

# How E-buses Took off in Latin America to Save Lives, CO2 and Money

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## **EXECUTIVE SUMMARY**

*Building confidence for zero emission buses has been the strategy to create demand in Latin America. A few cities have more e-buses than any other region in the world outside of China. It all started by testing hybrid and electric buses, sharing data, building innovative economic models, making site visits, and sharing results in workshops. It all occurred during the last 10 years. Institutions including development banks are now committed to assisting with the transition towards zero emission public transport in cities. A number of bus suppliers offer their technologies, most of them from China as Europe is still behind in the Latam e-bus market. Most barriers have already been broken, and confidence in the technology and the market has brought investors to the region. E-buses are key to reducing greenhouse emissions in the region, and the accelerated transition is helping cities with this challenge.*

## **INTRODUCTION**

In 2010, the Inter-American Development Bank (IADB) supported the first-of-its-kind project to test hybrid and electric buses in 4 cities in Latin America: Bogotá, Santiago de Chile, Rio de Janeiro, and São Paulo. It was carried out by C40 Cities and the Clinton Climate Initiative (CCI). The justification for such a project was the need to speed up the transition towards zero emission transport systems in order to reduce pollution and the greenhouse gas emissions (GHG) from the massive sectoral use of fossil fuels in public transport. In this sector old diesel buses were predominant, easy to maintain, mechanically well known by the bus operators, and good for business as they were cheap. However, these buses were not only very inefficient in terms of energy use but also the main source of deadly particle emission to the atmosphere: PM2.5. The hypothesis was simple: proving the availability of low or zero emissions

technologies to reduce fossil fuel consumption, therefore deadly particle and GHG emissions, would allow cities to transition towards zero emission transport.

However, proving the hypothesis was not enough to trigger the growth of the low or zero emission bus market. It was also essential to prove that: i) technologies were available and there were suppliers; ii) the technology was reliable; iii) buses, although more expensive, might end up costing less; iv) there were additional environmental and economic benefits that would be achieved, and v) bus operators and transport agencies in cities would be confident enough in the technologies to start the transition. All these subjects were, in essence, knowledge generation for decision makers.

However, it turned out that documenting and providing answers to the subjects mentioned above was far from enough to foster the transition towards low or zero emission transport. Several myths supported business as usual for bus operators and cities, such as: i) electric engines are not powerful enough to climb hills, ii) battery range was not enough to cope with the long journeys buses make every day, iii) batteries explode or burn, iv) batteries are not recyclable, v) buses are too expensive, vi) there are no electric buses in the market or the main bus suppliers are not prepared for them, and viii) buses are only built in China.

An important part of this chapter is the result of many meetings, site visits, discussions and field work undertaken by the author. These helped collect information that has been shared with stakeholders via projects like ZEBRA<sup>1</sup> in Latin America (Latam).

The chapter recaps the main facts that took place before two cities in Latam decided to jump into electromobility and highlights the economics behind the decisions. It also summarizes the most relevant elements regarding the knowledge that helped cities and transport operators make well-funded technological and economic decisions. Finally, it presents some facts and figures using the current state of the transition towards zero emission buses in the region.

The intention of this chapter is not to evaluate the co-benefits of the e-buses compared to the fossil buses as for example those derived from particle reduction, noise reduction and the like. It is focused on the economic and financial facts that are moving Latin America towards a zero-emission public transport fleet.

## **BACKGROUND**

In August 2010, the Clinton Climate Initiative, C40's implementing agency at the time, signed a non-reimbursable technical cooperation with the IADB. This allowed C40 to test hybrid and electric buses in Bogotá, Santiago de Chile, Rio de Janeiro, and São Paulo, and to compare their performance and the life cycle economic cost or total ownership cost (TCO) against that of an equivalent bus that used diesel fuel.

This project, the first of its kind in the world, obtained the participation of several bus suppliers: BYD (electric - China), Eletra (hybrid - Brazil), Hankuk Fiber (electric - Korea), Mercedes Benz (diesel - Brazil), Volvo (diesel and hybrid – Sweden, Brazil), and Youngman (hybrid - China). All tests engaged bus operators in each of the cities and Bus Rapid Transit (BRT) authorities. Buses were imported from different places and an international consultancy team –International Sustainable Systems Research Center (ISSRC)– was hired to develop specific test protocols and to carry out the tests. Supervision of the field work was also contracted with international experts for each city.

Based on the performance results of the buses and with data provided by bus suppliers and bus operators, an economic analysis was carried out by Dalberg, a consulting firm that helped C40 carry out

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