Getting the Finance Flowing: Chile

Case Study 21. E-buses in Santiago de Chile

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Context

The integration of e-buses in Santiago's public transport system is driven by Chile's broader commitment to achieve carbon neutrality by 2050, its National Electromobility Strategy (established in 2017, updated in 2021), and other programs.[11] This is in addition to nationwide initiatives such as the National Climate Change Plan 2017–22, the Energy Route 2018–22, and more recently the approval of a Decarbonization Plan in the context of COP25. The transport sector was responsible for 25 percent of Chile's CO_2 equivalent emissions in 2018, with roads accounting for 86 percent, 65 percent of which is traceable to trucks and buses (Ministerio del Medio Ambiente 2019). While oil dominates the energy mix, power generation is quickly shifting to renewables, tapping into the country's vast resources of solar energy and abundant unexploited potential for wind, hydro, and geothermal (IEA 2018).

Santiago, with a population of 6.8 million in 2018, has almost 40 percent of the country's population and is the most densely populated city. Its public transport system, the Red Metropolitana de Movilidad—known simply as Red, and formerly Transantiago—records an average of 5.5 million daily transactions. Known for recent decades of economic and political stability, Chile's inequality remains a salient problem. In this context, providing sustainable and affordable mobility is a high priority.

The National Electromobility Strategy seeks to contribute to the mitigation of GHG emissions by improving the mobility and quality of life for Chileans. It outlines the actions that Chile must take in the short and medium term to ensure that 100 percent of all urban public transport buses and light and medium vehicles sold are electric by 2035 (Government of Chile 2021).

Chile faces operational, infrastructure, and financial challenges to adopting e-buses. First, the e-buses have lower passenger capacity per vehicle than regular buses (with internal combustion engines), so to achieve the same level of supply, more buses and frequency are necessary. This requires new operating plans, more drivers and maintenance staff, and additional infrastructure and finance. Training enough workers to operate and support the new systems and technology is also a challenge. Second, e-buses require custom modifications and charging infrastructure for urban operations. This includes designing, building, and installing charging depots, electric infrastructure, power management systems, and possibly energy storage. Implementing regulatory systems and streamlined approval processes to manage infrastructure

installations and maintenance presents another challenge. Third, at $450,000 per bus, the cost of Chile's first e-buses was more than double the diesel Euro VI vehicles. As the e-bus fleet grew and manufacturers expanded into the Latin American market, prices went down to $300,000 per e-bus by 2020 and are expected to decline further as technology advances. A key challenge is harnessing the full potential of e-buses' lower operating expenditures to offset this higher capital cost.

The Experience of E-buses in Santiago

Santiago's public transport system is based on six bus companies: Metbus, Buses Vule, Servicio de Transporte de Personas (STP) Santiago, RedBus, Subus, and Express. Each company is assigned a group of bus services, integrated through a seamless electronic payment system that uses a smart card called Bip!. The regulator collects and manages revenues. Concession contracts were originally 10 years, and the life cycle of a bus fleet is defined as at least 1 million kilometers and/or 12 years of operation, after which there is an imminent need to renew the fleet.

The business model used to implement e-buses in Santiago consists of a PPP between the Ministry of Transport and Telecommunications and private energy companies Enel and Engie, who serve as bus operators and investors. Fleet provision and depot ownership are separated from the operation of buses in the street, introducing two types of contract: one for operations, and the other for enabling infrastructure and assets. The transition involved a proactive government role in supporting fleet renewal with better and cleaner technologies through the adoption of vehicle and fuel standards and vehicle certification. Chile's Center for Vehicle Control and Certification has a technical laboratory to certify the characteristics of different types of vehicles, including assessing the emissions and energy efficiency of buses in the public transport system. The transition also involved bold government actions to facilitate the process, reduce approval and authorization times, and support e-bus planning and regulation.

As an innovation, financing for the charging infrastructure and e-buses was developed as part of a scheme in the core business of Enel and Engie. They developed leasing contracts with the private bus operator companies with monthly payments to cover fleet provision, charging infrastructure, and energy supply, allowing operators' quotes for fleet provision to be paid directly to the bus provider (and investor). A financial entity in charge of collecting revenue and managing operators' payments deducts from each operator's payment the amount corresponding to the leasing contract it has with the energy company, reducing the risk for investors. The providers and operators sign provision contracts, approved by the state, that specify that no matter what company operates the e-buses, the state guarantees that the buses will remain in the system until the debt is paid. Managing and monitoring the e-buses' operation is mainly the responsibility of the bus operator but depends on contractual agreements between the different actors, especially regarding fleet and electric infrastructure maintenance, but also charging management issues.

Metbus was the first operator to include e-buses in its fleet (285 vehicles), operating the first e-corridor in Latin America, and was followed by Buses Vule (76 vehicles), STP (25 vehicles), and RedBus (25 e-buses in 2020). These buses represent approximately 6 percent of the Santiago fleet (411 e-buses in a total fleet of 6,849 in 2019), making Chile's the world's second-biggest e-bus fleet, after China. Under the existing plan, the bus fleet will be evenly split between Euro VI diesel and e-buses by 2030; consequently, emissions and particulate matter (PM) are expected to drop significantly: nitric oxide, nitrogen dioxide, and hydrocarbons (by 90 percent); CO_2 (by 15 percent); and PM2.5 and PM10 (by 70 and 56 percent, respectively). This will have a direct impact on air pollution and thus health outcomes in the city. Meanwhile, the overall quality of the public transport system has increased, with passengers preferring e-buses for their smooth ride, lower noise levels, and good air conditioning. The shift would also create energy cost savings of 70 percent.

Key Takeaways

Building a cooperative partnership between private companies (bus operators, bus manufacturers, and financiers) and the public sector is vital. Although financing can come from traditional sources, creating adequate policies to incentivize private companies, such as utilities, to invest can help minimize the fiscal burden. The government's role in minimizing nonpayment risks cannot be overemphasized, either as facilitator or as policy maker. The planning stage should include construction time for the electric infrastructure as well as technical operational adjustments to adapt to the capacity of the new buses. Planners should also consider the selection of bus routes suitable for e-buses, in terms of slope and length, and possible adjustments to buses for operating on certain routes.

Pilot projects are an essential element to consider when implementing e-bus fleets, to test the battery range and e-bus capabilities for specific city conditions. A salient priority is training e-bus drivers, maintenance technicians, and other personnel in charge of electrical infrastructure. At the same time, universities and technical institutions should adapt their degrees and other courses to the future challenges of e-mobility.

Having viable and enforceable contractual arrangements for fleet and charging infrastructure maintenance is also essential. Maintenance is an important issue to guarantee e-fleet availability and the proper operation of e-buses. Similarly, the bus performance should be guaranteed from the first moment of operation.