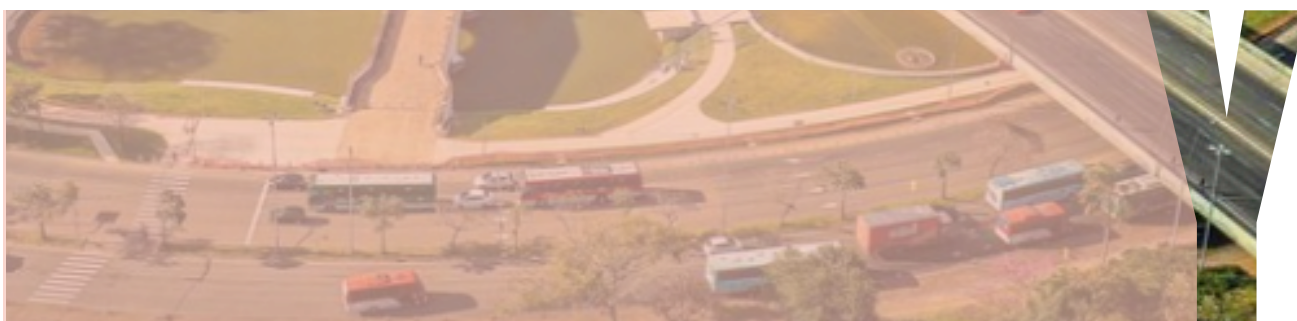
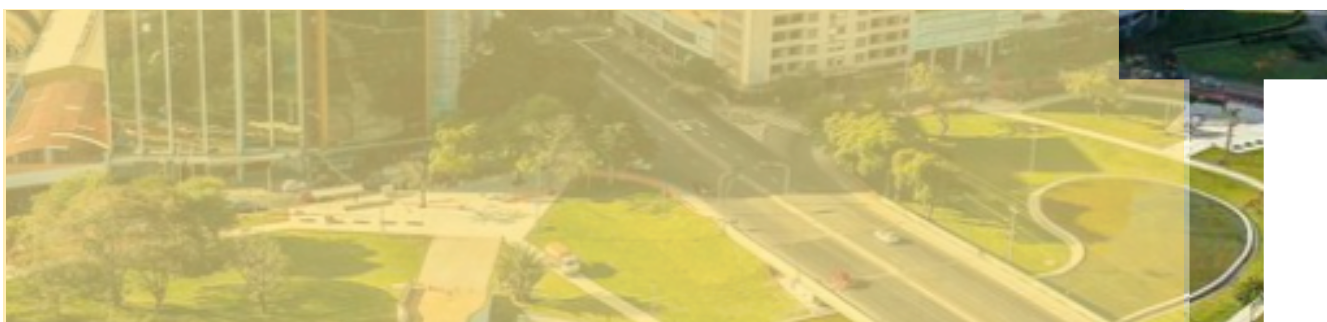


PORTO ALEGRE, BRAZIL



CITY FEATURES



Porto Alegre is a Brazilian municipality and the capital of the southernmost state of Brazil, Rio Grande do Sul. It is home to the second-largest urban concentration in the southern region and the fifth most populous city in Brazil, with nearly 1.3 million inhabitants. The city features diverse geography, including hills, plains, and a large lake, the Guaíba. In the late 1950s, the first Master Plan was implemented, promoting urban verticalization and leading to the most significant real estate expansion in the city's history, which substantially transformed its urban morphology. Its geopolitical location facilitates trade with neighboring countries, particularly Uruguay and Argentina, while also serving as a key connection point to the rest of Brazil, especially the Southeast region.



Population
1,332,845
(2022)



Land area
495.9 km²



Average temperature
20°C

TRANSPORT FEATURES

Status quo and urban mobility trends

Porto Alegre has been working to improve transportation affordability for users through changes in the remuneration methodology and a subsidy of approximately 390 million reais. Additionally, investments have been made to enhance transportation infrastructure, including upgrades to bus stops and terminals.

The transition towards equitable and climate-sustainable mobility systems presents a key opportunity to enhance the quality and comfort of public transportation, encouraging more people to opt for collective and active modes of travel. However, one of the biggest challenges remains the high acquisition cost of electric buses.

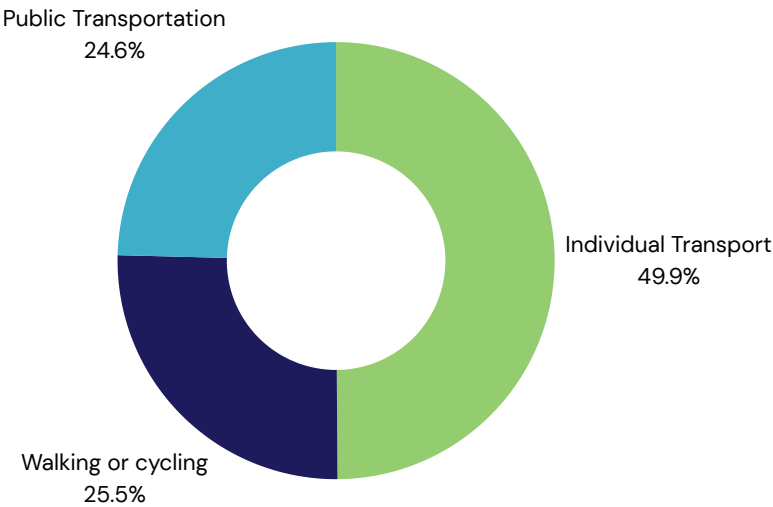
In 2024, the city introduced 12 electric buses as part of the public transportation electrification project, operating on three fully electric routes. The average travel time on these lines is 31 minutes.

The expanded data from the 2023 OD (Origin-Destination) Survey revealed a total of 1,332,197 people across Porto Alegre's 106 traffic zones, collectively making 1,732,140 trips on a typical weekday. This resulted in a Mobility Index of 1.30.



TRANSPORT FEATURES

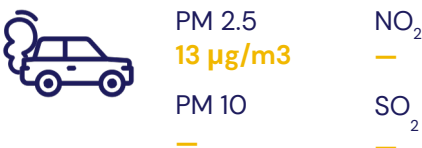
Modal Split¹



GHG Emission Levels²



Air Pollutant Levels

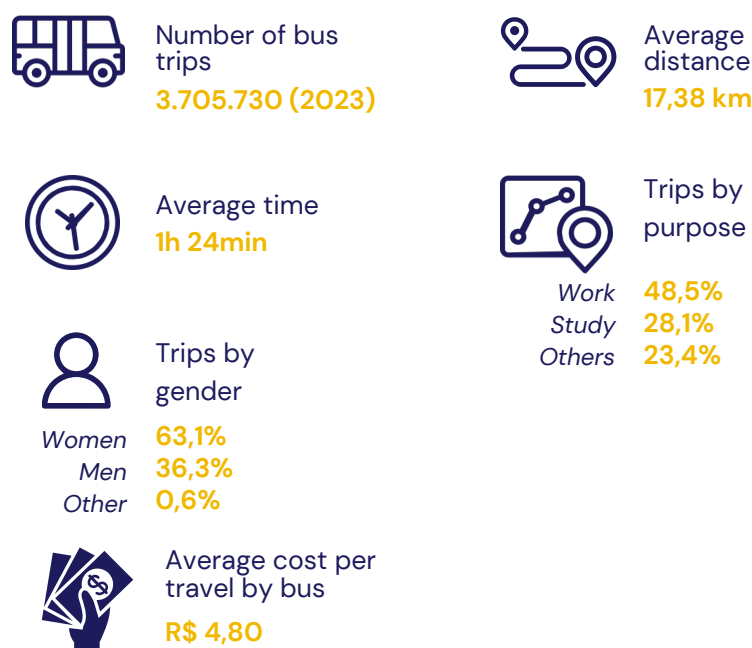


Average air quality level

42 µg/m

In Porto Alegre, 49.9% of trips rely on individual transport, such as cars and motorcycles, highlighting a car-centric mobility pattern. Meanwhile, 25.5% of residents walk or cycle, and 24.6% use public transportation. Air quality is monitored through stations that measure pollutants like suspended particles and toxic gases, which affect health and the environment. The municipality recorded total emissions of 2.4 MtCO_{2e}, with transportation as the largest contributor (~67%), followed by stationary energy (~23%), waste (~9%), and agriculture, forestry, and other land uses (AFOLU) (~1%).

Bus Trips Features



According to the 2022 Quali Ônibus survey, more than 40% of users are up to 34 years old, while 13.5% are 65 or older. This indicates that the majority of users are young, although there is also a significant presence of elderly passengers.

Additionally, 59.2% of users are women, and approximately 55.7% of all users have a household income of up to two minimum wages. This highlights that public transportation is widely used by lower and middle-income groups, as well as socially vulnerable populations.

Another relevant finding is that nearly 50% of users own a car, underscoring the importance of the bus system in the city, as it remains a preferred transportation option over private vehicles or motorcycles. The modal share of buses is 24.6%.

1 Porto Alegre Full-day modal split - Main Mode - EDOM 2023
2 Porto Alegre Greenhouse Gas Inventory Report, 2021

BUS SYSTEMS OUTLOOK

Fleet and Infrastructure



Number of buses
1364

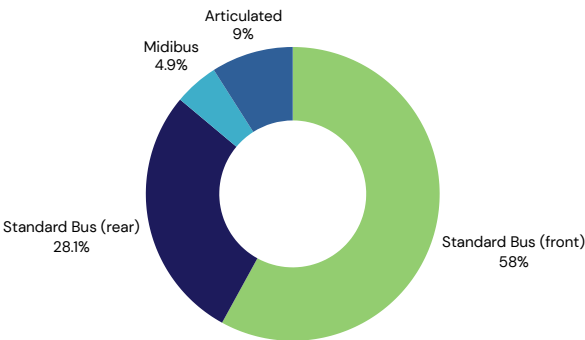


Number of bus routes
276

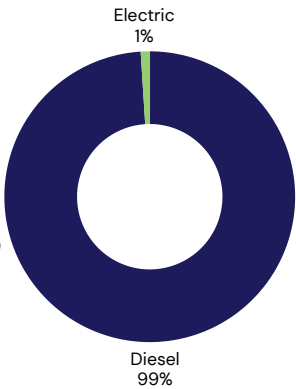


5756 bus stops
11 bus depots

Buses by fleet type



Buses by fuel type



Porto Alegre's bus fleet is 100% accessible, with 83.8% of the vehicles equipped with air conditioning and an average fleet age of 6.55 years. Since 2023, all new fleet additions must comply with the EURO 6 standard, which currently represents 19.2% of the system's fleet, in addition to 12 electric buses. All bus depots are privately operated, and three of them are equipped with charging infrastructure for electric buses.

Quality of Service

Porto Alegre's public bus network offers extensive coverage, reaching nearly all urbanized areas. Every neighborhood is served by at least one bus line, often connecting directly to the city center. The southern and eastern neighborhoods, which have lower population density and large urban gaps, experience the least coverage. In terms of efficiency, 23% of users surveyed in 2023 expressed satisfaction with the speed of the service. The city benefits from 104 km of bus-priority lanes, contributing to faster and more reliable transit. The bus network includes 42.2 km of exclusive lanes and 61.5 km of corridors. Additionally, the entire urban network integrates fare payments, offering a 50% discount on the second trip. While buses are generally planned with a capacity of 4 passengers per square meter, overcrowding can occur during peak hours, as in other major Brazilian cities. Safety and accessibility are priorities, with cameras and facial recognition on all buses. A specialized police unit has helped reduce bus robberies by 95% from 2016 to 2022. Public safety satisfaction increased by 29% between 2018 and 2022, as reported in the QualiÔnibus survey.

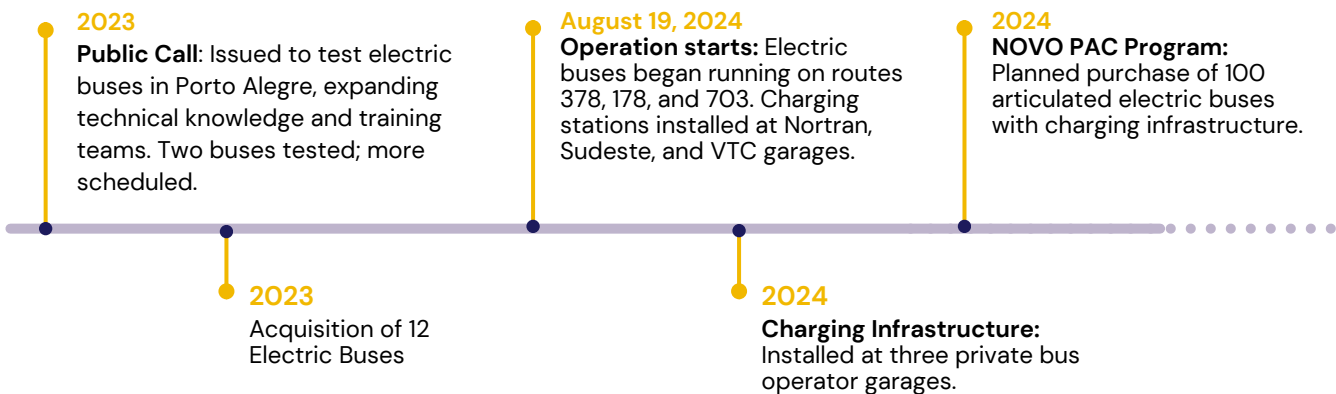


Existing Business Model ³

A	B	C	D	E
Model A: Vertically integrated, private operator in BRT/integrated system	Model B: Divided responsibilities in BRT/ integrated system	Model C: Large, more formal, private operator in traditional service	Model D: Small, informal, private operator in traditional service	Model E: Government-run system
C	Porto Alegre’s public transportation system includes three private operational zones with eleven bus companies in four consortiums and a transversal zone operated by Carris, privatized in January 2024. The fleet has 1,364 GPS-equipped buses, a tracking app, facial recognition, 501 active routes, and an electronic ticketing system for fare integration.			
D	The Selective Transport by “Lotação” complements Porto Alegre’s public transit with fixed-route minibuses. As of November 2022, 207 minibuses operate. By law, fares must be at least 1.4 times traditional buses, reflecting premium service with fewer stops, greater comfort, and faster travel, enhancing mobility in high-demand areas. (Law 13.168/2022).			



E-BUS ADOPTION APPROACH



3 Based on Accelerating a market transition in Latin America: New business models for electric bus deployment, P4G, Zebra and Dalberg, 2020

E-Bus Fleet Technical Features



Model/Brand

Type A

**Attivi Integral/
Marcopolo**

Type B

**Eletra/
Caio Eletra**



Number of buses with this Technology

8 bus Type A

4 bus Type B



Passenger capacity

Type A

80 pax

Type B

70 pax



Charging System

Type A

CCS2DC

Type B

CCS2DC



Battery features

Type A

398,6 kWh

Type B

250 kWh

Capacity

Range

360 km/charge

250 km/charge



Price

Type A

R\$ 2,700,000.00

Type B

R\$ 2,790,000.00

E-Bus Business Model

The business model of the electric bus operator in the city/region/state is structured around a financial advance provided by the Granting Authority. This advance covers acquisition costs, including depreciation and capital remuneration, as outlined in Decree No. 19.635/2016. Specifically, it finances 99% of the electric vehicle's cost, upon proof of purchase, and 100% of the battery charging infrastructure and installation services. The municipality owns and maintains road infrastructure, stations, and terminals, while operators are responsible for fleet maintenance and charging infrastructure. Fare collection is conducted by the operating companies. The regulatory authority fully controls fleet specifications and operational planning. Currently, the government subsidizes 25% of the system to maintain the fare at R\$4.80. The main advantage of this model is centralized fleet and operation control. However, rising vehicle and input costs put financial pressure on both the municipal budget and users.

Opportunities and Challenges to Scaling E-Bus Fleets



Opportunities

- The adoption of electric buses in Porto Alegre contributes to lower emissions, long-term operational cost reduction, and improved energy efficiency. Government incentives, such as new financing models and economic subsidies, support this transition. Given Brazil's high availability of renewable energy sources, integrating electric bus charging infrastructure with solar and wind power aligns with sustainability goals.
- Key benefits include enhanced quality of life, local technological development, job creation, and greater investment in clean technology. Engaging the public in this transition fosters awareness of environmental and social benefits. Efficient battery recycling systems can further support a circular economy.



Challenges

- Challenges include the high cost of electric buses, dependence on energy providers for charging infrastructure, and potential power outages affecting fleet availability. Expanding charging networks, improving battery range and affordability, reducing charging times, and ensuring sustainable battery materials are crucial for widespread adoption. Managing electricity demand and increasing consumer acceptance remain key considerations.

OVERALL FRAMEWORK

Policy

Several entities play key roles in promoting sustainable mobility and bus fleet electrification in Porto Alegre. The municipal government oversees budgeting, while the Mobility Secretariat manages operational planning and oversight. The Finance Secretariat allocates funds, and private operators, vehicle manufacturers, charging infrastructure providers, and the state energy supplier contribute to implementation. Drivers, fare collectors, and engineers also support operations. At the national level, the NOVO PAC program funds electric and Euro 6 diesel bus acquisitions. Locally, the Climate Action Plan (PLAC) and the city's Urban Development Master Plan align with mobility strategies to facilitate the transition to electric buses.

Porto Alegre aims to acquire 100 additional electric buses in the short term. The city also encourages manufacturers to test new vehicle technologies through public calls, fostering innovation and reducing greenhouse gas emissions.

Financing

Porto Alegre adopted an Economic Subsidy model to acquire 12 electric buses and install charging infrastructure in three private depots. This public policy instrument provides direct financial support to businesses or sectors of public interest. The total subsidy amounted to 38 million reais, covering both the fleet and charging infrastructure. Funds were allocated according to legal and regulatory criteria, with oversight mechanisms in place. The government advanced payments for acquisition costs, including depreciation and capital remuneration, as per Decree No. 19.635/2016. At the end of their lifespan, vehicles, electric motors, converters, and batteries will revert to the government to ensure fare affordability. Used batteries may be upgraded, traded in for new purchases, sold, or repurposed. The city initially funded 12 buses with municipal resources and plans to acquire 100 more through PAC financing. Future funding options include development bank loans and international climate funds.

Impact

Porto Alegre is developing a Climate Action Plan with targets for 2030, 2040, and 2050, aiming for net-zero emissions, a hybrid/electric public transportation fleet, increased low-carbon private vehicles, and promoting active transportation. The plan also focuses on renewable energy in buildings, better waste treatment, reduced water loss, and enhanced biodiversity. A baseline emissions assessment shows rising greenhouse gas emissions in transportation, energy, and waste. However, actions like expanding the electric bus fleet and using renewable energy in public buildings may not fully offset emission growth. The city is ensuring an equitable transition by providing subsidies, accessible infrastructure, and involving vulnerable communities through consultations and training programs.



TUMI E-bus Mission City Network – Profile

PORTO ALEGRE, BRAZIL



Acknowledgements

Author:

Leticia Borges (ICLEI SAMS)
Pablo Souza (ICLEI Consultant)

Contributors:

Mariana Lovato dos Santos (EPTC)
Maria Cristina Molina (SMMU)

Editors:

Ana Maria Cruz Ochoa (ICLEI World Secretariat)
Tu My Tran (ICLEI World Secretariat)

Design:

Andreina Garcia Grisanti, Olga Tokareva, Laura López,
(ICLEI World Secretariat)

Disclaimer

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About the TUMI E-Bus Mission

Funded by the German Ministry for Economic Cooperation and Development (BMZ), a core group of organizations supports cities in their transition toward electric bus deployment.

For more information please contact:
tumi-network@iclei.org or visit
<https://sustainablemobility.iclei.org/tumi/>

Contact

ICLEI

Local Governments for Sustainability e.V.
Kaiser-Friedrich-Str. 7
53113 Bonn | Germany
Tel. +49-228 / 97 62 99-00
Fax +49-228 / 97 62 99-01
Website: www.iclei.org
<https://sustainablemobility.iclei.org/>

