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Best Practice: Metrobus Bus Rapid Transit System

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CITY: MEXICO CITY

POLICY: TRANSPORTATION

BEST PRACTICE

Mexico City established the bus rapid transit (BRT) system, **Metrobus**, in the greater metropolitan area of Mexico City, the Zona Metropolitana del Valle de Mexico (ZMVM), to provide an efficient, safe, rapid, convenient and effective modern mass transit system for approximately twenty million residents.

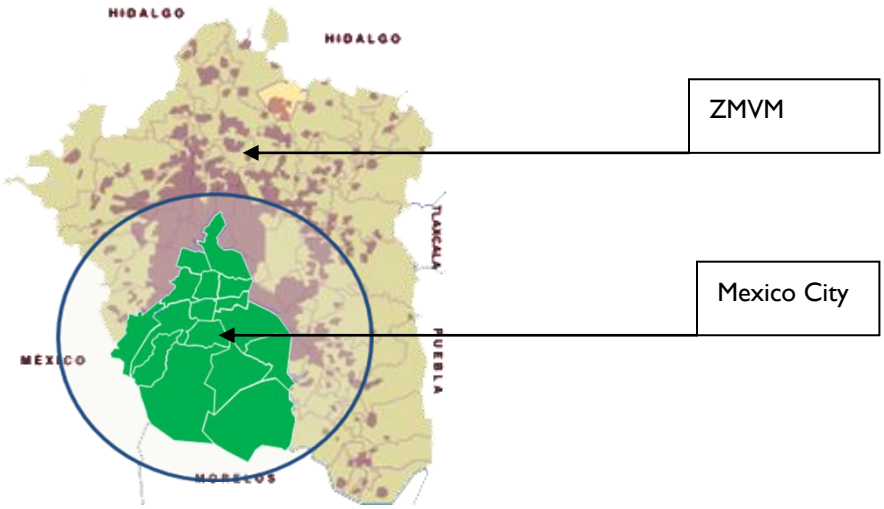
ISSUE

Mexico City's 200 kilometers of metro are not sufficient to handle the demand for mass transport. In 2000, only 9% of the 14.8 million daily trips on public transport were taken on the metro. It was clear that Mexico City needed to vastly expand its transportation system and, in 2002, Mexico City started the planning process for its first Metrobus corridor. Ten years later, in 2012, Mexico City has 95 more kilometers of corridors with mass transport.

GOALS AND OBJECTIVES

The objectives of the Metrobus are to:

- Improve mobility in Mexico City by establishing an efficient, safe, rapid, convenient, and effective modern mass transit system.
- Address the need for public transport on the main transportation corridors in the most congested areas of the city, reducing travel time and improving the quality of existing services.
- Contribute to combating climate change through reducing green house gas emissions, specifically particle matter such as NOx (Nitrogen oxide) and Sulfur dioxide. This is achieved through a more efficient transport system and through new, clean fuel buses.
- Improve the quality of life in Mexico City by reducing:
  - the amount of time lost in congestion;
  - number of accidents due to improved public transit organization and management;
  - particle matter pollution, thereby reducing the number of incidents of respiratory disease among residents;
  - noise pollution.
- Produce economic benefits mainly on a macroeconomic level by reducing the economic costs of congestion.



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IMPLEMENTATION

Zona Metropolitana del Valle de México (ZMVM)
Prior to the launch of the Metrobus, the baseline transportation landscape in the ZMVM included 3.5 million passenger cars, 180,000 motorcycles, more than 130,000 taxis and approximately 30,000 public transit buses, along with various metro lines. Passengers would use existing modes of transport including conventional buses, taxis, cars, motorcycles, rail-based Mass Rapid Transit System (MRTS), and Non-Motorized Transport (NMT).

Expansion
In July 2005, the Metrobus corridor began operation on Insurgentes Avenue. It was the first BRT corridor in the city, extending over 20 kilometers (12.4 miles), with central stations. The number of passengers has rapidly increased since then from 250,000 daily in 2005 to 270,000 in 2007, an annual increase of approximately 10%. In 2008, the corridor was extended nine kilometers (about 5.5 miles) to the south, and by the end of the year, the Line 2 in the Eje 4 Sur began operating twenty kilometers (12.4 miles) from east to west. In 2009 the demand of the system grew to 480,000 daily passengers. In 2011 with the construction of the Line 3 in the Eje 1 Poniente, Metrobus increased 17 kilometers (10.5 miles), consolidating 67 km (41.6 miles), and 710,000 trips per day. Today the Metrobus system transports 187 million passengers annually. In the coming months Line 4 will be in operation with 28 kilometers (about 17 miles), and the incorporation of 46 buses with Euro V-EEV technology and 8 hybrid buses (diesel-electric), reaching the international airport and downtown Mexico City.

TEPALCATES CENTRAL STATION (Before)

TEPALCATES CENTRAL STATION (Today)

The current Metrobus Expansion Program includes constructing ten new Metrobus lines, or 200 kilometers (124 miles) of BRT corridors and procuring 800 new buses. By 2015, there will be eight transportation corridors in Mexico City with 150 kilometers (93 miles) of restricted lanes and 600 tandem buses to replace over 2,000 microbuses. The corridors will be as follows:

- Line 1 – Insurgentes
- Line 2 – Eje 4 Sur
- Line 3 – Eje 1 Poniente
- Line 4 – Buenavista – Centro Histórico - Aeropuerto
- Line 5 – Eje 3 Oriente
- Line 6 – Eje 5 Norte
- Line 7 – Periférico Arco Oriente
- Line 8 – Eje 6 Sur

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Line 3 in operation, lines 4 & 5 to be ready in 2012

As of spring 2010, the first two lines have been completed and the third is under construction. These achievements are the result of continuous work since 2002. Mexico City has received technical support, monitoring, evaluation and financial resource from the World Bank and the CTS-Mexico (EMBARQ), a non-governmental organization that acts as a social, financial and environmental catalyst in the search for solutions to problems of urban mobility.

COST

The cost for the BRT Metrobus program is estimated at $800 million USD (including the buses cost). The cost by corridor is as follows:

Line 1 – Insurgentes	$82.9 million
Line 2 - Eje 4 Sur	$87.3 million
Line 3 - Eje 1 Poniente	$196.4 million (Public Private Partnership engagement includes the corridor maintenance for 10 years)
Line 4 – Bv – CH - AICM	$50 million (estimated by cost per kilometer)
Line 5 – Eje 3 Oriente	$60 million (estimated by cost per kilometer)
Line 6 – Eje 5 Norte	$90 million (estimated by cost per kilometer)
Line 7 – Periférico Arco Oriente	$100 million (estimated by cost per kilometer)
Line 8 – Eje 6 Sur	$130 million (estimated by cost per kilometer)

RESULTS AND EVALUATION

Metrobus transports 187 million passengers annually, through approximately 710,000 thousand trips per day.

During the first six years of operation, the first BRT line was able to reduce CO_2 equivalent emissions by 300,000 metric tons, corresponding to $800,000 of income for the city. It is estimated that the 67 kilometers (41.6 miles) serviced by 275 articulated and 13 bi-articulated diesel buses reduce Greenhouse gas emissions by 100,000 metric tons per year (estimated by NM0258, new methodology approved by the United Nations Framework Convention on Climate Change for counting the Greenhouse gas emission reductions).

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Other outcomes:

- Reduction in the number of car trips per day, resulting in 15% of Metrobus users who formerly traveled by car.
- 30% reduction in accidents.
- 40% travel time savings for users.
- Unhindered passage for emergency vehicles such as ambulances, fire engines and police cars throughout the corridor.
- 2-3 times reduction in exposure to particulate matter ($PM_{2.5}$), diminishing health damage effects (National Institute of Ecology, 2006).

TIMELINE

2002	Started planning process for the first Metrobus Corridor
June 2005	Opening of the Metrobus Line 1 – Insurgentes Phase I (Northern section)
December 2006	Metrobus project receives a World Leadership Award from the World Leadership Forum, recognizing it as the best Transport Project of 2006
March 2007	Sales in the voluntary market of 29.177 CO_2 eq tons, equivalent to €121,959 ($150, 777) paid to Metrobus
March 2008	Opening of the Metrobus Line 1 – Insurgentes Phase II (Southern section)
March 2008	Sales in the voluntary market of 38,210 CO_2 eq tons, equivalent to €159,717 ($197, 432) paid to Metrobus
December 2008	Opening of the Metrobus Line 2 - Eje 4 Sur
March 2009	Sales in the voluntary market of 36,870 CO_2 eq tons, equivalent to €166,655 ($ 206,008) paid to Metrobus
October 2009	Final approval of the methodology CDM-NM025 by the Clean Development Mechanism Executive Board
November 2009	Metrobus received the 2009 Roy Family Award for Environmental Partnership from the John F. Kennedy School of Government at Harvard University.
April 2010	Metrobus and CTS Mexico shared the Mapfre Award for Best Environmental Performance
March 2010	Start of the construction of the third Metrobus line 3
February 2011	Opening of the Metrobus Line 3 - Eje 1 Poniente
April 2012	Estimated opening of the Metrobus Line 4 – Buenavista – Downtown – San Lázaro - Airport
2012	Estimated opening of the Metrobus Line 5 – Eje 3 Oriente

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LEGISLATION

Modifications were made to Transit Regulation to increase penalties for damages caused to the infrastructure. Also those who make left-turns over the segregated lines or use the confined lanes are subject to fines.

LESSONS LEARNED

There were several obstacles that emerged in this project including:

Negotiating complications: Negotiations with public transport operators often posed risks of delay in project implementation.

Delays in construction work: The delays in the construction of the corridors had direct influence on the opening. In the case of Line 2, the complications involved a rescheduling of the opening during the first few months of service.

Opposition groups: Metrobus projects are often misunderstood by the local community who fear complications of construction and congestion. These fears can be allayed by an explanation of the project and its benefits.

Level of service: These systems had to cope with a high number of travelers while facing operational complications such as: congestion conflicts, blocking intersections, and institutional weaknesses. One of the major challenges faced was how to satisfy demand with the best level of service possible, while making the best use of limited resources.

TRANSFERABILITY

Many large cities in developing countries face high levels of traffic congestion and enormous demands for public transport. BRTs serve as a cost-effective solution for these cities. In Mexico, many cities nationwide are now implementing BRT corridors including Guadalajara, Monterrey, Puebla, Queretaro, Estado de México, Chihuahua, Culiacan, Cancun, and Acapulco.

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Facts and figures in this report were provided by the highlighted city agency to New York City Global Partners.