

BRT in China

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China's first law on road traffic safety defined the system of busways to be implemented, and the Ministry of Construction (MOC) established a national policy stipulating that public transport should be a priority and developed as the dominant mode of urban passenger transport. It also recommended bus rapid transit (BRT) as the mass rapid transit (MRT) mode to be used for developing large and medium cities. Some BRT projects, such as the Kunming Busways, the Beijing North-South Central Axis Line and the Chongqing BRT Plan have been planned and built to alleviate traffic congestion and to promote the development of sustainable transport in China.

Background

Over the last two decades, urban public transport has developed very quickly in China with 660 cities providing public transport systems and services - mainly large buses - which carry out around 20% of all trips. The number of public transport vehicles has risen from 45,000 in 1985 to 245,000 in 2003 and passenger volume amounts to over 388 billion trips per year. It is estimated that a public transport journey lasts on average almost twice as long (50 minutes) than with any other mode (20-30 minutes). Unsurprisingly,

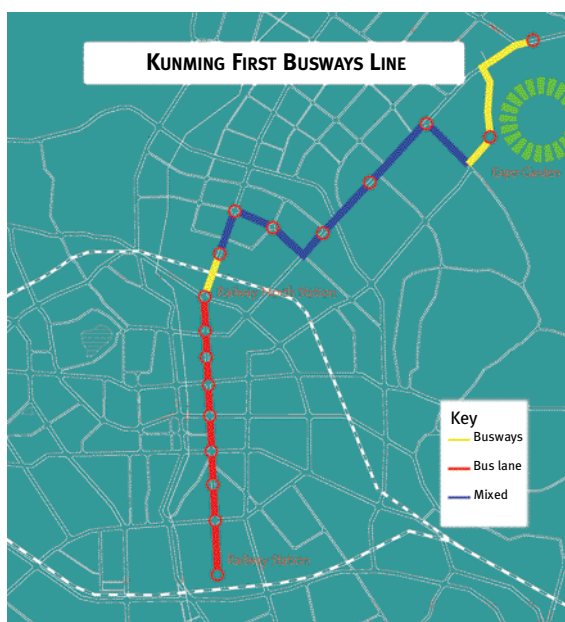
bus ridership fell in favour of motorcycles, cars, and taxi or bicycles, for those who could afford it. However, with the rising urban population and soaring number of private cars, traffic congestion has become a common headache for many city dwellers raising the troubling question of transport sustainability.

Bus transport will remain the mainstay of the public transport system for most cities. Although the metro is a sustainable transport mode and more than 20 cities are constructing or planning a metro system, the State Council of China had to suspend all new metro projects because it was too expensive for developing cities, the capital cost being over CNY5 billion (USD0.6 billion). Even Light Rail Transit (LRT) can cost up to 10 times as much per kilometre as BRT.

Kunming busways

Kunming is the capital of the Yunnan province in southwest China, situated on top of the Yunnan Plateau. It was the first city to adopt a BRT concept and build a segregated median busway in 1999, which led to improved traffic management in the downtown district. The

Kunming's first busway line
 Source: Kunming Transit Corporation



Cunming Urban Development and Transit Initiative was established in collaboration with Zurich and supported by the Swiss Agency for Development and Cooperation. Its aim was to achieve sustainable development and an efficient and modern transport policy.

The 5km long Beijing Road busways extend from Railway Station through Railway North Station up until the Expo Garden (total 17km) and are served by three journey bus lines and 21 other segment bus lines. The 17 bus stops are 65m long and 3.5m wide at intersections and loading points. Two other bus lanes on Renmin Road and Jinbi Road are respectively 9.9km and 4.38km long. Most of the buses in operation are standard 10-12m model buses.

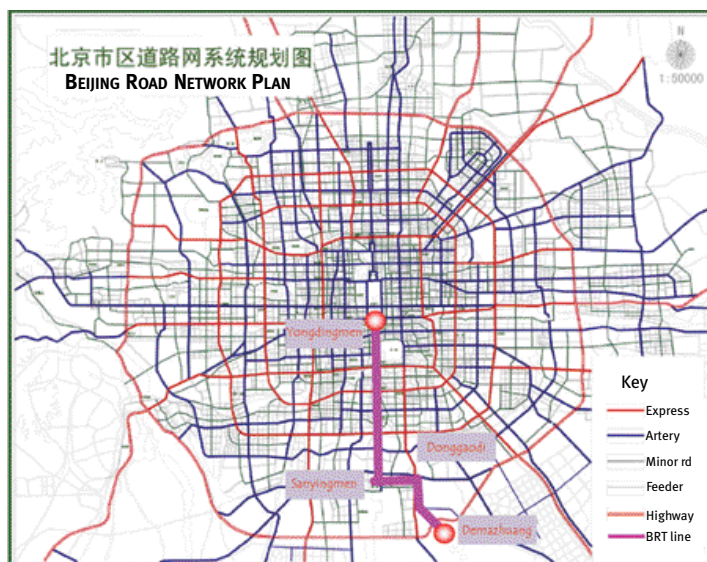
Cunming government invested CNY54.04 million (USD6.5 million) in busways engineering and operation, including traffic engineering facilities costing CNY15.94 million (USD1.92 million), road rebuilding engineering costing CNY38.10 million (USD4.6 million), and the purchase of 300 buses.

As a result of the implementation of busways and bus lanes, public transport by bus has already increased its passenger carrying capacity by 46% and reduced automobile traffic volume by 20%. Bus transport's mode share rose from 6% to 13%, with a significant share of this modal shift coming from bicycles rather than from motorised modes. Furthermore, the use of busways and bus lanes reduced total fuel consumption by bus transport by 7.9 litres/100km. Ridership is now 7,500 passengers per hour compared to 1,500 passengers per lane per hour before the busways were implemented.

Bus transport operating data shows that the average overall bus trip speed on busways or bus lanes at peak hours increased from 9.6km/h to 15.2km/h and waiting times at bus stops decreased by 59% (average waiting time is 23 seconds).

Beijing North-South Central Axis BRT Line

Beijing is the capital and most congested city in China with the



Beijing north-south central axis BRT line

number of registered motor vehicles exceeding 2 million (including 1.28 million cars). Traffic speed on some urban roads averaged 12km/h in 2003, compared to 20km/h in 1996, and 45km/h in 1994. More than 40% of residents spent more than one hour getting to work and 87% of road sections are constantly congested. Traffic congestion will therefore be a major challenge for Beijing ahead of the 2008 Summer Olympic Games.

Developing MRT is of course the solution: some 600km of rail systems are planned and a 200km-long busway network to be ready for 2008 will link the metro system and the Olympic Games facilities. The first segregated median busway from Yongdingmen Gate to Demazhuang is now being built and is scheduled to open in December 2004. It will be 15.8km long with 20 stops. The capital cost for this north-south central axis BRT line is CNY2.48 billion (USD0.3bn) per kilometre, while the total capital cost will be CNY39,215 million (USD4.7 million), as stated by the Beijing Transit Corporation.

If BRT is to be considered a realistic MRT option, it needs to be evaluated on the same basis as other transport modes and political and general public reluctance overcome as far as is possible.

The Beijing BRT line will be operated by a concession company consisting of Beijing Transit Corporation and four other investors (one may be from Hong Kong).

200 articulated buses (18m) have been ordered and the system will operate using features characteristic of rail transport such as flat fare tickets, pre-paid tickets at bus stops, and Intelligent Transportation Systems (ITS).

In Beijing, three BRT standard lines are being designed to reach an average speed of 20-25km/h, another with less frequent stops with an average speed of 25-30km/h and one express line which should reach 35km/h.

Chongqing BRT Plan

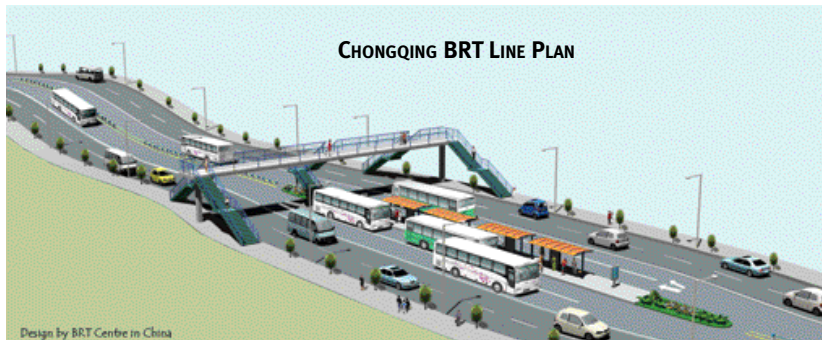
Chongqing is the fourth largest municipality of China, situated at the confluence of the Yangtze and Jialing Rivers. It recently signed a public transport cooperation protocol with Curitiba (Brazil).

A 15km long BRT project to be developed in two phases is planned for the urban centre. The first phase is an exclusive two-way dedicated bus roadway on 6 lanes (12km; 3 lanes per direction), with lane dividers. The second phase is a busway operating on a four-lane mixed-use artery (3km), with special signs and road markings for buses. This BRT line will connect the Central Business District (Jiefangbei), Hi-tech Development Zone (Shiqiaopu) and university area (Shapingba).

Currently, 56 buses lines and 658 buses operate along this corridor (BRT line). Passenger capacity is 133,858 trips per day and 8,366 trips per direction



Chongqing BRT line plan
Source: Chongqing Transit Corporation



A growing number of cities in China are taking part in the BRT programme. Shanghai has begun a sustainable transport partnership created by World Resources Institute (WRI), with the goal of creating a public-private partnership to develop a flexible, integrated transportation system. The immediate tasks ahead include an initial feasibility study for a BRT system and developing a set of transport indicators that will allow the city to manage its growth efficiently and effectively.

Yangzhou and Changzhou have followed the eco city planning and management programme set up by municipal governments and the Deutsche Gesellschaft fuer Technische Zusammenarbeit (GTZ). The choice of transport options shapes a city's future. A range of transport alternatives, including public transport systems, should be on offer. It is only natural therefore that BRT, an economical and low cost choice, is being implemented in these cities.

Xian, Chengdu, Tianjin, Wuhan, Xiamen, Shenyang, Suzhou and other cities are investigating the feasibility of integrating BRT into their road systems. With some cities having already prepared a study for government, it is likely that in coming years we will see BRT lines up and running in more cities.

during peak time. Existing conventional buses will be transformed separately into express buses and feeder buses, and the BRT line will become the principal corridor for the urban transport system. 19 roadside bus stops will be closed; passengers will pay their fare on entering pedestrian overpasses or subways leading to the station, which will reduce boarding and alighting times. Nine existing pedestrian overpasses and bus bays will be rebuilt in addition to five new interchanges.

The Chongqing BRT line is due to start operating with 76 articulated buses (18m) including 2 prototype hybrid power low-floor articulated buses with an average overall trip speed rising from the existing 17.05km/h to 25km/h.

This BRT line will be operated, managed and maintained by a new concession company. ITS technologies will also be used for traffic signals and to give right of way to buses; other advanced technologies, such as docking guidance systems, will be used in the articulated buses.

Operating costs are estimated at CNY1,545 (USDo.186) per trip and

passenger capacity at 102.6 thousands per day (compared to the current 133,000 trips/day). Economic analyses show that the line will be self-financing. With a flat fare price of CNY2.0 (USDo.24) per trip on the BRT line, 6,000 passengers per direction at peak hour, or 100,000 passengers during an average working day would be needed for the line to be self-financing.

In order to reach this level, the BRT system will need to reach a good commercial speed, and more existing bus lines converted into feeder lines. Following the results of a test bus run on a BRT schedule, the average speed can be estimated at 23.4km/h.

Conclusion

It has been acknowledged that BRT is an MRT model that moves passengers as efficiently as an LRT system, but at 10% of the capital cost. Integrating a BRT system into an existing road network presents many challenges, but because BRT has the merit of being flexible and able to be implemented gradually, it can accommodate city-specific constraints more easily than LRT. This flexibility can explain the wide interest in BRT in China.

In response to traffic jams, pollution and urban sprawl, planners and decision-makers in local government and urban transport authorities have embraced public transport-oriented development, in particular its cost effective feasibility. BRT heralds a new era of low-cost, high-quality and sustainable development in urban transport.

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