



CASE STUDY

SÃO JOSÉ DOS CAMPOS, BRAZIL

The transition to E-Buses



City Profile

As of April 2023



Map locator of São Paulo's São José dos Campos city, Brazil. Source: Wikipedia

Local Government Name

São José dos Campos

Official Name

São José dos Campos

Population

737.710 inhabitants (2021)

Total Area

1.099,6 km² , Urban and rural area

Municipal Budget

R\$3,91 billion (2023)

R\$3,19 billion (2022)

\$ 7,86 billion approximately

Web address

<https://www.sjc.sp.gov.br/>

Project profile

Local Government Name

TUMI

Project start / end date

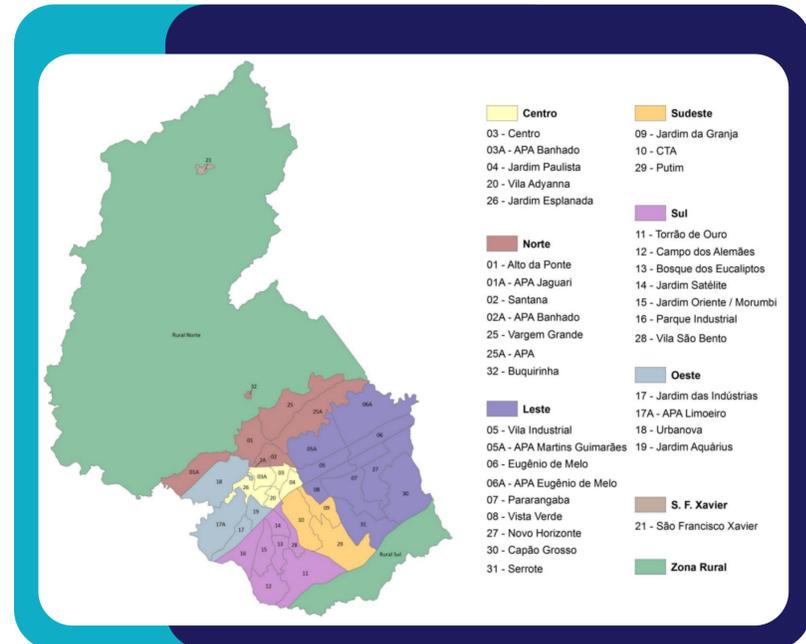
2021/2023

Scale

Global

Key Partners

- German Ministry for Economic Cooperation and Development (BMZ)
- German Society for International Cooperation (GIZ)
- C40 Cities
- The International Council on Clean Transportation (ICCT)
- The Institute for Transportation and Development Policy (ITDP)
- ICLEI – Local Governments for Sustainability
- The International Association of Public Transport (UITP)
- World Resources Institute (WRI)



Map of São José dos Campos. In green the rural areas, in other colors the urban area. Source: São José dos Campos Master Plan, 2017.

Summary

São José dos Campos is a Brazilian municipality in the countryside of the state of São Paulo, renowned for its high-tech industries and research centers. The city is demonstrating a huge effort into progress towards a sustainable future by integrating electric buses into its public transportation system.

To meet these goals, the municipality started the process of decarbonizing public transportation in 2022 by purchasing 12 electric buses, with the aim of reducing the city's carbon footprint. The project has been successful thus far,

with the deployment of 12 electric buses that have significantly reduced emissions and garnered favorable feedback from the community. To oversee the implementation process, an interdisciplinary team consisting of various stakeholders has been essential in addressing the multiple challenges of the transition process.

This case study describes the actors involved and the first steps the city has taken so far in its journey towards the adoption of electric buses, the challenges, and the lessons learned.

Introduction

São José dos Campos, located in the state of São Paulo, Brazil, is known for its high-tech industries and research centers, including the National Institute for Space Research (INPE), the Brazilian Aerospace Association (AEB), and home to the largest technology park in the country, the São José dos Campos Technology Park.

The city has implemented territorial and mobility planning policies in line with the Integrated Development Master Plan to promote a compact city and encourage the use of active modes of transportation and public transit. The city's public transportation system includes municipal buses, alternative transportation services consisting of vans, and intercity lines operating within the city. The internal road system spans approximately 2,900 km, with nearly 22,08 km dedicated to public transportation on exclusive and preferential lanes.

São José dos Campos has recently implemented a new transportation

initiative, the Green Line project, followed by strong efforts to replace all its diesel-powered buses with electric buses. The initiative is part of the city's commitment to sustainable development and reducing its carbon footprint.

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This case study will explore the city's path, and the successes and challenges of this transition. The study will also provide insights and recommendations for other cities looking to implement similar sustainable initiatives. By sharing their experiences, the city hopes to inspire others to take action towards a more sustainable future.



How the city of São José dos Campos is transitioning to electric buses integrated into the transportation system

Getting to know São José dos Campos' transportation system

The city's buses are currently operated by three companies through a service concession, that are responsible for ticket sales operation and management, while the city handles operational planning and service inspection.

The system consists of 101 bus lines, including the 2 lines that operate in the Green Line, which are divided into three different lots throughout the city. The network prioritizes interconnectivity between neighborhoods and the city center, with an average travel time of 45 minutes. The majority of trips (74%) are made for obligatory reasons, in which work represents 44%, study 16%, and errands 14%.

According to the latest origin-destination survey conducted in 2011, only 27% of people use public transportation. This is a concerning statistic, as 46% use private vehicles (cars and motorcycles) as their primary mode of transportation. Another 23% of people walk, and only 3% use bicycles.

Currently, there are 340 urban buses in operation, with 96% operating on diesel and 4% being electric operating on the Green Line, which has 12.5 km of exclusive lanes, 3.6 km of preferential lanes, and 6.1 km of an exclusive corridor for electric buses.

The Green Line project, launched in 2022, aims to increase the use of electric buses and reduce the city's carbon footprint.

Through this project, the city has acquired 12 electric buses, which have been put into operation. The electric buses have proven to be successful in reducing emissions and have received positive feedback from the community. The city plans to expand the project in the coming years to further promote sustainable transportation, which will be explained in the following topics.



Figure 1. Electric urban bus at the Innovation Arch.
Source: Adenir Britto/PMSJC



Interdisciplinary work team and stakeholder mapping

The city has made significant progress in its transition policy towards electric buses, starting with the acquisition of the first 12 articulated vehicles and conducting relevant bidding processes. To ensure the success of this transition, an interdisciplinary work team was formed to oversee the implementation process and address any challenges that may arise. Additionally, a stakeholder mapping was done, and helps identify key players and their roles in the transition, facilitating effective communication and collaboration among all parties involved.

These main stakeholders include the Municipal Secretariat of Urban Mobility and the Secretariat of Urbanism and Sustainability, as well as other local government representatives, such as government representatives and URBAM, which is a mixed economy company in which the municipality is the major shareholder, thus holding control of the company.

The Municipal Council for Urban Mobility (COMOB), has also played a significant role, consisting of a diverse group of members, including representatives from security, urban planning, the environment, finance, and the social sectors. Furthermore, the council involves the civil society, which is mandated by law and operates under internal regulations as an advisory body, the community was also invited to participate in public hearings.

The current transport operators and the transport industry were an important part of the transition to a new technology, so in

the process, the municipality was in contact with many stakeholders such as ELETRA, BYD, HIGER, Marcopolo, and Mercedes Benz, among others. Energy providers, such as EDP Bandeirante, have also been critical stakeholders in the transition process. Currently, the city purchases energy from the open market for operation, although there is a project to generate solar and biogas energy to supply energy to the public transport system.

Furthermore, the infrastructure required for electric bus charging has been developed by Nansen, contracted by the municipality, with other companies like BYD and WEG also involved in the process. The inclusion of these diverse stakeholders has been crucial to addressing the various challenges of the transition process and developing sustainable solutions for the city's future.



Figure 2. Pilot test of the electric buses carried out in december 2021. Source: Claudio Vieira/PMSJC



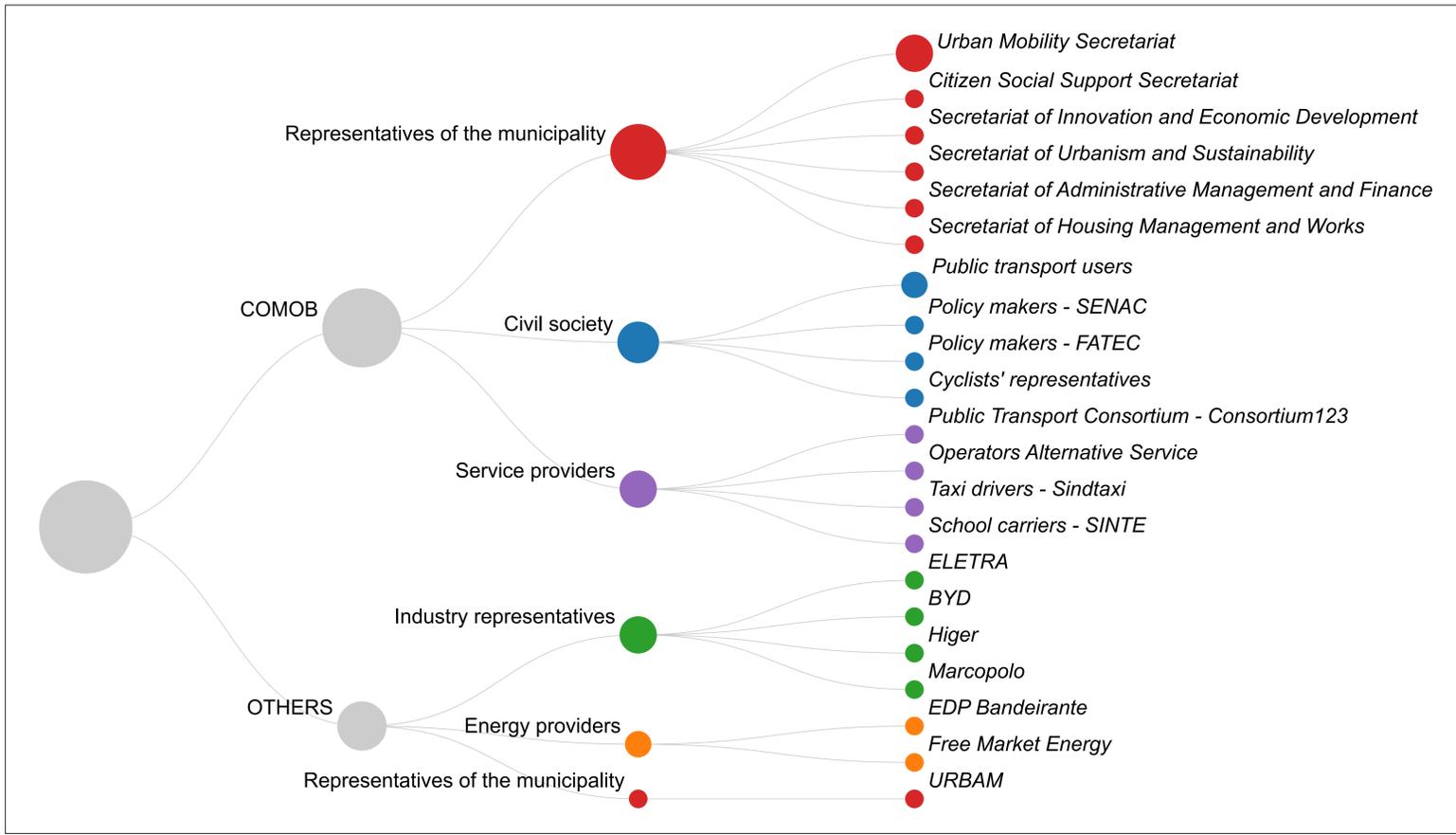


Figure 3. Graphic of the stakeholders involved in the e-buses project.
Source: São José dos Campos Municipality.

Goals towards the electric bus transition

In this process, it was also important to establish goals that would drive the city to continue the process. The goals that have been outlined by São José dos Campos correspond to:

Goals	Year
Acquisition of 12 articulated electric buses for the Green Line.	2020
Start of pilot operation of the electric buses (without recharging and outside the planned route of the Green Line).	2021
Start of Green Line operation with the 12 electric buses in a partial section (South Zone).	2022
Tender for leasing of the 400 electric buses for new operation.	2023
Operation of the new system with electric buses begins.	expect 2024

Operational design

Through the success of the Green Line and stakeholder engagement, the municipality started working toward the goal of turning all the bus fleet into electric buses, which involves a change in the current operational design.

The operation of the 400 electric buses will follow the design of the new network, allowing for a demand reserve in case of

growth. It is expected that with the improvement of the service (fleet, systems, and operation), there will be an incentive for an increase in demand (return of passengers), that is currently still recovering from the drop of users in the pandemic, but still far from 2019's numbers.

The municipality will acquire the projected charging infrastructure through a specific bidding process as soon as the acquisition of the 400 new vehicles is concluded to specify the necessary technology. The Secretariat of Urban Mobility will be in charge of supervision and monitoring systems, as well as the operational planning of the lines.

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About the vehicles, the Green Line has a fleet of 12 articulated buses of 22 m, with a capacity of 168 passengers and a battery range of 250 km, and the project for transition will replace the entire fleet with 400 electric buses that will be composed of 18 articulated buses (minimum 120 passengers), 212 standard buses (minimum 80 passengers), and 170 basic buses (minimum 70 passengers).

Financial structuring and business model

As said before, the public transportation system in São José dos Campos is operated through a concession service by three companies. Under the current contract, these companies are responsible for ticket sales, and their only income is based on the number of passengers transported.

These current contracts are coming to an end, and to implement the new fleet, the municipality is seeking a new model and

distribution of responsibilities between them and private bus operators. The idea is to separate the ticketing system from the bidding and contract processes.

The electric articulated buses that operate on the Line are owned by the municipality but are leased to two of the three current concessionaires, who are responsible for their operation and maintenance. The vehicle charging infrastructure is owned by the municipality and is located at one of the Green Line stations, with electricity consumption costs paid by the municipality.

To ensure the financial sustainability of the system, the leasing financial modeling of the 400 electric buses guarantees revenue from ticket sales, which may be supplemented with contributions from the municipality if needed.

Actually, the municipality is in the process of leasing the fleet; the contract is expected to last 15 years with a battery performance guarantee of up to 8 years, after which replacement will be the responsibility of the municipality. This process is happening through URBAM, which will be responsible for: electronic ticketing, operational fleet leasing, and other hardware that will be equipped in the vehicles. Once the acquisition of the 400 electric buses is completed, the following phases will be undertaken:

- Hiring Operators
- Hiring of rechargers
- Adaptation works for the installation of charging infrastructure
- Requalification of integration areas
- Contracting of the ticketing system and means of payment
- Contracting of the monitoring and inspection system.



Local regulatory frameworks for the transition to electric buses

Since 2016, public policy, decrees, and municipal laws have been defined to stimulate development, regulate the Municipal Council, and encourage the participation of civil society. This was important throughout the process to allow the municipality to establish solid baselines and introduce the theme in the local framework.

Standard and year	Context
Municipal Urban Mobility Policy, 2016	Action 2 – Determine the use of cleaner vehicle technology for the public transport fleet: stimulating scientific-technological development and the use of cleaner renewable energies;
Law No. 9.779 / 2018	Creates the Municipal Council for Urban Mobility (COMOB).
Municipal Decree No. 18.780 / 2021	Regulates the holding of public hearings to address the bid edital for the financial management, data management, and establishment of means of payment in the new public transportation system of the municipality.
Municipal Decree No. 18.742 / 2021	The buses that enter the public transport system of the country, from 2025 must be electric.

Results

This case study highlights the importance of public policies and incentives in promoting sustainable urban transportation. Since 2016, the municipality has been implementing policies, decrees, and laws that foster the development of electric buses.

The acquisition of 12 electric buses for Green Line operation in 2020 marked a significant milestone in the transition to sustainable urban transportation, and demonstrated the feasibility and potential of electric buses for public transportation, resulting in a significant reduction of around 400 tons of CO₂-eq emissions in the first year of operation. The Green Line proposal also serves as an important driver for sustainable urban growth, complying with transit-oriented development (TOD) policies. The ongoing development of the Urban Mobility Plan provides a roadmap for future actions

and perspectives in sustainable urban transportation.

For the future, the municipality aims to start the lease the contract for the 400 electric buses, representing the electrification of the entire fleet, which the Urbanism and Sustainability Secretariat estimates will reduce greenhouse gas emissions by 85%, equivalent to 36,000 tons of CO₂-eq per year. If it reaches this goal the city will become the first in Brazil with a 100% electric bus fleet.



Figure 3. E-Bus operating in the Green Line.
Source: Adenir Britto/PMSJC 31/07"

Lessons Learned

Political will

The political momentum has a strong will and commitment by the mayor and secretaries towards electrification, with the goal of transforming the city as the first to have a fleet of 100% e-buses in Brazil. This led the whole municipality to work together towards this and to overcome all the difficulties that have shown up along the way.

Teamwork and stakeholder engagement

During the whole process, the municipality engaged a team with many different actors, including civil society. This was important to overcome the difficulties through teamwork and also so the civil society could feel part of and embrace the e-bus project.

Ambitious

The city didn't stop on the Green Line project; they took advantage of the strong political commitment moment, the engagement of multiple actors, and the good acceptance of civil society, to scale the implementation of electric buses. The city managed to reach a bidding to replace the whole fleet, willing to become the first Brazilian city with 100% electric buses.



Figure 3. Electric urban bus at the Innovation Arch
Source: Adenir Britto/PMSJC

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Additional reading

ICLEI. City Profile of São José dos Campos –TUMI E-Bus Mission City Network.

Published in: [link to access](#)

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SÃO JOSÉ DOS CAMPOS

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