in transport and other sectors.

Large disparities exist among cities in terms of the application level of natural gas. Mega cities like Beijing, Shanghai, Chongqing and Chengdu have begun applying natural gas in the public transport system (mainly in buses and taxis) since late 1990s. Through the development over more than 10 years, comparatively mature systems have been established and rich experiences have been accumulated, in terms of the share of natural gas motors in public transport and the construction of refueling stations, administrative regulations and industrial management. Medium and small sized cities now follow the trend by exploring the application of natural gas firstly in public transport and later in private motor vehicles.

As a medium sized city located in the south of Guangdong Province, Dongguan has been plagued by acid rain for years. In 2006, the Municipality began to allow and to encourage agreements being signed among natural gas providers and interested taxi car owners to initiate mixed fuel taxis retrofits. To further promote natural gas application in public transport, the Municipality published *The Implementation Plan of Natural Gas Vehicle Fueling Project Promotion in Dongguan* (referred to as the Plan below) in September of 2008. This is also meant to improve air quality and optimize the energy systems.

The Plan specifies the subsidy for refueling stations and taxis that would have oil to gas transformation during the period of 2008-2010:

- 500,000 RMB per CNG refueling station/per mixed one newly built, reconstructed or expanded;
- 3,000 RMB per taxi and 4,500 RMB per bus transformed to CNG powered;
- 2,000 RMB per taxi and 2,000 RMB per bus purchased;



Shenghe CNG refueling station



Refueling CNG



Fuel surcharge increase



Blue taxis with 2 RMB surcharge

The Plan also sets out the expansion goals for the following years:

The number or percetage/Year	2007	2008	2009	2010	By 2015
Number of CNG Refueling Station	2	5	10	15	60
Number of CNG taxi	100	800	2,800	4,800	>90%
Number of CNG bus	—	100	500	1,000	>90%

Notes: 1. By 2015, it is aimed that all sanitation trucks would use CNG;

2. It was estimated that every new refueling station would meet the daily CNG consumption of 500-800 taxis.

Selected long distance bus terminals and urban bus stations in operation or under (re)construction, or expansion are also encouraged to participate in the CNG transformation.

Several measures were also taken to accelerate the transformation from traditional vehicles to CNG/mixed ones, including setting time schedules for CNG bus purchases to reduce traditional ones. Buses that fail to meet emission standards were also refused licenses. Charges were introduced on taxis that have excessive emissions.

The Plan also requires that the locations of CNG refueling stations are consistent with the overall urban planning and compliant with industry standards. The entire network of the refueling stations would be based on start-up demonstration projects including more stations added later to service larger and adjacent areas.

Currently, among the total 7,671 taxis in Dongguan, more than half have been transformed into CNG taxis. However, the limited number of CNG refueling stations is still a bottleneck which prevents large scale application. Given the national fuel surcharge raised for the traditional taxis, the current debate concerned is about whether CNG taxis/mixed ones should be taxed too. Dongguan Municipality raised the fuel surcharge non discriminatively in May this year, causing complains and worries among taxi drivers. The Municipality plans to prepare an *Pricing Linkage Mechanism for Petroleum and CNG* and to hold hearings by the end of the year.

Compared with mega cities where natural gas application in motor vehicles has been long established and standardized, Dongguan's experience is relatively new and progresses not without obstacles and problems in terms of the enforcement of the regulation and supervision, the fairness of competition in an open market or the pricing and quality of service, etc.. It might represent the development process of natural gas application in public transport in many other medium and small sized cities to some extent. Hence, Dongguan experience could provide some references in terms of the model of planning and measures.

In general, with a growing number of cities planning a transition to natural gas in the public transport system and private vehicles, the concerns of safety and safety inspection, insurance, regulations and standards of transformation of the vehicles and refueling stations may need further studies. Natural gas is also expected to serve heavy trucks and agricultural vehicles in the near future.

For more information on natural gas vehicles in China, please refer to:

<http://www.trqqc168.com/articlelist/1428092/1.html>

For more information on the Plan, click: <http://www.dgeia.com/news/Print.asp?ArticleID=2216>

For more information on the development of natural gas vehicles in China, please refer to:

<http://www.trqqc168.com/news/10449375.html>



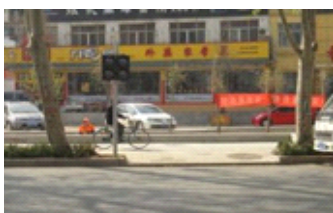
Promoting Non-motorized Transport in China

Examples of successful pilot projects for improving traffic flows in Jinan, Shandong Province

As one of the measures to promote the transformation of the urban transport development model and to achieve energy saving, emission reduction and "green" transport, the Ministry of Housing and Urban-Rural Development (MOHURD) initiated Demonstration Projects of Urban Walking and Bicycle Transport System (the Projects) nationwide in June of 2010, starting with six cities, including Chongqing, Hangzhou, Changshu, Kunshan, Kunming and Jinan. With the financial support from MOHURD, several demonstration projects to promote walking and bicycle transport were already realized within the first year.

Jinan Municipality drew up *Jinan City Walking and Bicycle Transport System Planning* and *Jinan City Walking and Bicycle Transport System Design Guidelines and Policies and Measures to Promote the Planning and Construction of Urban Walking and Bicycle Transport System*. Phase 1 demonstration zone includes four roads (Yuxing Road, Wenhudong Road, Wenhuxi Road and Heihuquanxi Road). With the primary objectives of separating motor vehicles and non-motors and separating pedestrians and bicycles, the overall concept is to assign and guarantee more road right to pedestrians and bicycles. Some of the concrete measures taken are listed below:

- Clear signs and marks for sidewalks and bicycles at the intersections;
- Car stop stones or bars at the non-motorized section;
- Colorful pitch bicycle lanes and granite sidewalks together with green hedge isolation in between;
- Independent and coherent sidewalks (including sidewalks for the blind) system, especially at the intersections and various exits alongside to ensure the integrity of walking system;
- Independent and coherent bicycle lines, especially at the bus stations (bicycles bypassing the stations) and a rigid isolation with fast track;
- Special signal, traffic safety island or sloping across the streets for pedestrians and bicycles crossing a road;
- Reduced turning radius at intersections to slow down the motor vehicles and thus enhance the safety for pedestrians and bicycles;
- Cultural sceneries and public facilities (like benches, etc.) together with orderly stands alongside to improve the landscape and to provide convenience service;



Signs & marks



Car stop stones



Separation



Bicycle bypass



Special signal & slope



Cultural scenarios



Landscape



Sidewalk benches

As a medium sized city in the east part of China, Jinan case shows how a project of this kind can succeed with the financial support and guidelines from the central government. Jinan provides a model for other cities to learn.

China, the old "bicycle kingdom", is increasingly motorized and urbanized. With the fast growing motor vehicle population, transport infrastructures have been ever since updated to meet demands like more space, more scientific and sensible design, and more suitable regulations accordingly, etc.. On the one hand, the air pollution and traffic congestion generated by tailpipe emissions and crowded traffic enhance people's due concerns and make green transport like non-motorized transport a more an advisable option. On the other hand, too many bicycles or irrational designs like non separation between motor vehicles and non motors or non separation at the intersections is one of the very reason that slow down motor vehicles and cause traffic congestion and accidents.

Research shows that the motor vehicle and non motors mixture slow down the motor vehicles' speed to an average of 20 km/h within the urban area in China, at which point generate the most incomplete combustion and thus most emission. At speed of 40-50 km/h, motor vehicle emissions are significantly reduced.

Many cities now initiate projects promoting non-motorized transport and transport mode separation. Parallel measures like public bicycle rental, pedestrian zones and green way are also important elements. Demonstration projects make a good start for promoting non-motorized transport. Independent and coherent systems of sidewalks and bicycles will eventually needed in all urban areas.

For more information on Jinan's slow traffic system, please refer to:

<http://www.chinautc.com/manxingjiaotong/newsclass.asp?classid=8&pclassid=4>

For more information on projects in other five selected cities under the Projects, please refer to:

<http://www.chinautc.com/manxingjiaotong/index.asp>

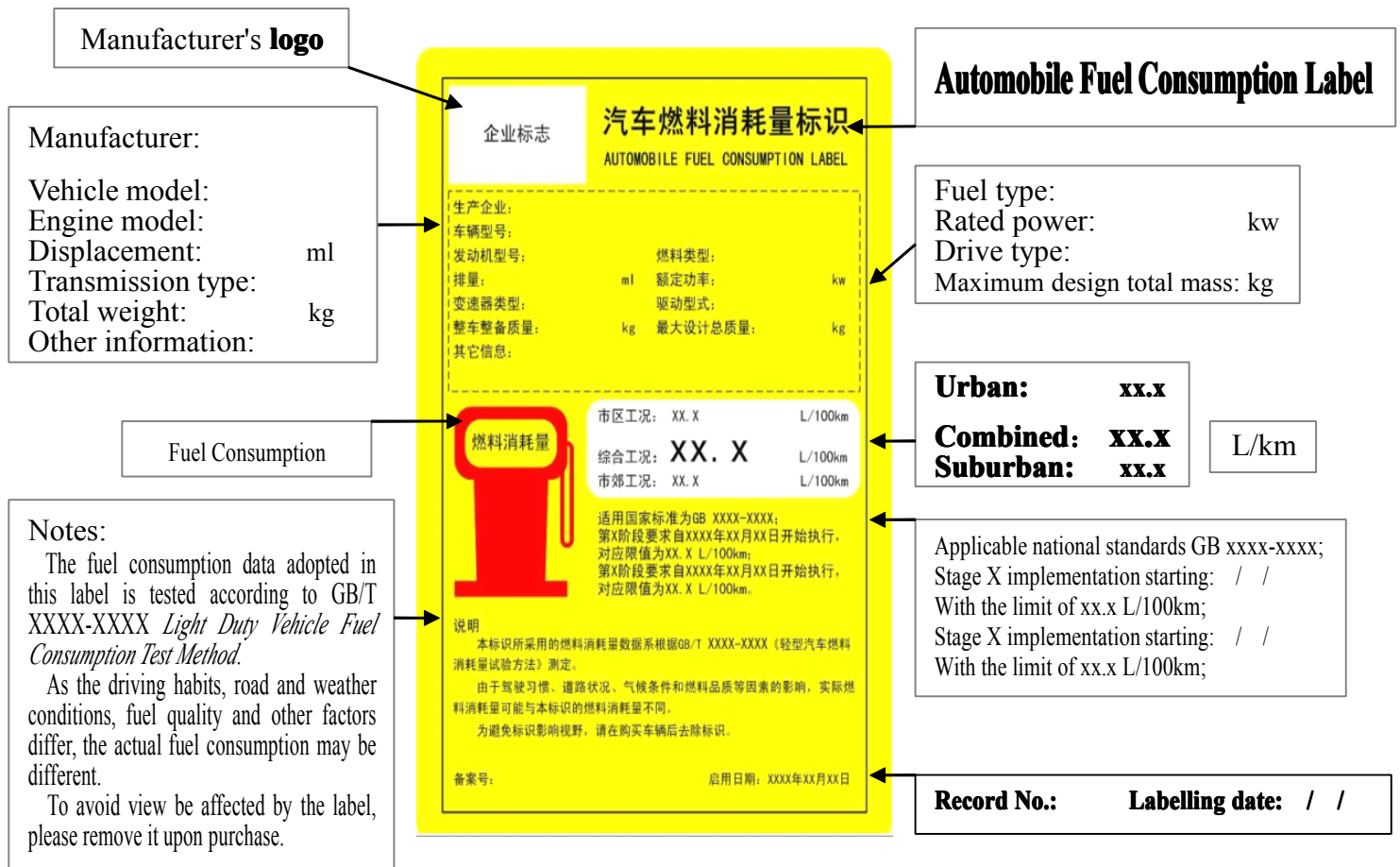
For more examples, discussions and explorations into the subject of waling and bicycle transport system, please refer to: <http://www.chinautc.com/zhuanti/news.asp?classid=22>

China Establishes Motor Vehicle Fuel Efficiency Standards and Labelling

China became the world largest auto producer and market in 2009. Fuel consumption (mainly petroleum consumption) and energy supply stability have become a growing concern of the national government, auto industry and individual consumers. Fuel consumption labelling is one of the essential elements in motor vehicle regulation.

On July 1st, 2008, National Development and Reform Commission (NDRC) announced the implementation of *Automobile Fuel Consumption Label* (referred to as the Label below). The Label was designed by the China Automotive Technology & Research Center. All automobiles sold on Chinese market must bear the fuel consumption label as shown below. Tested under the unified standards by NDRC authorized institutions, the label specifies automobiles' fuel consumptions for every 100 km in urban area, suburban area and a combined situation, which aims to provide the consumer with more objective and comprehensive fuel consumption information. In the start up phase, the use of the Label was not yet compulsory.

On January 1st, 2010, the Ministry of Industry and Information Technology (MIIT) adopted the *Fuel Consumption labelling Administrative Rule for Light Duty Vehicles* (referred to as the Rule below) by . Light duty vehicles are passenger cars and light commercial vehicles (gasoline or diesel), with a maximum total weight not exceeding 3.5 tonnes. The Rule defines the testing protocol and reporting procedures, and complete implementation of automobile fuel consumption labelling system. It obliges all domestic automobile manufacturers and import car dealers to abide by the standard procedure.



Disclaimer: The English translation is based on the original content in Chinese.

The rapid expansion of the auto market in China requires urgent measure to manage the growth in motor fuel consumption. Some of the main steps taken since 2003 are listed below:

2003	<i>Fuel Consumption Test Method for Light Duty Vehicle</i> : unifying the test method;
2004	<i>Fuel Consumption Limit Standards for Passenger Cars</i> :
2005	Establishment of fuel consumption goals for motor vehicles (grouped by weight);
2007	NDRC published fuel consumption of 409 vehicles produced by 34 manufacturers;
2007	<i>Fuel Consumption Limit Standards for Light Commercial Vehicles</i> introduced;
2008	Improvement in the regulation of fuel efficiency standards for vehicles;
2008	<i>Automobile Fuel Consumption Label</i> : unifying labelling standards;
2010	<i>Fuel Consumption labelling Administrative Rule for Light Duty Vehicles</i> : specifying testing, reporting, filing, labelling, release, supervision and punishment.

Notes: within each cell in the left column, 1st line: release time; 2nd line: implementation time.

The implementation of the labelling regulation is a part of the establishment and improvement of fuel efficiency standards in China. It is also an essential component for the long-term management of automobile energy efficiency.

The mandatory labelling, the setting up of unified standards and test methods, the designation of testing institutions, and the provision of fuel consumption information of domestic and imported cars to the public will result in better informed consumers who may purchase better or more fuel efficient cars. Domestic automobile manufacturers are encouraged to invest in and develop fuel efficiency technology, and car dealers specializing in import cars are urged to introduce more fuel efficient cars into domestic market.

The fuel consumption of motor vehicles varies with the driving conditions. It is thereafter important that test drive cycles correctly reflect actual driving conditions. It is also important that test results are independently verified. Regular monitoring should ensure transparency of procedure and fairness to all stakeholders.

For detailed content of the Label, please refer to:

<http://baike.baidu.com/view/2797637.htm>

For more comment on the implementation of the Label please refer to:

<http://auto.sina.com.cn/news/2008-02-08/0851346899.shtml>

<http://auto.people.com.cn/GB/1051/7476344.html>

For more information on the Rule, please refer to:

<http://finance.sina.com.cn/roll/20090812/08193006041.shtml>

<http://www.pyesc.com/news/csxw/134.html>

Innovation Center for Energy and Transportation (iCET) published China's first Green Car Guide which offers a Ranking of motor vehicles by various criteria. For more information and its other Green Car programs, please refer to:

<http://www.icet.org.cn/english/newss.asp?CataID=A0015&id=560>

Improving Barrier-free Transport Systems in China

Beijing's initiative in enabling barrier-free mobility



The disabled and the senior citizens, as well as other disadvantaged groups, are all important social groups. By the end of 2006, there were already 83 million disabled people (6.3 per cent of the total population) and 104 million senior citizens (7.9 per cent of the total population) in China. Along with the rapid urbanization and economic development, China urgently needs to improve its barrier-free facilities to enhance the mobility for these social groups.

Beijing Municipality issued the *Regulations on Municipal Barrier-free Facility Construction* (referred to as the Regulation below) in May of 2000. It regulates that all construction, including public and residential buildings, roads, bridges, pedestrian overpasses and underpasses, metro and rail stations, tourist sites and other construction projects should involve barrier-free design and actual implementation to enable the safe and convenient mobility of the disabled, senior, injured, children and other disadvantaged groups. It also specifies the maintaining, monitoring and penalties for obstruction of the barrier-free mobility.

To prepare itself for hosting the 29th Olympic Games (8-24 August 2008) and the 13th Paralympic Games (6-17 September 2008), Beijing Municipality took a series of measures to enhance its barrier-free facilities. Barrier-free transport is a main sector in these efforts. Meanwhile, to provide more systematic and detailed information on available barrier-free facilities, the Organizing Committee for the Olympic Games compiled a *Guide to Barrier-free Services* in four languages: Chinese, English, and Braille in Chinese and English, 450,000 copies were made available to the public and spectators free of charge. Some of the main actions include:

- At the capital airport, dedicated barrier-free entry channels, straight ladders and low counters. More than 400 barrier-free facilities were set up;
- More than 2,835 barrier-free buses and 600 dedicated buses with a capacity of 6 wheelchairs were put in operation, and 16 dedicated bus lines were opened. Buses have special seats for wheelchairs with seat belts and fixed wheel holders to fasten the wheels, and automatic retractable bridges to connect the ground and bus;
- 318 barrier-free bus stations with sidewalks for the blind, ramps, wheelchair waiting positions, ground signs were built accordingly;
- Around 70 barrier-free taxis can be telephone booked to provide door-to-door services. Three types of taxis were used with regular charge: 30 TX4s with a ramp tailgate at the rear cabinet for wheelchairs and no co-pilot seat but space for luggage, 30 modified Santana 3000s with rotating and retractable co-pilot seat, and 10 Transits with electric wheelchair life equipment at the back gate.
- Besides sidewalks for the blind, totally 143 metro station entrances/exits of the 8 metro lines in operation were equipped with 140 elevators and 120 lifting platforms to ease mobility of the wheelchair passengers
- Barrier-free transformations were also made at several main tourist attractions like The Great Wall, Forbidden City, Summer Palace, etc., without damaging heritage preservation.



Barrier-free channel at Capital Airport



Barrier-free bus



TX4 barrier-free taxi



Braille on the handrail

In August 2010, China's first barrier-free transit hub - Dongwuyuan Transit Hub was completed. China's first barrier-free bus line-Line 10 (connecting Nancaiyuan and Beijing Railway Station) was opened. With 3,600 barrier-free buses already in operation, Beijing has the most barrier-free buses in China.

- 10 barrier-free bus lines among the 16 dedicated bus lines that have bigger passenger volume and better meet the travel needs of disabled people were kept post Olympics;
- Barrier-free construction or reconstruction were completed in the 70 old metro stations (Line 1, Line 2, Line 13 and Batong Line) and all new metro stations (Line 5, Line 10 and other three new metro lines); Two barrier-free elevators should be present within the metro stations within the 4th Ring Road, and at least one outside the 4th Ring Road; Two barrier-free parking would be set at entrance/exit of all the new metro lines;
- Meanwhile, a series of service specifications were formulated by the Municipal Transport Commission: *Service Standards for Wheelchair Passengers*, *Service Standards for Physically Disabled Passengers without Wheelchair*, *Service Standards for Visually Handicapped Passengers*, *Service Standards for Deaf-dumb Passengers*;
- 10 inter-provincial bus terminals were transformed into barrier-free terminals, with dedicated barrier-free channels and signs, sidewalks for the blind, ramps, and low information desks, low telephones, barrier-free parking and toilets;
- At the "Barrier-free Day", Transport Experience Card were distributed among several barrier-free supervisors or supervisors who are themselves disabled people to take buses, metro, barrier-free taxis to spot and report inadequate barrier-free facilities to concerned authorities; Likewise, every such "Barrier-free Day" would see a theme activity to promote the barrier-free conception and facilities;

Recently, at the symposium for the one-year implementation of *Barrier-free Design Procedure of Urban Rail Transit Facilities*, several standards regulators, designers, constructors and operators of Beijing transport system raised remaining issues and identifier persistent problems like the non coherent connection between barrier-free facilities of the station areas and road system, and among the facilities within the stations, non standardized locations of the barrier-free cabinet, non clear barrier-free signs, and low standards for elevators and barrier-free toilets within the stations. Further revisions would be made accordingly to achieve the principles of safety, feasibility and accessibility and better regulate the construction and reconstruction in the future.

As a mega city, Beijing is initiative in applying barrier-free facilities through its transport system and other construction/reconstruction projects. It is also a paradigm of upgrading the barrier-free facilities via hosting international or large public events. Similar cases like Shanghai for the 2010 EXPO, Shenzhen for 2011 Universiade and other cities all take effective measures to better its barrier-free facilities in recent years.

However, much still remain to be done to improve the barrier-free facilities in many of the other cities China to better meet the mobility needs of the disabled, the senior and other disadvantaged groups and to enable them participate in and contribute to the society equally.

For further possible improvements, please refer to:

<http://www.cupta.net.cn/Details.aspx?ID=11262>

Click here to download the English version of *Guide to Barrier-free Services*:

here:<http://en.beijing2008.cn/spectators/n214496503.shtml>

For more information on the development of barrier-free facilities after Beijing Olympics, please refer to:

<http://www.cupta.net.cn/>

Electric Bicycles and Scooters Are Becoming Increasingly Popular

New opportunities of mobility in small and midsize cities

Electric bicycles and scooters have become very popular in recent years, especially in small and midsize cities in China. Chinese people have long been in love with bicycles. From the 1960s to 1980s, people were riding traditional bicycles. During the 1990s people fancied motorbikes. Since the year 2000, when the world is entering the so-called “post-petroleum era”, which calls for a resource-saving and environment-friendly lifestyle and “green” urban transport mobility, people started to choose electric bicycles and scooters for going to school, to work, shopping or even traveling. It is projected by analysts that electric bicycles and scooters will become one of the most important transportation options. There is a vast market potential for future electric mobility development in China.

Statistics from China Market Intelligence Center show that China is the world's largest producer and consumer of electric bicycles, contributing over 90 per cent to the global output and consumption respectively. In 2010 alone, China produced 29.54 million electric bicycles, 33 per cent increase from the previous year.

Currently, there are over 1,000 electric bicycle and scooter manufacturers in China. About 300 of them are large-scaled producers. By region, Tianjin, Jiangsu, Zhejiang, Shandong and Shanghai are the major producers of electric bicycles. In 2010, Tianjin City produced 13.43 million electric bicycles, ranking first in China. Based on the advantages in bicycles, more than 90 per cent of the electric bicycle companies in Tianjin evolved from traditional bicycle makers, including well-known enterprises like Tianjin Jianwei, Taifeng Tianjin Birdie and Tianjin Battle. Tianjin Jianwei is a famous manufacturer of simple electric bicycles, with an annual production capacity of 1 million.

The electric bicycle companies in Jiangsu mainly produce luxury electric bicycles, including Jiangsu Xinri, Jiangsu Yadea and Changzhou Supaq. Jiangsu Xinri is one of the largest manufacturers of electric bicycles in China, with the annual capacity of 5 million electric bicycles; it has ranked first in the output of electric bicycles in the world for consecutive 6 years.

In Zhejiang, well-known electric bicycle brands include Luyuan, Lanbei and Xinyue. Luyuan Group has 5 major manufacturing bases. It introduced lithium battery powered bikes in 2010 and launched its own lithium batteries in 2011. Shandong Incalcu, Aucma (Yinan) and Shandong Bidewen are other major electric vehicle manufacturers in Shandong. Shandong Incalcu has an annual production capacity of 3 million electric bicycles.



Electric Bicycle



Electric Scooter



Foldable E-Bike



Foldable E-Scooter

浙江野德电动车业有限公司

www.hc360.com



Foldable and portable e-bikes for healthy and comfortable family mobility

There are varieties of designs for both electric bicycles and electric scooters available in the market. The diameter of the wheel varies from 510 mm to 560 mm, 610 mm and 660 mm. In terms of gear transmission there are 4 types: shaft drive transmission, mid-entry chain transmission, side-entry gearing and friction transmission. In terms of operation mode there are two types: hand-controlled electric bicycles and foot-controlled ones. Foot-controlled electric bicycles are also called intelligent electric bicycles, because the rider doesn't need to use hand to control the power.

The boom of demand for electric bicycles and electric scooters triggered the construction of additional battery plants. New plants now strive to compete for the market by technical innovation with a vision of greening urban transport. Currently there are three kinds of batteries in the market: lead battery, nickel hydride battery, and lithium battery. As the lead battery is recyclable, it is gaining popularity among electric bicycle/scooter manufacturers and riders. Popular battery brands are Tianneng (Changxin, Zhejiang), Chaowei (Changxin, Zhejiang), Haibao (Shanghai), Sail (Baoding, Hebei), to name only a few.

Essential facts that support the prevalence of electric bicycles/scooters include the following:

- Transport authorities regulate that electric bicycles/scooters, though powered by batteries and run much faster than traditional bicycles, still belong to the same category as regular bicycles. People buy an e-bike is as easy as a normal bike.
- Since 1997, over 70 cities of 23 provinces have formulated rules and regulations to ban motorbikes and motor scooters. Eventually all cities may revoke the license of motorbikes.
- Big cities have light rail or bus transit system. However, public transport systems are much less developed in small and midsize cities for their mobility need. Commuters and shoppers need to largely depend on the bicycles and scooters.
- The introduction of electric bicycles and scooters has greatly improved the mobility of low income communities and people in need of them.
- China is running short of petroleum resources and the oil price has been rising steadily. More and more people are forsaking fuel-powered vehicles. Some now choose to ride electric bicycles instead.
- Materials of electric bicycles/scooters are been improved all the time and new designs are boosting, and both the bicycles and batteries are to be reused or recycled.
- Prices of electric bicycles and scooters are gradually falling and becoming more affordable for ordinary workers and low income communities.

For more information on electric bicycles and scooters please visit the baidu.com thesaurus: <http://wenku.baidu.com/view/d0310cd249649b6648d747b3.html>

Picture Credits: <http://image.baidu.com>

Guilin, an International Tourist City

Combining short-term measures, mid-term objectives and long-term strategy to achieve sustainable transport networks

Guilin is a famous tourist city with a long cultural history, one of the four major Chinese tourist cities recognized by the World Tourism Organization. It is located in the northeast of Guangxi Zhuang Autonomous Region, with a population of 590,000, and land coverage of 565 square kilometers.

The Guilin area belongs to the Karst formation. The limestone weathered and eroded over millions of years has formed forests of peaks of fantastic shapes, as well as labyrinths of dissolved caves. The special geomorphology, together with the fascinating Lijiang River and charming pastoral scenery forms a unique, picturesque landscape. It is reputed as “the four matchless”: green hills, crystal waters, fantastic caves and marvelously shaped rocks. The picturesque landscape of Guilin has attracted many visitors and poets and wrote lengthy pieces and articles. The most famous places of interest are the Prince City of Ming Dynasty, Sea of Osmanthus Trees with Forest of Steles, Solitary Beauty Peak, Elephant Trunk Hill, Seven Star Crag, Reed Flute Cave and the Banyan Lake. The Lijiang River and the hills flanking both sides from Guilin to Yangshuo are particularly scenic and popular among tourists.

In recent years Guilin City has started a new initiative of tourism development. Comprehensive management and environmental engineering has contributed to the development of a modern international tourist city. Guilin City invited many renowned experts to contribute to the planning process, which combines short-term measures, mid-term objectives and long-term strategy to achieve a sustainable transport network. Guilin takes protecting the natural ecological environment as a lifeline for tourism and economic development. For three consecutive years Guilin has been ranked first among 50 major tourist cities nationwide in this regard.

The public transportation in Guilin is well developed. Intercity buses and taxis are available for local transportation. Various trains and airlines connect the city to many other major cities. The Liangjiang International Airport is 28 km from Guilin City and can handle five million passengers a year on 48 air routes. It also services five international air routes to Hong Kong, Macau, Japan, Thailand, and Republic of Korea. There are also many domestic cities with direct flights to Guilin. Guilin has two railway stations and is the largest rail hub in Southern China. There are eight special tourism buses servicing 110 local routes free of charge. These buses are the best way to access the natural parks and sites around Guilin. Both foreigners and locals can use this service. Buses also link Guilin to surrounding cities like Yangshuo, Quanzhou, Lipu, and Longsheng. The most popular and spectacular way to get from Guilin to Yangshuo is cruising on the Lijiang River.

Guilin has three transport networks in operation: the normal route network, peak hour route network, and overnight route network. Most of the roads have mixed functions: bike, e-bike, bus, cars and tricycles, but public transport is given priority.

To answer the call of “greening” urban transport, the Guilin Transport Authorities took the following measures as part of an energy-saving and emission-reduction campaign:

- Establish an effective system for assessment and measurement of fuel consumption;
- Promote the use of methanol tourist ferry boats on the Lijiang River;
- Practice a “One Route, One Company” system for road transport;
- Encourage transport enterprises to modernize their vehicles and boats.



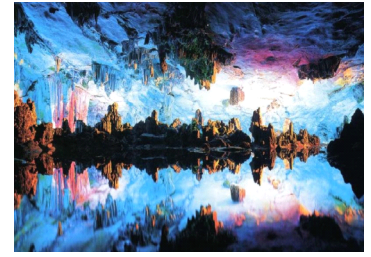
Guilin Landscape



Guilin Waterscape



Cruising on Lijiang River



Karst Caves

In 2010, the city's transport energy consumption for goods transportation dropped by 8 per cent compared with 2005. Transport energy consumption for passengers transportation dropped by 6.3 per cent over the same period.

In 2011, Guilin City reinforced additional measures for energy saving and emission reduction:

1. Disseminate scientific research results to promote recycling of transport waste and scrap, and encourage companies and individuals to use recyclable materials, techniques;
2. Strict control and enhancement of retrofitting vehicles and boats and promote dual fuel taxis, hybrid ships, electric buses, multispindle heavy trucks and dumping trailers.
3. Implement regulations issued by the State Ministry of Transport and raise passenger ship load rate to full capacity.
4. Encourage Drive Training using advanced facilities that are in accord with energy conservation and emission reduction.

From time to time, the city authority launches campaigns to encourage green transport and lifestyles. For instance on September 22, to observe the World Car Free Day, city authorities propagate the theme "Green Transport, Low-Carbon Lifestyle", and motivate more residents to buy electric cars and electric bikes. The Cycling Club of the city holds "Around the City" Races as sports event, as well as to raise public awareness of low-carbon traveling options.

For the mid-term development objectives, in accordance with the National 12th Five-Year Programme (2011-2015), Guilin will:

- Build a second airport to be a more efficient international tourist transport hub
- Build more railways to link more lines to cities such as Nanning-Liuzhou, Baise-Guilin-Gangzhou, Zhangjiajie-Guilin-Yulin, as well as Guilin-Hengyang (Hunan) and Guilin-Guangzhou(Guangdong)
- For bus lines, Xing'an-Guilin, Yangshuo-Luzhai-Guilin-Sanjiang(three rivers), and the Guanyang-Quanzhou-Lipu-Yulin Expressway Networks, and then further build a county-city one-hour economic circle and regional intercity two-hour economic circle.
- Strengthen inter-township highway building and form an urban-rural integration network.
- Build Lijiang River-Guijiang River waterways, and join the economic belts of Jiangxi Province.

For more information on Guilin green transport, please visit:

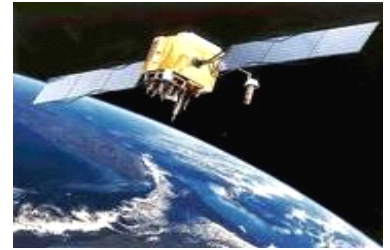
A brief introduction to Guilin: <http://www.doyouhike.net/huangye/p/5451.html>

Measures of energy-saving and emission reduction: <http://news.hexun.com/2011-03-22/128119142.html>

Car Free Day <http://www.chinanews.com/sh/2010/09-22/2550490.shtml>

Picture Credits: <http://image.baidu.com>

GPS Use in Public Transport in China



Multiple options for enhancing transport efficiency

Global Positioning System (GPS), which provides location and time information in all weather, provides many options and has greatly improved the operation of public transport. GPS application in public transport can improve vehicles' running efficiency, regulate the operation, ensure the traffic safety and enforce vehicle management and monitoring. Useful GPS applications are now widely applied in public buses (including BRT), metro system, taxis and long distance buses.

GPS vehicle monitoring and control mechanism

The positioning of vehicles is enabled through GPS vehicle monitoring system, which consists of moving units (MU) and central control units (CCU, including monitoring center). MUs are installed on board of vehicles to calculate the real time position information based on signals received from GPS satellites. Under the control of CCU, combined information of location, speed and time, together with the vehicle identity information is transmitted to the monitoring center through wireless networks. The CCU is responsible for controlling the operation of the entire wireless communication network, receiving information from MU and dispatching information to the monitoring platform, which is a platform of electronic map-based main database. The sum of all information can then be displayed on E-maps, based on which the system administrator can check the vehicle status and the traffic volume and dispatch vehicles accordingly.

GPS functions in public transport

By providing real time information, GPS serves public transport in many aspects. With location, status, speed, time and identity information available, the dispatch center can manage the entire traffic. It can redirect traffic to achieve an optimal dynamic deployment of vehicles, adjust vehicle frequency and report traffic congestion in real time to alleviate traffic jams and inform passengers in due time.

GPS also enables a data-based vehicle management, including automatical operating plans, the allocation of vehicles and drivers for every route, and providing information of vehicle operating conditions, tourist attractions, weather reports through information display installed on vehicles for passengers.

GPS application in buses/bus rapid transit and metro system

On buses and metro systems, GPS can provide information on the operating status like the speed, time, stop information, first and final line. At the bus/metro stops, GPS can inform passengers of waiting times left for the next service and schedule changes.

GPS applications for taxis

GPS provides multiple applications for taxis, including the following:

- Positioning and dispatching: based on real time information of vehicle locations, dispatches can be made more effectively to reduce empty driving and enhance the utilization of vehicle and road resources;
- Alarms and reminders: Alarms can be sent automatically in situations like border crossing, speeding, vehicle theft or accidents;



GPS monitor center



GPS devices for bus



Metro station LED display for next train info.



MU at taxis

- Communication equipment and short message and image transmission services connect the driver with the monitoring center to take dispatch orders or inquire necessary information. It can also connect the driver with other drivers or friends.
- Data management enables the storage, editing and inquiry of vehicle or driver information;
- Memorizing the driving information in history like mileage and working length;
- IC memory cards can also record and collect comprehensive vehicle information concerned;

Taxi booking services are now available at many cities. Senior or disabled passengers, or passengers who are in places where public transport is not easily available or passengers who are in special situation or have special needs could call taxi booking servers to pre order taxis for small additional fees.

Recently, Wuhan city in Hubei Province initiated a GPS-based online taxi booking service. Passengers can access the GPS Information Managing Platform via Internet connection. The information platform would display the passenger's location and taxis nearby (dynamic point on the E-map). Passengers can click one of these "moving points" and call the taxi driver to book a service.

GPS application in taxis is still costly in terms of application fees and booking service fees. Taxi drivers might need to pay monthly for using GPS or pay for every booking service. Also, many taxi drivers think that though GPS could restore and send alarms or information under special circumstances like criminal behaviour, the system might not be able to respond quickly enough to prevent crimes. All these concerns have still limited the application of GPS in taxis.

Some taxi drivers have also expanded concerns on online booking services. They may find themselves directed to unfamiliar or unsafe locations. Some drivers reported that the passenger, who had booked the service, have already left. Some passengers also complain about the extra charge for the booking service.

Hence, more research and adjustment is still needed to improve GPS service management in terms of the pricing of GPS applications and services, providing quality services, cooperation with local police and other institutes to better serve taxis in special situations. More promotions are needed to widen the use of GPS in taxis.

GPS application in long distance buses

Quality of service in long distance bus transport is still a major public concern. There is a growing need for reliable, safe, punctual and affordable services. Sometimes to increase the profit, operators/drivers don't follow the planned operating line or timetables. Sometimes they change stops at will, extend waiting time at some stops while omit others, drive at excessive speed on some roads while slowly at others, resulting in traffic disorder and safety risks. The GPS application enables the monitoring of the whole process. Many long distance bus companies have significantly improved their services since GPS system were installed on buses.

For more information on GPS vehicle monitoring and control mechanism, please refer to:

http://www.tranbbs.com/Techarticle/gps/Techarticle_24756.shtml

For more information on GPS application on buses, please refer to:

<http://www.gpsbao.com/datum/23356.html>

For more discussion on GPS application in taxis, please refer to:

http://www.tranbbs.com/Techarticle/gps/Techarticle_24755.shtml

Shenzhen City Pilot Projects on Electric Taxi and Bus Fleets

Modernizing public transport in Southern China

In April 2010, the Pengcheng Electric Taxi Co., Ltd was founded by Shenzhen Bus Group (holding 60 per cent stake) and BYD Co., Ltd (40 per cent). The joint venture company initially put 100 battery-powered electric taxi cabs in operation and formed a taxi fleet, supported by 10 charging stations at various locations. BYD takes the part of manufacturing the electric taxis while Shenzhen Bus Group is responsible for managing the taxi company.

The Shenzhen Bus Group also tested hybrid buses for public transport. In April 2009, it started a trial with 27 hybrid buses. The trial was an immediate success. Hence, the company continued to expand the service network. In August 2011, as the city was hosting the 26th World Universiade, the number of electric taxis was increased to 300 (including 200 innovative E6 pure electric taxis). Shenzhen Bus Group started to operate 101 pure electric buses together with the about 1,000 hybrid buses formerly in use, to better serve the increasing number of passengers.

Advantages of the electric vehicles:

- It is estimated that the 100 electric taxis have decreased CO₂ emissions by approx 3,600 tons per annum (or 42 per cent lower energy consumption);
- The cost of EV operation is about 1/3 of that of the gasoline-powered vehicles, and EVs save taxi passengers 2 *yuan* additional fee (fuel supplemental fee). In the not-too-distant-future, the fare is expected to be lower than that of the fuel vehicles.
- As EVs generate no tailpipe emissions and very little noise, it is more comfortable and healthier for passengers to ride in them.

Features of BYD E6 Pure Electric Cars

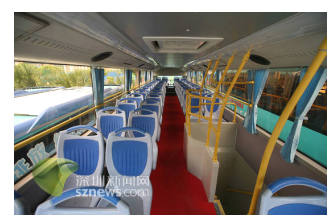
- With specifications of the car body 4560/1822/1630 mm, and axle space 2830 mm, the E6 vehicle is more spacious and provides comfortable seating for four or five passengers.
- It can run 300 km after charging the batteries, which is a world record of longest league for pure EVs.
- The battery can be charged about 80 per cent in 15 minutes, thus saves the charging time at daytime, which also sets the record for fast-speed charging. (Normally the drivers may charge their cars at night at the parking lot, especially within favorable-price hours. For normal charging it takes about 1 or 2 hours.)
- The iron battery has strong output power reserves which can prompt the speed of over 140 km/h within 10 seconds.
- EV energy efficiency: 90 per cent
- Materials used in EVs and EV batteries are 100 per cent recyclable.
- The iron batteries built-in the car body passed the test of high-temperature, high pressure and hitting, batteries and car body intermingled together, ensuring safety of batteries and the whole car.

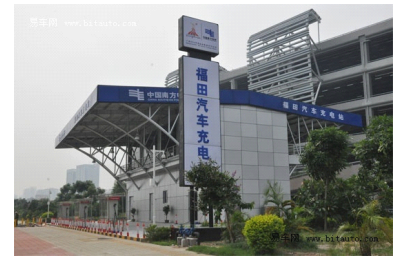


E6 Electric Taxi



Electric Bus





Charging Stations/Posts in Various Locations of Shenzhen City

Management and trend:

At present, electric taxi/bus drivers are under contract with the public bus transport management system. They get paid a fixed salary and do not need to pay a monthly rental charge. It is planned to introduce a market mechanism in 2 years time when prices of EVs and maintenance cost drop to acceptable range. In another development BYD is also designing and manufacturing EVs with exchangeable batteries, which in the future will save the time for charging at daytime.

Advantages of Public Transport Management System in Promoting New Energy Vehicles

1. Electric vehicles are relatively intensive in a group, easy to be managed and promoted in large scale.
2. Charging stations/posts are easy to be handled in a network, saving spaces of urban land use.
3. Matured operation management system easy to collect scientific data and easy to form charging station network within the city.

Exploring Sustainable Development of Electric Vehicles

In the beginning it is important and necessary for government to provide subsidies for promoting electric vehicles. After its incubating stage a commercial operation mode is an imperative. In the process of popularizing EVs, Shenzhen Bus Group pays special attention to building the business model. The company has established a long-term partnership with the professional charging station operator Potevio Co., Ltd. For both companies the cooperation provides a win-win solution.

Shenzhen City is now taking the lead in implementing the programme of “1,000 EVs 10 Cities” launched by the Chinese central government. According to the *Implementation Plan for Energy Conservation and Promotion of New Energy Automobiles in Shenzhen City (2009-2012)*, Shenzhen will innovate mainly in three fields, namely the public transport sector, official cars, private cars. By 2012, a total of 24,000 electric vehicles will be in operation, including 3000 hybrid buses, 1,000 pure electric buses, 2500 taxis, 2500 official cars, and 15,000 private cars. The supporting facilities will be built at the same time, for instance 50 bus charging stations, 2500 official car charging posts, 200 public charging stations, 10,000 charging posts will be consecutively built to form a sound network.

For more information on Shenzhen Bus Group please visit: <http://www.szbus.com.cn/> and contact person: Mr. Michael Kwei, Vice President.

For more information on DYD E6 Pure Electric Cars please visit: http://cn.china.cn/article/d779388,0586d1,d2098_7463.html;

Picture Credits: <http://image.baidu.com>

Developing Railways in Southwest China



Initiative of integrating large scale public transport project into regional development

Coming into full operation on July 1st, 2006, Qinghai-Tibet Railway is now the highest altitude and longest plateau railway in the world. Connecting Xining (the capital city of Qinghai Province) and Lasa (the capital city of Tibet Autonomous Region), it is also the first railway ever connecting the Tibet region to other provinces.

It was constructed through two phases: Phase 1 connects Xining and Ge'ermu and was completed in 1984. Phase 2, continuing the line to Lasa, required an estimated investment of 33 billion RMB (≈5.12 billion US dollars) (National debt: 75 per cent; Railway construction fund 25 per cent) exclusively from the central government, and it's known for tackling several engineering challenges.

Length	<ul style="list-style-type: none">✓ 1,956 km (1,215 miles): Phase 1: 815 km, Phase 2: 1,142 km; bridge and tunnel coverage: 8 per cent;✓ 45 stops with 38 unstaffed and monitored by control center in Xining, 13 planning;✓ 25 hours from Xining to Lasa;✓ More rails connecting Lasa and other parts of Tibet under planning and construction;
Altitude	<ul style="list-style-type: none">✓ ≈960 km with an altitude of more than 4,000 m;✓ The highest railway station: Tanggula Station: ≈5,068m;✓ The highest railway tunnel: Fenghuoshan Tunnel ≈4,905m;
Speed	The maximum of 120 km/h, and 100 km/h on permafrost;
Passenger trains	From Beijing, Chengdu, Chongqing, Guangzhou, Shanghai, Lanzhou;
Capacity	<ul style="list-style-type: none">✓ 8 pairs of passenger trains;✓ Unidirectional cargo density: 500 million ton;
Fuel	Diesel.

Disclaimer: Data from various sources might be a little bit different.

The Project was constructed within the first five years of the 21st centuries involving more than 20,000 workers and over 6,000 pieces of industrial equipments. The projects faced many engineering challenges like low temperature, lack of oxygen, permafrost, earthquake and fragile ecological environment.

- With the average temperature below zero (lowest -40 °C) and 60-65 per cent reduced oxygen pressure, hyperbaric oxygen chambers and 17 oxygen stations were built along the line to prevent the workers from getting altitude sickness and related diseases during construction period. Fully closed carriages provide oxygen equipment for all passengers;
- In order to protect elevated tracks and viaducts with foundations deeply sunk into the ground from seasonal thawing of the permafrost, vertical ammonia pipes, level cement ventilation pipes and sun shades are used to keep the rail bed frozen;
- With Tanggula Mountain being earthquake active region, dozens of automatic earthquake monitors were placed in the area;
- To least affect the wild animals like the Tibetan antelope, when selecting the construction sites, the habitat and activity area were avoided and thirty three channels were design for their migration passage. Turf transplantation was also done near the embankment.



Qinghai-Tibet Railway



Elevated track & migration channel



Lasa station: Lasa-Beijing



Passengers at Xining station

As a large national rail transit project connecting the Tibetan region to other parts of China, it has brought multiple benefits in terms of social and economic development during the construction and post operation. The probable environmental impact is also widely concerned and calls for sustainable solutions.

Economy

With a decreased transportation cost for both passengers and goods to and from Tibet, the immediate economic activities like resource development and flows and tourism now link Tibet to the larger market, generating a growing employment opportunities locally and for Tibet migrant workers. In the long run, new energy development and industry might establish a more prospective future in the region.

Society and culture

With more products available at more affordable prices and more employment opportunities, the living standards are elevated significantly. Meanwhile, more human resources communications would improve the local educational and medical conditions in general. Cultural communications between Tibet and other parts of China and the rest of the world enrich the human legacy as a whole.

Environment

An estimated 1.54 billion RMB (\approx 239 million US dollars) was invested in environment protection during Phase 2 of the project. Migration channels were constructed, and turf transplantation and trash and excrement collection were also arranged. However, increased human activities brought about by the tourism and migration also cause growing environmental concerns in terms of ecosystem damage or air pollution.

The Qinghai-Tibet Railway Project exemplifies how a large scale public transit can be integrated into regional development. Since the operational period is comparatively short, many impacts are still unknown, like in the case of permafrost which might thaw with continuing global warming. Hence more advanced technologies may need to be developed to ensure a sustainable and positive regional development in the long term.

For more detailed information on the general introduction, please refer to:

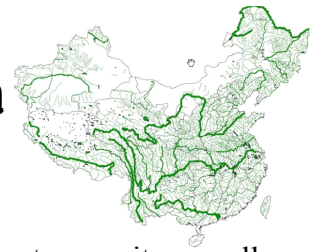
<http://baike.baidu.com/view/2580.htm>

For more official and updated information on the project, please refer to:

<http://www.qh.xinhuanet.com/qztlw/gk.htm>

<http://www.people.com.cn/GB/shizheng/252/5506/index.html>

The Role of Inland Waterways for Sustainable Transport in China



The Initiative of "green" water transport in Zhejiang Province

Inland water transport offers many advantages, including low cost, large transport capacity, small ecological footprint, low energy consumption and pollution, better safety and reliability. Water transport is an important component for an integrated transport system in modern society. The modernization and expansion of the water transport industry is revealing great potentials to support and accelerate a comprehensive and sustainable transport system.

China has many navigable rivers and the water transport industry has been a major player in transporting goods and cargo, especially those of large volume and long distance. In China, more than 95 per cent of crude oil and 99 per cent of iron ore are transported by waterways. The section from Chongqing to Shanghai of Yangtze River provides an example, the advantages of water transport if compared with rail and road transport:

The ratios of container freight fares among Yangtze River, rail and road transport is 1:2:6; In the case of the same transport distance, the trafficability of level 3 or level 4 channels on Yangtze River is 1-1.5 times of that of truck railway, and 4-6 times of that of highway; The ratio of energy consumption every thousand tonne-kilometre among Yangtze River, rail and road transport is 1:2:14; The pollutant emission per unit of Yangtze River is 1/1.2 of that of rail, and 1/15 of that of road.

However, the capacity of domestic water transport is still comparatively low. An integrated system including laws and regulations, industry standards, and incentives are needed. Water transport services are still lagging behind with the increasing demand raised from many rapidly developing riverside regions and economic zones. In recent years, the development of coastal areas has been more emphasized with large financial support given to transport construction and upgrading. Along with the overall policy of industrial restructuring and sustainable development, inland water transport, with its multiple advantages, is becoming another priority for logistics management.

In May of 2007, the State Council approved *The Plan of National Waterways and Ports Development* prepared by the National Development and Reform Commission (NDRC) and the Ministry of Communications. The Plan foresees a network including two artery routes of Yangtze River and Xijiang River, Jing-Hang Canal, Yangtze River Delta quality capacity channel network and the Pearl River Delta quality capacity channel network, 18 additional quality capacity artery channels and 28 major inland ports.

An estimated 20 trillion RMB will be invested to inland water transport. Greater use of water transport will help energy saving and emissions reduction. During China's Twelfth Five-year Plan (2011-2015). The *Law on Waterways* and the *Law on Shipping* and standards for inland water transport are planned to be enacted as a matter of priority.

Green water transport in theory:

In July last year, at the Technology Exchange Conference of Co-building Green Water Transport held by Ministry of Communications in Shanghai, an all-around green transportation concept was presented by Mr. Li Kejun, the director of China Classification Society (CCS). In the new concept, "Green" water transport is composed of five elements: "green" ships, "green" transport, "green" mooring, "green" docks, "green" loading/unloading.

The development of an integrated "green" water transport framework comprises 5 elements: national strategic goals, policies and laws/regulations, criteria and standards, demonstration and verification,

promotion and implementation. The systematic framework was illustrated as below:

National strategic goals	Policies Laws Regulations	Criteria & standards (national, industrial, entrepreneurial)	Demonstration & verifications	Promotion & implementation
Energy saving; Emissions reduction;	National laws/regulations; Industrial laws/regulations; Industrial policies; Industrial index;	Technology criteria; Technology standards; Implementation guide;	Demonstrations; Advertisement; Authentication and approval; Testing and examination; Supervision and evaluation;	Ensuring funding; Ensuring technology; Application; Management system; Training and education;

The framework provides a comprehensive guide for the development of "green" water transport. It is compatible with the five tasks set out in the Twelfth Five-year Plan. Forty specific projects are also specified in the Plan, which calls for joint actions among all parties concerned.

Green water transport and eco waterways in Zhejiang Province

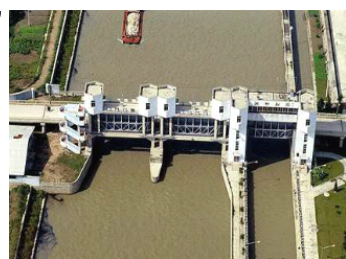
Zhejiang Province has a large waterway network, many quality capacity channels and important ports for inland water transport. Large volume goods like coal and raw materials for manufacturers and producers can cost-effectively and sustainably transported by ship. In 2009, it achieved cruising range of 9,704 km ranked as the fifty nation wide and the cargo throughput of 323 million ranked as the 2nd nationwide.

Major efforts have been in order to better make use of the water transport and achieve sustainability. With upgrading the channels and macroweight of 500-1000 tonne standard shipping, transport capacity has been increased. By involving engineering, biology, horticulture and innovative managing concepts, waterways became multi functional in serving flood control, drainage, irrigation and even tourism.

"Green walls" were planted along the waterways to improve the ecology and to prevent soil erosion. The Huzhou section of the Hu-Jia-Shen Line is the first thousand tonnage level waterway to become a national demonstration project of Eco Green Wall.



Zhejiang waterways



A bridge across the river



Green waterways



Green walls in Huzhou

The development of green water transport is taking place both at the national level and at local levels. However, the establishment of an all around green water transport system requires further greening measures in multiple aspects as mentioned earlier. Green water transport should also have a coherent connection with other transport modes like rail, road and air transport and be integrated into local eco planning in order to function sustainably for the long term future.

For more information on green water transport development in the Twelfth Five-year Plan, please refer to: http://www.moc.gov.cn/zhuzhan/jiaotongxinwen/xinwenredian/201101xinwen/201101/t20110116_897135.html

To read more about Mr. Li Kejun's talk entitled *New Conceptions of Goal-oriented Green water transport*, click here: <http://wenku.baidu.com/view/0097990eba1aa8114431d940.html>

For more information on Zhejiang's green water transport, please refer to: <http://www.anhuinews.com/zhuyeguanli/system/2010/11/19/003478338.shtml>

China Enforces Law to Safeguard Road Safety

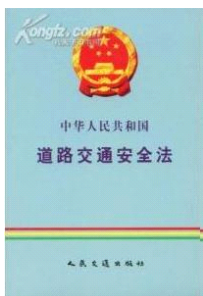
Initial success in reduction of accidents and casualties

Since the turn of the century road transport in China has grown tremendously. Currently the total length of road network open to traffic is 4,095,000 km, including 3,828,000 km of highway and 267,000 km of urban road. From 2003 to 2010, the average annual growth of the road network was 18.6 per cent. The current length is about 45 times more than 50 years ago. At the same time, the number of vehicles is on a constant increase. By February 2011, the inventory of motor vehicles was 211 million, with 20 cities having more than 1 million.

Before 2003, road safety was managed by rules and regulations issued by the Central Government and implementation procedures of the rules and regulations formulated by provincial or municipal governments.

On October 28, 2003, China's first-ever law on road safety was passed by the National People's Congress (NPC). It took effect on May 1, 2004. It was intended to address an alarmingly high traffic fatality rate, which is four or five times greater than in other countries.

- When accidents occur between pedestrians or non-motorized vehicles and motor vehicles, except for the case where the pedestrian or the non-motorized vehicle deliberately causes the incident, the motorist must always bear responsibility. Responsibility for the motorist is reduced if the pedestrian or non-motorized side violated traffic laws.
- The law enforces a vehicle insurance system. Insurance on motor vehicles is now compulsory.
- Harsh penalties were put in place for drunk driving and driving by people who did not hold a valid driver's license, or drove a vehicle without license plates.
- Cases where drivers were speeding 50 per cent in excess of the applicable speed limit the penalty is the revocation of the driver's license.
- The pre-existing point system for penalties was integrated into the law. The penalty for hit-and-run accidents is the permanent revocation of driver licenses. Penalties are now higher, from the former RMB 200 up to RMB 2000. Provinces, municipalities and autonomous regions can only enact specific penalties within the given range. Previously, the nationwide maximum penalty was RMB 200, but areas like Beijing and Kunming had enacted laws mandating penalties in the thousands of RMB.



The Road Traffic Safety Law published



Posters of the Law put up in public places



Giving quiz to students

In December 2007, the 10th National People's Congress adopted an amendment to the Road Safety Law, which came into effect on May 1, 2008, changing one controversial article which had caused frictions

between motor vehicle drivers and pedestrians over the past three years. The amendment to the law classified the following: “If automobile drivers make no fault in accidents, they should face no more than 10 per cent of the total compensation”. The amendment was adopted in spite of opposition from many drivers who argued that they should not face compensation liability if they were not to blame in the accidents.

The amendment, based on the principle of “respect to life”, further clarified the responsibility of compensation by vehicle drivers, non-motorized vehicles and pedestrians. It stipulated that “If non-motorized vehicle drivers and pedestrians make no fault in accidents, the automobile drivers should bear the compensation liability.” It read, “automobile drivers should bear less responsibility if evidence shows that non-motorized vehicle drivers or pedestrians are at fault. The automobile driver's compensation liability should be reduced according to the extent of the fault that the non-motorized vehicle drivers or pedestrians have made.”

On April 23, 2011, NPC once more adopted an amendment to the Road Safety Law that stipulates harsher penalties for drunk drivers. According to the amendment, drunk drivers would face revocation of their driver licenses. Now drivers will have to wait five years to recover the licenses. The amendment also permanently revoked the driver license of anyone who caused an accident that is serious enough to constitute a crime while under the influence of alcohol.

The table below shows that traffic accidents in the past ten year are on the decrease, though the inventory of motor vehicles are on the drastic increase:

Year	Traffic Accidents	Death Toll	Persons Injured	Direct Loss in RMB Yuan
2001	754,919	105,930	546,485	3,087,870,000
2002	773,137	109,381	562,074	3,324,380,000
2003	667,507	104,372	494,174	3,369,140,000
2004	567,753	99,217	451,810	2,774,780,000
2005	450,254	98,738	469,911	1,884,010,000
2006	378,781	89,455	431,139	1,489,56 0,000
2007	327,209	81,649	380,442	1,198,790,000
2008	265,204	73,484	304,919	1,009,720,000
2009	238,351	67,759	275,125	914,368,000
2010	390,616	65,225	254,075	930,000,000

To read full text of China’s Law on Road Traffic Safety, please visit:

http://news.xinhuanet.com/legal/2007-11/19/content_7103019.htm

For information on road traffic accidents and fatalities, please visit:

<http://auto.163.com/10/0709/10/6B53JH6B000816HJ.html>

<http://www.xc122.com/show.asp?id=328>

For information on road traffic development:

<http://www.bjjtgl.gov.cn/publish/portal0/tab120/info18049.htm>

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Local Authorities Formulate Procedures to Implement Road Safety Law

The implementation of the *Law of the People's Republic of China on Road Traffic Safety* was enforced by the State Council which issued the *Regulations for the Implementation of the Law of the People's Republic of China on Road Traffic Safety*.

Based on the Law and the Regulations, each province formulated their own implementation procedures. A provincial implementation procedure normally contains the following main points in its general provision:

- ◆ Governments at or above the county level shall observe the responsibility for road safety. Road safety should be an integrate part of comprehensive public security assessment. Remuneration and rewards shall be given to those who make outstanding contributions to the road traffic safety.
- ◆ Township governments and city street offices shall supervise their jurisdictions to observe road safety, conduct road traffic safety education and eliminate potential safety hazards. Community resident committees and village committees shall give assistance in road traffic safety management.
- ◆ Public security organs and traffic management departments of governments at or above the county level shall assume the responsibility for road safety management within the jurisdiction. Other departments of governments at or above the county level, such as transportation, construction, planning, production safety supervision, agriculture (agricultural machinery), and quality and technology supervision shall also assume relevant responsibilities in accordance with their respective duties. The safety management of highways and city expressways shall be assigned by the provincial traffic administrative department to that of the municipal governments.
- ◆ Governmental organizations, army, enterprises, institutions, and social organizations shall do their own part for road safety education, their own vehicles management and observation of road safety responsibility system. Education authorities shall include road traffic safety education in school curricula and schools shall take measures to ensure students' road safety. Newspapers, radio, television and other media shall propagate road safety to the public.

Once in a while, in response to a series of severe traffic accidents that have occurred in a certain period, the Ministry of Transport would hold emergency meetings and ordered local authorities to place a priority on safety and on ensuring that safe means of transport are available to the public. For instance, on July 26, 2011 responding to a series of severe traffic accidents that have occurred in less than a month, a meeting was held to emphasize that overloaded vehicles, which endanger passengers and tend to damage highways and bridges, will be strictly banned to prevent traffic accidents.



School Ahead, Please Slow Down.



Traffic Accident Vulnerable Segment



No Driving When Drinking



Unified Signs for School Buses



Log for School Bus



Signs for School Bus Stop

Those were two serious traffic accidents: On July 22, a fire in a long-distance sleeper bus killed 41 of the 47 passengers onboard. The double-decker, designed to carry 35 passengers, caught fire near the city of Xinyang in Henan province. Earlier in the week, a rigid frame 230-meter bridge in Beijing's Huairou district crumbled when a truck carrying 145 tons of sand drove onto it. The bridge was designed to hold vehicles weighing a maximum of 55 tons. It was the fourth bridge to collapse this month and the second to be brought down by an overloaded vehicle. Ministry of Transport called for the stricter punishments to be imposed not only on drivers of overloaded vehicles but also on shipping companies and the owners of cargo that are involved in such cases.

In another development, the Ministry of Education launched a pilot program to improve the management of the country's school buses. The pilot program was launched in 6 counties in east China's Zhejiang and Shandong provinces and north China's Liaoning, Heilongjiang and Shaanxi provinces. The six pilot regions have good experience in running school bus services, and many local governments have soon adopted the effective measures, by introducing services from bus companies and granting subsidies to schools running bus services. Ministry of Education also urged local governments to establish specific work committees and allocate more funds in purchasing and maintenance of school buses. In July 2010, a national standard for primary school buses came into effect, requiring all school buses to bear "unified signs."

For information on Decree of the State Council Enforcement Regulations for Road Traffic Safety Law, please visit: <http://www.china.com.cn/chinese/2004/May/556360.htm>

For information on road traffic development:
<http://www.bjttgl.gov.cn/publish/portal0/tab120/info18049.htm>

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The 26th Universiade Held in Shenzhen



Sustainable urban transport and long-lasting effects on road safety



The Newly built Universiade Center



Electronic Fireworks at Opening and Closing Ceremonies

The 26th World University Students' Summer Games (Universiade) were successfully held in Shenzhen China on 12~23 August 2011. The motto for Shenzhen Universiade was *Start there, Make a difference*. The city used the event as a catalyst for the creation of a new, environmentally friendly city. The "green" Universiade attracted some 12,000 university athletes, coaches and officials from 152 countries and regions.

The 26th Universiade in Shenzhen: "Green" Facts

- The city launched a "Green Commuting" campaign, calling for car owners to drive their cars less often during the Universiade period. More than 400,000 car owners volunteered to give up driving during the Universiade.
- The city launched a market-based carbon-trading program. The money raised from these carbon sales were used to plant trees, build energy-saving facilities and fund environmental research projects. Each share of "Universiade Carbon" was priced at 32 yuan (about five U.S. dollars), and about 30,000 shares of "Universiade Carbon" were purchased by local residents.
- The city launched a project to introduce 2,011 electric and hybrid vehicles, mostly buses and taxis. It also opened five additional subway lines, with a total length of 178 kilometers, significantly relieving traffic congestion. The new lines carry about 1.8 million passengers a day, which drastically cut down on street traffic during the Universiade.
- Shenzhen City launched an online virtual torch relay. It was also the first time in international sports events. The online torch relay attracted more than 9.4 million netizens as observers.
- All the 60 games venues are fully utilized to serve for Shenzhen's development and the Universiade Village was to function as a campus and students dormitories after the games.
- The city established a comprehensive volunteer service system including 20,000 games volunteers, 25,000 city volunteers and 1 million social volunteers.

The most crucial measures to ensure a "green" Universiade were the 9 measures listed below:

1. Shenzhen residents were given leave during the opening and closing ceremonies. 4 days for the opening ceremony and 3 days for closing ceremony. This has significantly reduced local travel demand.

2. On the five main roads for the Universiade, an even-odd license plate number restriction was exercised.
3. Special travel routes for exclusive use of athletes, guests traveling between the airports and Universiade Village, and guests traveling between intersection points near the Universiade Village and places of interest were established.
4. Cars of government offices and state-run enterprises and public intuitions were temporarily banned, 80 per cent were banned on the opening and closing ceremony days, and 50 per cent during the other days of the event.
5. Yellow-plate vehicles (vehicles that do not meet National Standards IV) were banned from 7 a.m. to 8 p.m. every day during the event, about 300,000 vehicles were banned.
6. Goods vehicles were to be temporarily banned, and were to use detour routes during the event.
7. Carriage of dangerous goods was banned. 4-24 August 7 a.m. to 8 p.m. All vehicles that carry dangerous goods are banned, and/or had to follow the designated detour routes.
8. Strict control on dumping trucks, mixer trucks and access to construction sites. All vehicles had to follow designated routes at designated time.
9. Shenzhen Government also encouraged enterprises and citizens to sign up for giving up driving their cars, taking paid leaves, staggering work hours, working online or by other green travel means.

The Universiade has brought great changes to Shenzhen. Shenzhen's public transportation system has been significantly improved. The city environment has become more pleasant, with 335 kilometers of regional greenways and more leisure parks constructed. 80 more community service centers have been newly built to benefit community residents.

During the two years' preparation period, citizens of Shenzhen have formed good habits for driving, cycling and walking. Several of the road safety and green transport measures applied during the Universiades are still in use today.



2,011 electric and hybrid vehicles were put in operation



Bicycling to School



Volunteers for Green Traveling

For more information on Shenzhen Traffic Control Measures for the 26th World Universiade, please visit: <http://jt.sz.bendibao.com/news/2011610/305442.htm>

For Green Shenzhen Universiade, please visit:
<http://www.people.com.cn/h/2011/0713/c25408-4070998877.html>

Shenzhen Striving to Host Green Universiade:
 China Daily
http://www.chinadaily.com.cn/sports/shenzhen2011/2011-08/15/content_13109371.htm

Picture Credits: the Nanfang Daily <http://www.nfdaily.cn>;
http://image.s1979.com/allimg/101203/12_101203091450_1.jpg

Picture credits:

The sources of all pictures appearing in the summary files are listed below, including the one beside the title and those within the texts.

Promoting Non-motorized Transport in China

<http://www.chinautc.com/manxingjiaotong/index.asp>

Promoting Bus Rapid Transit System in China

http://www.uncrd.or.jp/env/5th-regional-est-forum/doc/08_Breakout%20Session2-B/BS2-B-3_Guangzhou_BRT.pdf

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Developing Railway Transit in Southwest China

<http://www.visittibet.cn/travel/756.html>

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The Role of Inland Waterways for Sustainable Transport in China

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Alleviating Traffic Congestion in China

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Beijing's Initiatives in Adjusting Motor Vehicle Growth and Improving the Overall Traffic

<http://tupian.hudong.com/s/%E4%BA%A4%E9%80%9A%E6%8C%87%E6%95%B0/xgtupian/1/1>

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China Establishes Motor Vehicle Fuel Efficiency Standards and Labelling

<http://www.csres.com/info/37850.html>

Increasing the Use of Alternative Transport Fuels in China

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<http://shop.dg.soufun.com/2011-05-06/4985588.htm>

GPS Use in Public Transport in China

<http://electronics.bowenwang.com.cn/gps4.htm>

<http://www.gznewssoft.com.cn/gps/gps.jsp>

<http://bbs.shangdu.com/>

<http://www.fmetro.net/index.php>

<http://gps.zol.com.cn/108/1088984.html>

Improving Barrier-free Transport Systems in China

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http://www.moc.gov.cn/zhuantizhuanlan/qita/aoyunjiaotong/jiaotongdongtai/200809/t20080909_520602.html

Announcement



RIO+20
United Nations
Conference on
Sustainable
Development

Objectives: To secure renewed political commitment for sustainable development; To assess the progress to date and the remaining gaps in the implementation of the outcomes of the major summits on sustainable development; And to address new and emerging challenge, with two themes: (a) a green economy in the context of sustainable development and poverty eradication; and (b) the institutional framework for sustainable development.

3rd Preparatory Committee Meeting for UN Conference on Sustainable Development
Rio de Janeiro, Brazil 28-30 May 2012

United Nations Conference on Sustainable Development (Rio +20)
Rio de Janeiro, Brazil 04-06 June 2012

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