INTRODUCTION

The passenger’s rail system in Latin America has a total of 2,429 km of lines in the metropolitan areas of 32 cities. Considering all kinds of systems, including metro, suburban train, tram and monorails. In this scenario the metro system means 45% of this extension.

PUBLIC TRANSPORT SECTOR BY RAIL

The metro lines in Latin America carries daily 20 million people (data 2015) in 22 cities in 10 countries, with a crucial role in the urban areas of mobility.

The metro lines are a proven solution for sustainable mobility in a continent that presents increasing number of inhabitants in the urban area, which creates a constant pressure for integrated solutions of public transport. Despite the large volume of investment needed the metro system answers precisely to the demand of Latin America cities’ mobility, which must improve the competitiveness and dynamism.

The number of metro systems in the region is still small, with low growth for decades. In 2000s was a decade with largest number of new systems opening, 7 new cities opened their systems.

This report provides an overview of the state of the art, covering characteristics of the lines, technology trends, and future developments.

Figure 1: Latin America’s metro capacity (passengers/hour peak/direction)

Figure 2: Latin America’s metro system opening by decade (1900-2015)
Latin America is a continent of 570 million people, of which 200 million use public transport daily, and the metro is 10% of public transport.

The 6 loaded most metro systems in the region, carrying over 15 million passengers every day, this means that only 5 systems carry 76% of the continent passengers.

This brings up the large capacity that systems have to answer for cities demands, and at the same time proves the potential growth for the metro system in the region.
For this document it was considered as metro only the fully electrified and segregated (elevated, surface and/or tunnel) systems with maximum operational headway 360 seconds, with a maximum distance of 2 kilometers between stations. In 2015, the metro system in Latin America had an extension of 1,099 km, operating in 62 lines with 884 stations.

The infrastructure is mostly underground. 44% of the metro extension runs in tunnels, by 40% on the surface and the other parts are elevated.

The system route mostly follows the international standard track gauge of 1,435 mm, 68% of the lines, and the remainder is 1,600 mm and 1,676 mm track gauge.

The electrification also varies according to the lines of the region, there is a predominant catenary system at 54% extension (750Vcc -11%, 1,500Vcc -20%), 3,000 VDC -19%, 3,600Vdc -4 %), the remaining of the system is the 3rd rail.
The metropolitan area of Monterrey (Nuevo León, northeastern Mexico) is the second largest in the country and the third in population, with over one million inhabitants. 4,500 tons daily of waste (non-hazardous urban and industrial) are used to generate energy. The system is in operation since 2009 producing electricity from biogas, it has a capacity of 16.9 MWh generation, avoiding the emission tons of methane gas. Currently provides 66% of total consumption of electric energy of the Monterrey metro system, which on average is 3.5 million kWh/month.

The system allowed large savings to the metro operator, the initial investment of USD $ 6 million (funded by the World Bank) and was recovered soon as there is a saving in energy value. This energy is 90% cheaper than in the previous concessionaire, in 2012 the economy was USD $770,000.
THE FUTURE OF REGION METRO SYSTEMS

In the coming years, until 2021, it will be seen a growth of networks and an increase in the number of passengers in the metro systems of cities. Today there are 22 cities with metro, 14 of them have expansion line projects, or new lines and in the list of 22 cities will be added 3 more cities with completely new systems.

The majority of new lines and systems will be on surface, being a feature for the future. Those new projects will increase 25% the extension of the network with over 270 km¹, which means 238 new stations, and an increase of 4.8 million passengers / day in Latin America metros systems.

The increase in the number of passengers transported by metro in Latin America will be 32%.

The investment in these new infrastructures is 42.8 billion dollars. What is observed about investments, it is still a very traditional model of financing, such as resources coming directly from governments (national and / or state); there is a few innovation with little private participation in projects. There are only 5 cities that consider private participation in the development of new infrastructure, but this amount represents 43% of new investments.

¹ In the list of new projects it is considered those which are already under construction, or there are clear assign resources and guarantees by local authorities in July / 2016.

INNOVATIVE FINANCING MODEL

Private operators in Latin America are responsible for the operation of 188 km of metro, carrying daily 2.8 million people in six cities in the region: Buenos Aires, Lima, Rio de Janeiro, Salvador, San Juan and Sao Paulo.

Innovation in models of contracts with the private sector is essential to bring resources to the metro sector in the region. In this sense one of the most successful experiences was the experience of Line 4 - Yellow of Sao Paulo system, which brought a new governance model for the sector.

In 2005, the PPP project was announced at a cost of USD $1.26 billion, 73% was funded by the State Government of Sao Paulo, World Bank and JBIC (Japan Bank for International Cooperation) and the private sector accounted for the remainder (27%). On the other hand the private sector has the concession for 30 years, including fare and non-fare revenues, with operation and maintenance requirement.

The system began the operation in 2010, it is the only fully automatic metro in region with high-performance, carrying daily over 700 thousand passengers.

INVESTMENT PROGNOSIS AND FUTURE EXPANSION

Figure 17: Depot Vila Sonia Yellow Line 4 of Sao Paulo metro
ANOTHER SUBWAY SYSTEM PRIVATE IN BRAZIL

An innovative financing model was crucial to the achievement of the metro system project in Salvador, Bahia, Brazil. The winning bidder signed the concession contract through Public Private Partnership (PPP) to deploy, operate and maintain the metro system for 30 years.

The initial investment was US$ 1.1 billion, coming from the Federal Government, State Government and the private operator.

The metro of Salvador started the commercial operation in January 2016, with the Line 1, counting 12 km long. In 2017, it will be completed the project of metro Line 2, until the region of Salvador International Airport, the extension will be 36 km long.

The project also accounts with the expansion of lines 1 and 2, totaling 41 km length, with the 10 bus terminals integration and 23 stations. Currently, the system carries about 50 000 passengers / day, expected to carry about 500 000 passengers / day when the two lines are completed and in full operation.