ENGLISH

MICROMOBILITY BRAZIL

Shared Bicycle and Scooter Systems _2021 Findings

DEVELOPMENT
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COLLABORATION
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SUPPORT
Itaú

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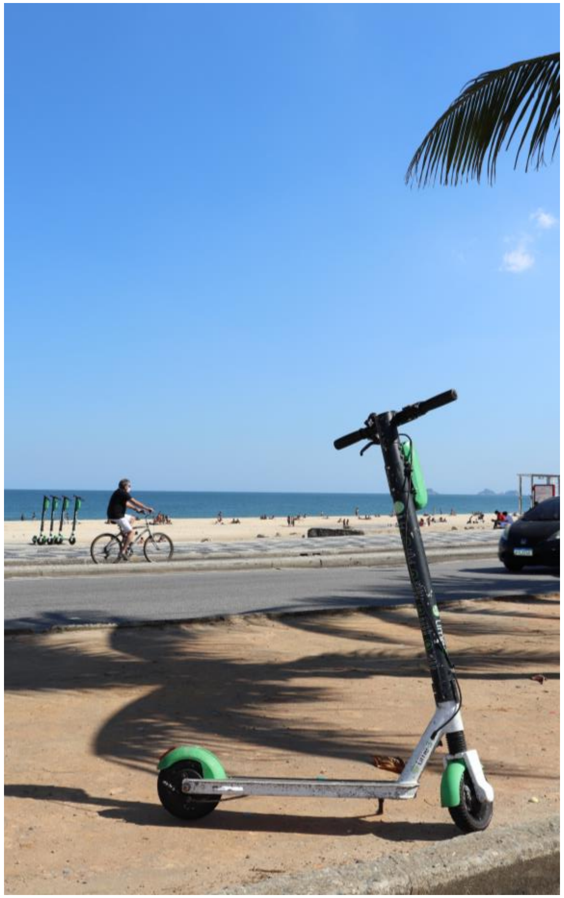


Electric scooters at Ipanema Beach.
Source: Pedro Bastos.

This booklet summarizes the monitoring of Brazilian shared bicycle and scooter systems displayed on the MicromobilityBrazil.org Platform in March 2021. Every six months, the platform georeferenced the public micromobility systems, aiming at promoting data transparency and calculating CO_2 emissions. It also presents information on demographic profiles and system-usage dynamics.

The Micromobility Brazil Platform is coordinated by the Sustainable Mobility Laboratory (LABMOB), of the Federal University of Rio de Janeiro (UFRJ), supported by Itaú Unibanco and held in partnership with the Energy and Environment Institute [*Instituto de Energia e Meio Ambiente*] (IEMA).

For the 2021 findings, micromobility operators Tembici, Serttel, and Mobhis Automação Urbana collaborated to provide data. The findings presented here are connected to the data in the homonymous report published in 2020, with more detailed and in-depth information on micromobility in Brazil. The previous report is available for download at labmob.org.

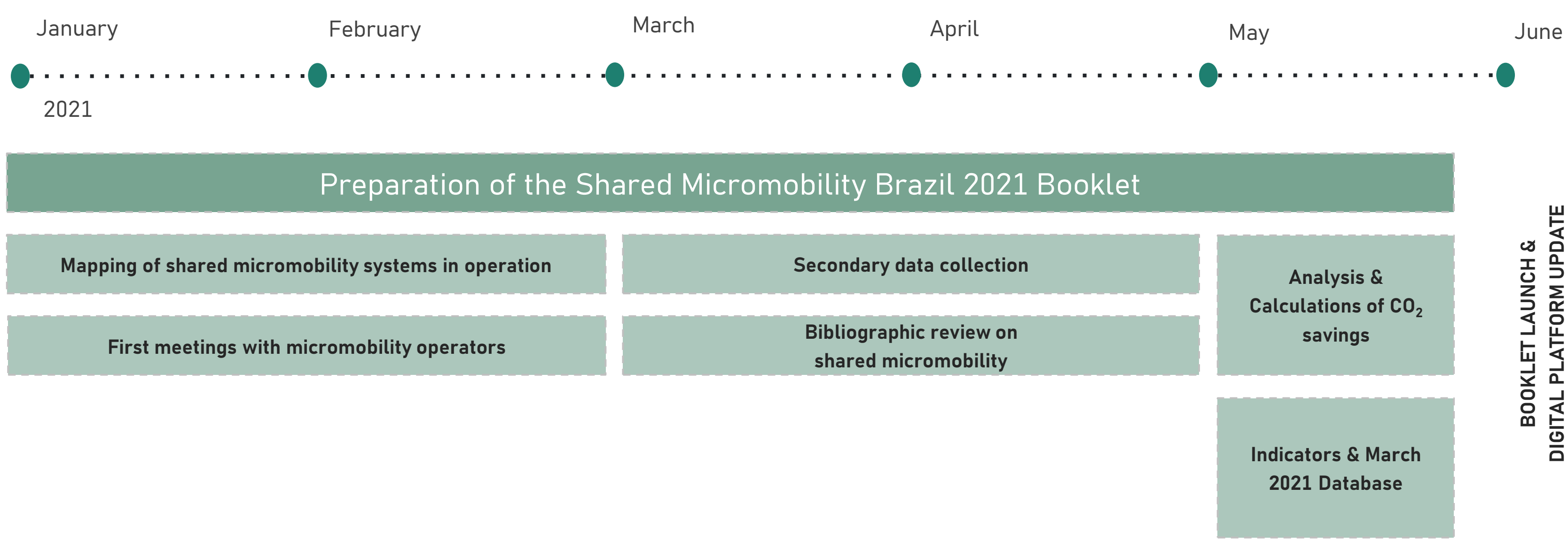
1. METHODS

STEP-BY-STEP

Mapping of systems in operation and first meetings with operators. Online search: press and city halls' official websites. Operators provided data directly to us.

Collection of secondary data on systems and bibliographic review. Operators could have provided raw data or sent requested information already calculated regarding our desired indicators.

Data analysis and calculation of CO_2 savings resulting from the use of micromobility systems, followed by the elaboration of indicators concerning the March 2021 database – see next page.



INDICATORS

Indicators are presented in three different scales: **Brazil, Cities** and **System**. The Brazil and Cities scales provide aggregated data, that is, sums of data available in the country and in cities with at least one shared micromobility system in operation regarding March/2021. In turn, the **System** scale displays the individual data available for each system we mapped.

	BRAZIL	CITIES	SYSTEM
ENVIRONMENTAL IMPACT	CO_2 savings	CO_2 savings	CO_2 savings
SYSTEM	total systems type of system *(station-based, dockless)* total vehicles type of vehicle *(electric, conventional)* viagens diárias *(average)* distance traveled per day *(average)*	total systems type of system *(station-based, dockless)* total vehicles type of vehicle *(electric, conventional)* viagens diárias *(average)* distance traveled per day *(average)*	type of system *(station-based, dockless)* total vehicles tipo de veículo *(electric, conventional)* viagens diárias *(average)* distance traveled per day *(average)*
USERS' DEMOGRAPHIC FEATURES			% users by sex % users by age group

DATA SCOPE

Data were obtained directly from three of the five operators mapped in Brazil: **Tembici, Serttel** and **Mobhis**. In general, they correspond **to daily totals or average** computados em março/21*. Details on the calculation used to calculate numerical data can be found in the methodological note available on the **Brazilian Micromobility Platform**.

Tembici shared a travel records database. The available data allowed the team to calculate the following indicators:

- Daily trips;
- Distance traveled per day;
- Percentage of users by age.

Serttel calculated the following indicators on its own:

- Daily trips;
- Distance traveled per day;
- Total number of users;
- Percentage of users by age;
- Percentage of users by gender.

Mobhis shared a report generated by its internal control system. The available data allowed the team to calculate the following indicators:

- Daily trips;
- Distance traveled per day;
- Total number of users;
- Percentage of users by age;
- Percentage of users by gender.

* It is worth contextualizing that several urban activities, including public shared micromobility systems, were impacted due to restrictions resulting from the Covid-19 pandemic.

CACULATING CO_2 SAVINGS

The equation used to estimate CO_2 savings was developed by the Institute of Energy and Environment (IEMA).

$$E_S = Q_S * \sum_{M} P_{M,S} * Fe_{M,S} = Q_S * \left(P_{auto,S} * Fe_{auto,S} + P_{moto,S} * Fe_{moto,S}\right)$$

E_S — CO_2 savings by using the S system in tons of CO_2e (carbon dioxide equivalent) per year;

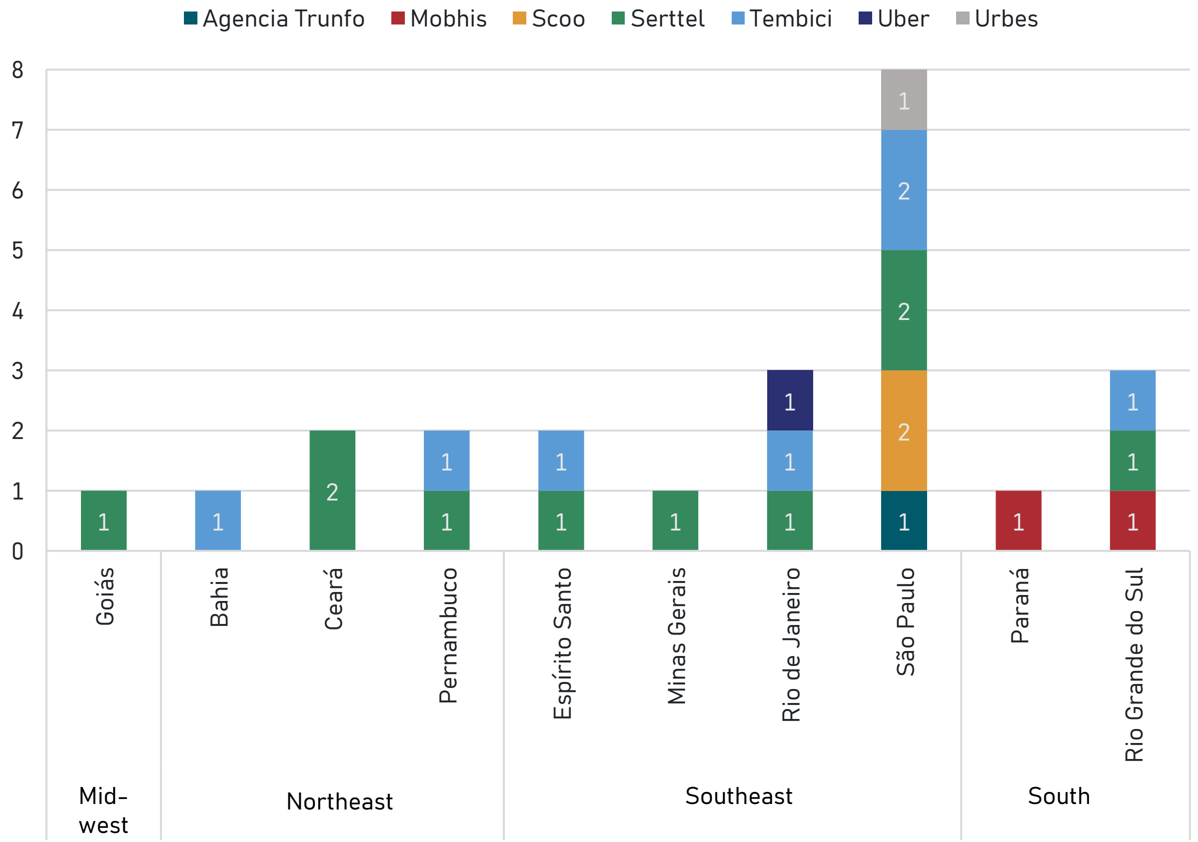
Q_S — mileage traveled by vehicles in the S system in kilometers (km) per year;

$P_{M,S}$ — percentage share (%) of the M transport mode (automobile or motorcycle) in the previous users' modal split of system S vehicles, depending on the municipality where the S system is located;

$Fe_{M,S}$ — CO_2e emission factor relative to the mode of transport M (car or motorcycle) in gCO_2e/km varying accordingly to the municipality where system S is located.

2. FINDINGS

Total of systems per operators accordingly to state and region



24
systems were operating in March 2021

54%
of the systems are located in Brazilian Southeast

42%
of the systems in operation are runned by Serttel

Total of systems per city

SÃO PAULO

RIO DE JANEIRO

FORTALEZA

The cities above mentioned lead the concentration of shared micromobility systems in March 2021. Each of them has more than 1 system in operation.

PROFILE OF BRAZILIAN MICROMOBILITY SYSTEMS

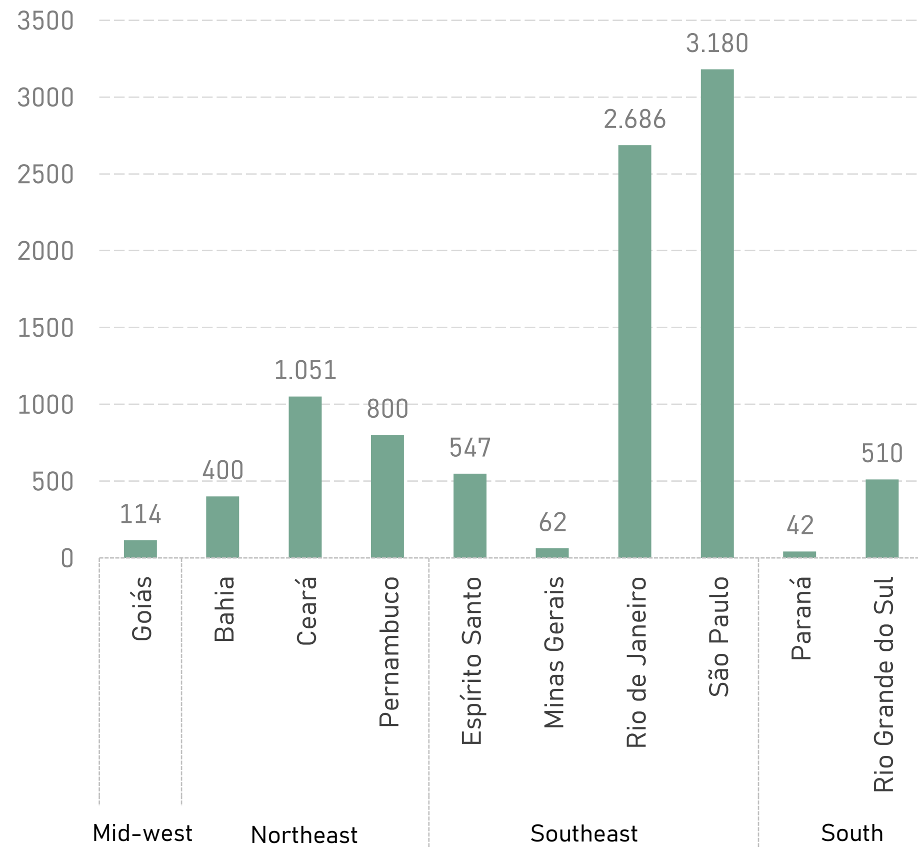
Types of vehicles

79,1% are station-based bicycles

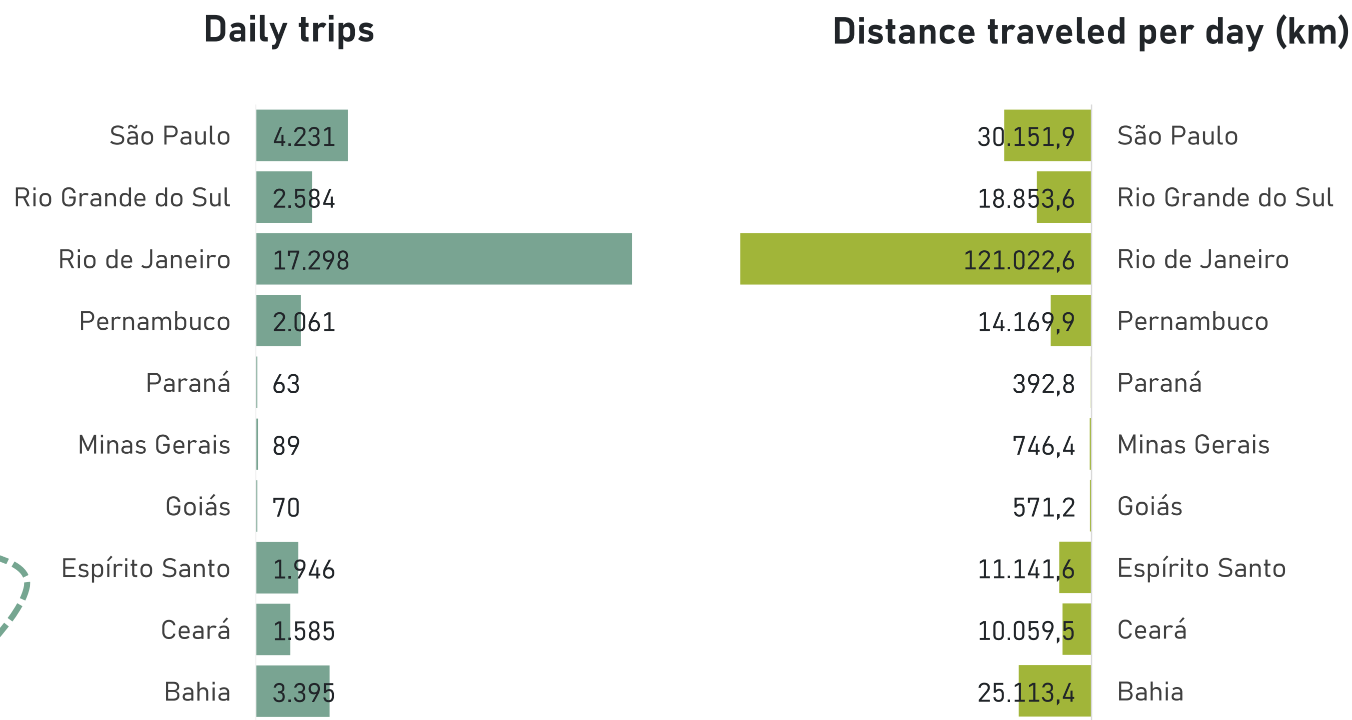
12,5% are dockless bikes

8,3% are dockless electric scooters

Total of bicycles per state



SYSTEMS-USAGE DYNAMICS

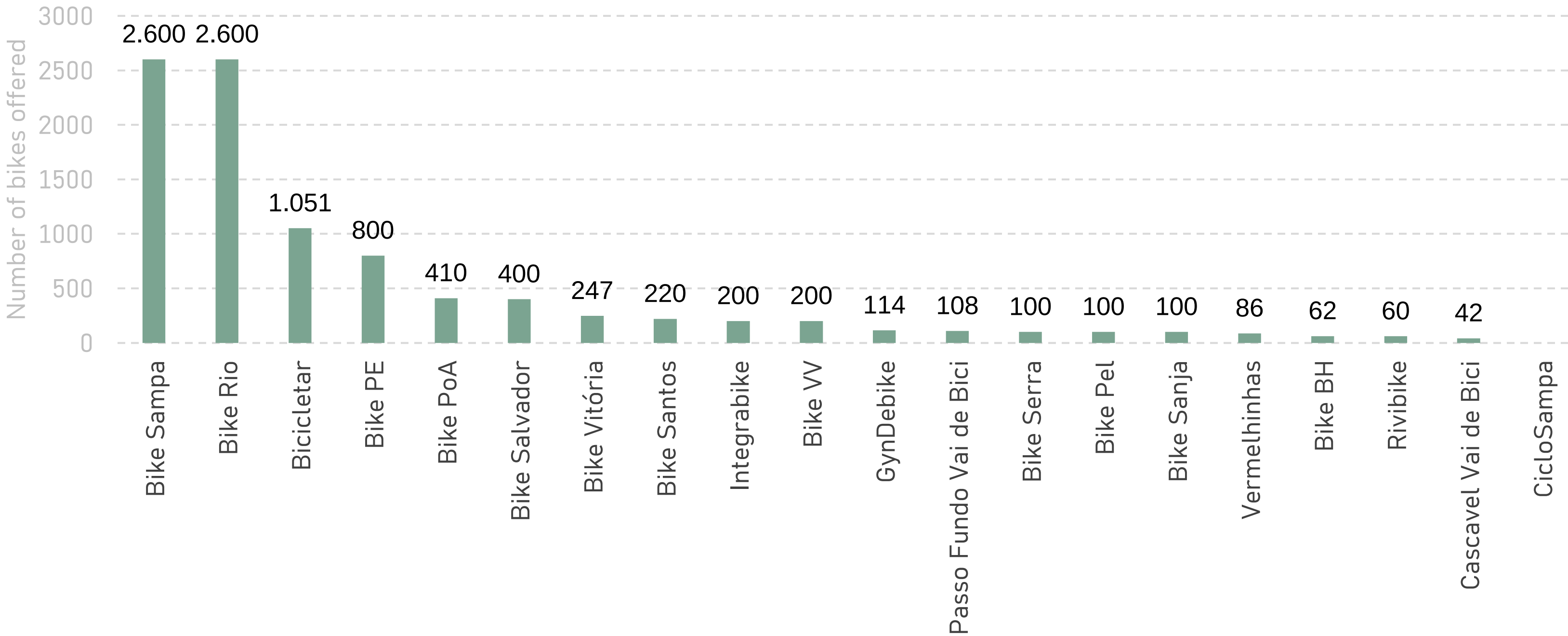


3.332 are the average daily trips in Brazil

23.2K are the average distance traveled per day

SYSTEMS-USAGE DYNAMICS

Total of bicycles provided and daily trips per system

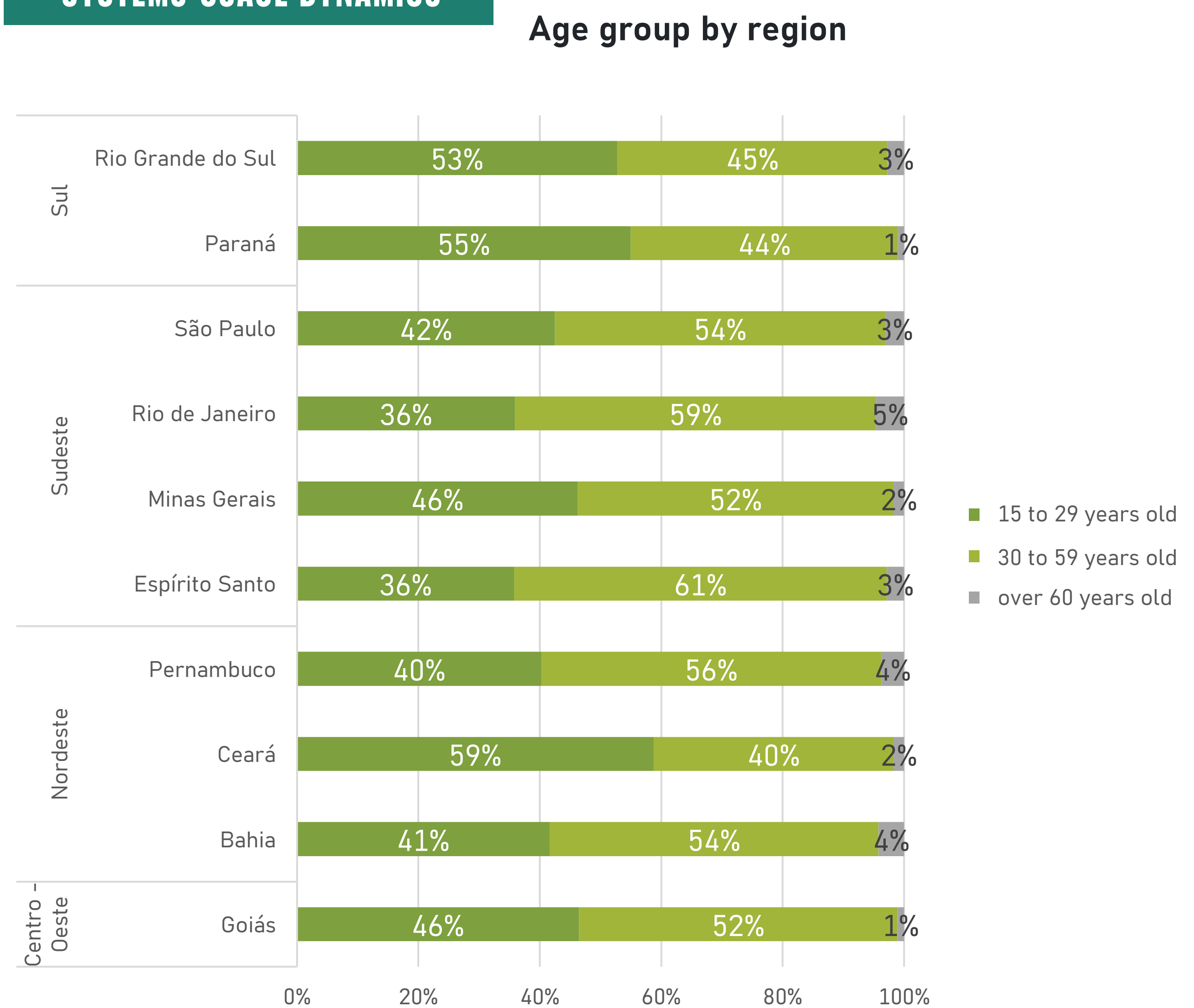


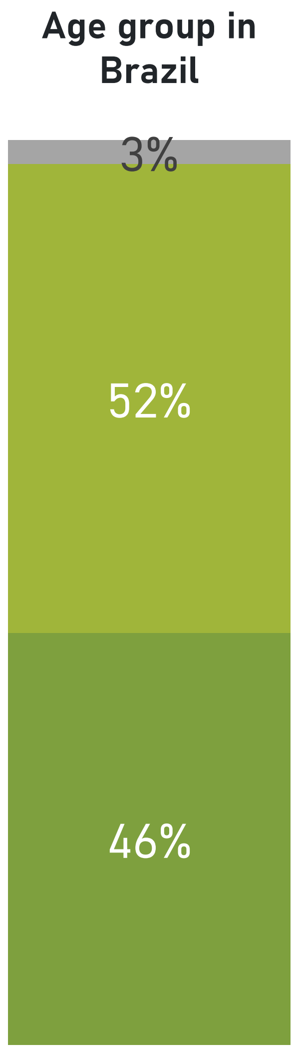
17,096

is the number of daily trips made by **Bike Rio**, the busiest micromobility system in Brazil.

System	Daily trips	System	Daily trips
Bike Rio	17,096	Bike Vitória	646
Bike Salvador	3.395	Vermelhinhas	202
Bike Sampa	3.328	Bike Serra	106
Bike PoA	2.494	Bike Pel	90
Bike PE	2.061	Bike BH	89
Bicicletar	1.585	GynDebike	70
Bike VV	1.194	Cascavel Vai de Bici	63
Bike Santos	875	Bike Sanja	28

SYSTEMS-USAGE DYNAMICS





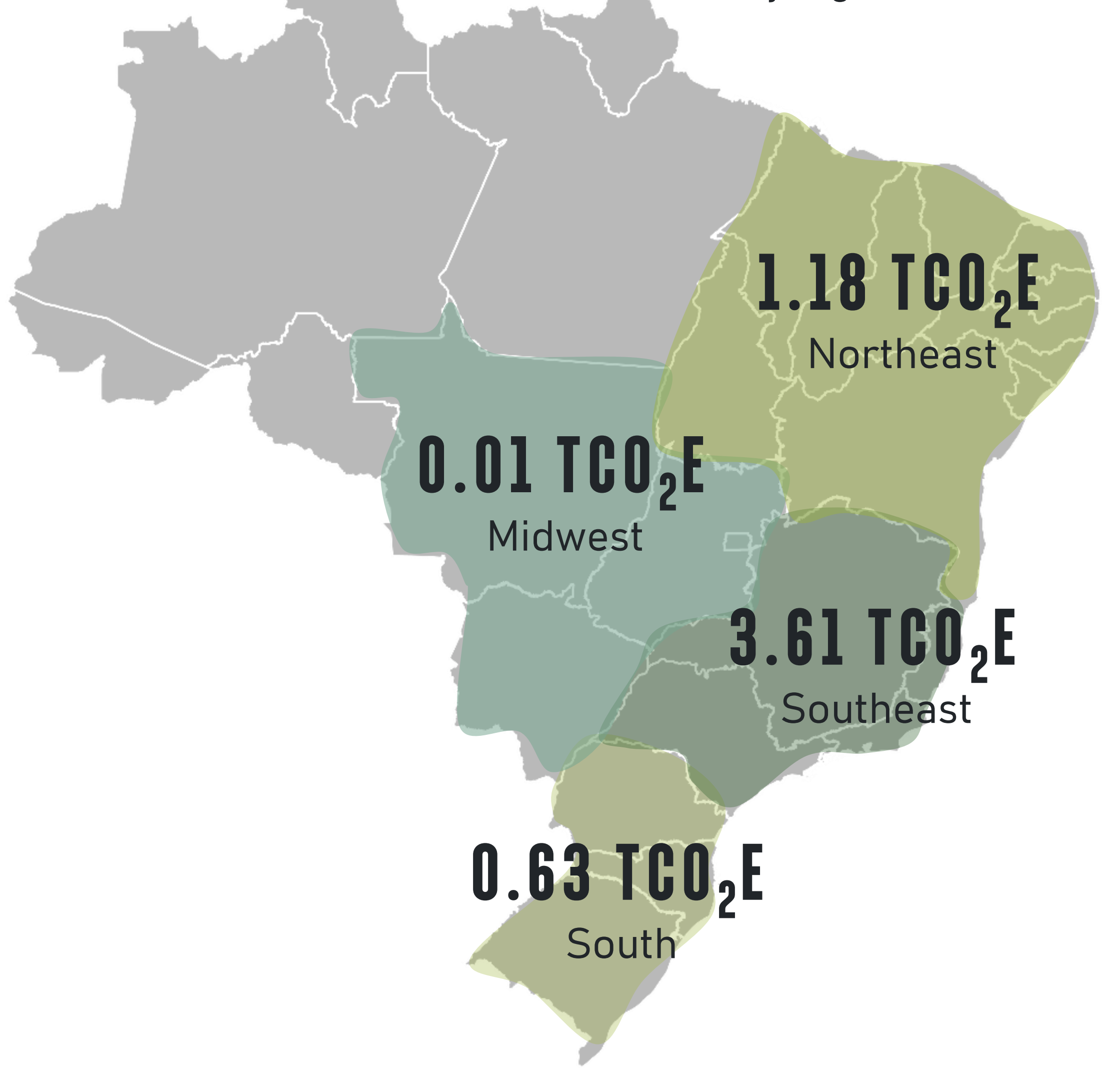
CO_2 SAVINGS

CO_2 savings regarding the use of micromobility systems correspond to

13.873

growing trees equivalent to sequester carbon

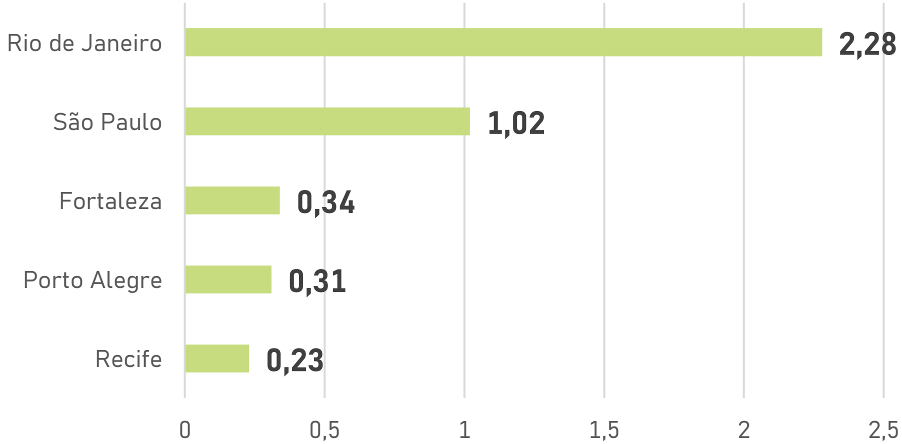
CO_2 savings by region



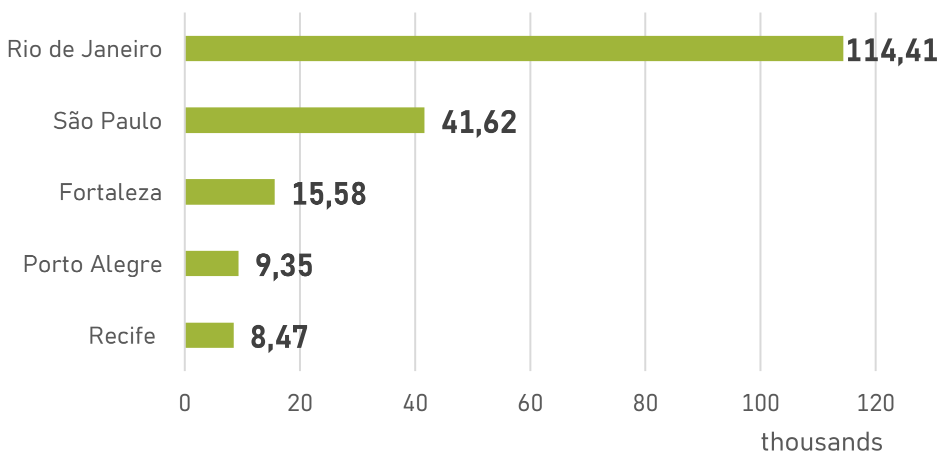
thousands

RANKING

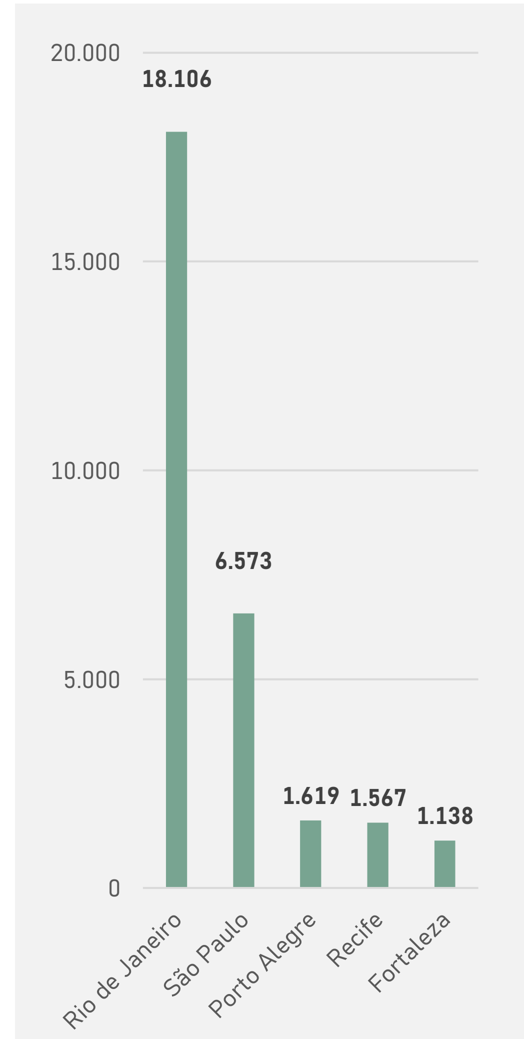
CO_2 savings per day (tCO_2e)



Distance traveled (km per day)



Daily trips



3. MICROMOBILITY EVOLUTION

TYPES OF SYSTEMS

STATION-BASED

A system focused on defining physical sites (stations or docks) allows people to borrow a bike or a scotter and return it at another dock belonging to the same system. The station-based model considers the urban density and the number of potential users for planning purposes since the stations work in a networked way.

DOCKLESS

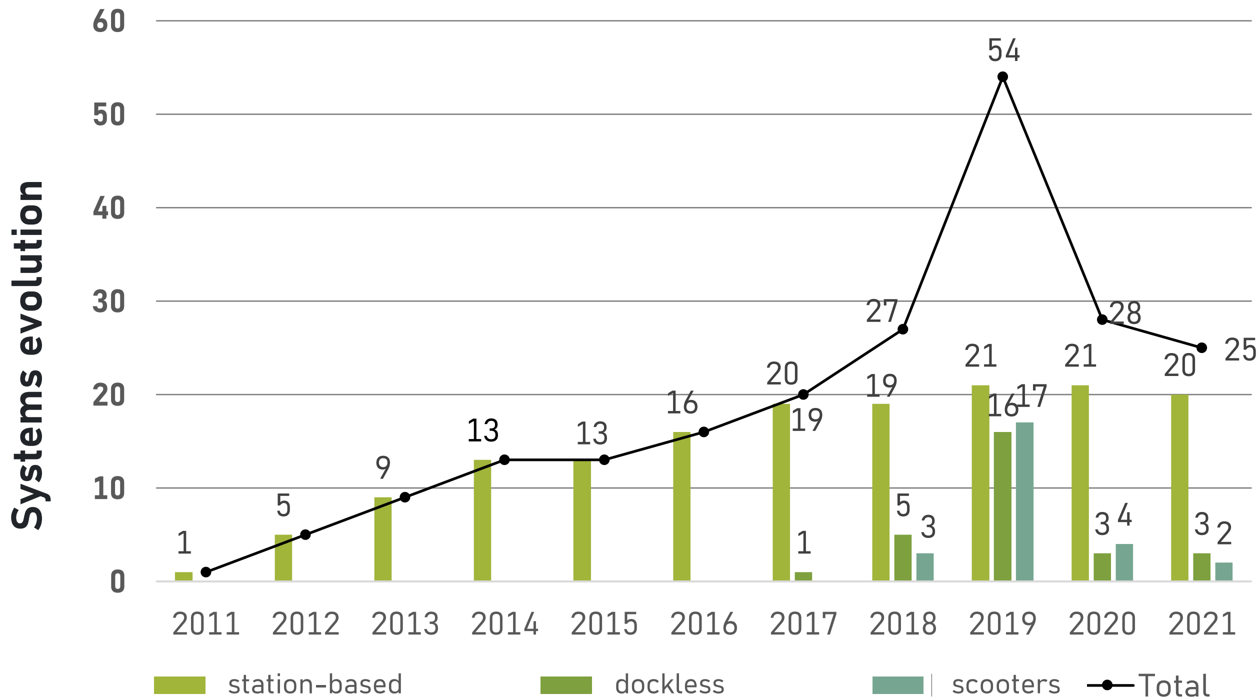
A system that offers dockless free-floating vehicles (bicycles and scooters) equipped with onboard GPS and integrated devices that allow users to unlock them through QR Code using a smartphone. This enables you to start or finish your trip anywhere as long as you leave it within the operating area, known as the "electronic fence."

HYBRID

A system adapted to optimize the operation of shared micromobility systems by combining the characteristics of the dock and dockless systems. In addition, the hybrid model attempts to improve the capacity to meet demand, reduce the costs regarding physical stations, and minimize conflicts in public space by defining sites to rent and return vehicles.

Source: Guia de Micromobilidade Compartilhada (2021).

Between 2011 and 2016, there was an increase in station-based bicycle systems, stabilizing between 2017 and 2021. In 2019, there was a peak in the provision of micromobility systems soon after the appearance of dockless models in 2018. However, before the Covid-19 pandemic broke out in Brazil, operators had already reduced systems in operation, leading to a significant decrease during 2020 (LABMOB, 2020). From March 2020 onwards, the industry and other urban activities continued to be impacted by the pandemic.



REGULATION

Regulation is necessary for implementing and operating micromobility systems. This is because they make use of public space and represent urban commuting alternatives. Besides, the lack of rules for electric scooters limited its usefulness once the 1997 Brazilian Traffic Code (CTB) did not include them in the list of acknowledged vehicles. Furthermore, the diversity of business models that have also emerged poses a challenge to public management, indicating that regulations should not be inflexible. For example, what works well for a station-based system may not work for a dockless system; what is ideal for bicycles may not be for electric scooters. The regulation of how public space must be used, in turn, is carried out by municipal laws and decrees.

One of the leading national and international debates on regulation deals with integrating systems with local mobility and accessibility policies. Besides, contractual tools that guarantee payment from operators for using public space; equity and accessibility; the monitoring of the operation; the protection and security of users; transparency data; the management of fines or sanctions for non-compliance; and evaluating the system and objectives over time (ITDP, 2018). In addition, issues related to the systems themselves, such as the supply of vehicles, location of stations (physical or virtual), ticketing, costs, and financing, should also be addressed in a regulatory tool for shared micromobility.

A station-based micromobility system from Bike Rio in the public space of Praça General Osório, Rio de Janeiro. Source: Pedro Bastos.

DIMENSION	TRAFFIC AND SAFETY	USE OF PUBLIC SPACE
CONCEPT/ DEFINITIONS	Traffic and safety rules are generally ruled by federal laws and legal resolutions. The circulation rules frame the classification of vehicles, determining permissions and restrictions of circulation through the constitutive characteristics and use of these vehicles. This is due to an alignment between the vehicle classification (size, weight, speed, materials, etc.) and the safety and good sharing rules, aiming at the safety of everyone in the public space. With very few exceptions, motor vehicles are prohibited in areas with active circulation, such as bicycle paths, sidewalks, and public sidewalks. Even micromobility vehicles are commonly barred from circulating on sidewalks due to an understanding that everyone must ensure the highest safety of pedestrians.	The rules on the use of public space vary according to the type of system. Whichever system operates in the public area must be aligned with some legal instrument that defines this rule. Whether it is a tax or legal permission, the strategies and tools for using the public space must be determined by local authorities – in the Brazilian case, by city halls. The instruments are diverse, and there are compelling examples of each. What is also observed is that city halls have adopted different legal frameworks for systems with and without stations. Often, the rules for using public space for electric scooters differ from those applied to bicycles, for example.
INDICATORS/ METRICS	**TRAFFIC INJURIES AND DEATH** **TRIPS BY MODE OF TRANSPORTATION**	**CHARGES AND FEES FOR USING PUBLIC SPACE**

Source: Guia de Micromobilidade Compartilhada (2021).

THE APPEARANCE OF SHARED E-BIKES

Electric bicycles from the Citibike system in New York, USA. Source: public domain.

The micromobility sector has evolved as new technologies impact and optimize the management and operation of systems. For example, the use of electric bicycles gained greater relevance as of 2017, with systems running e-vehicles exclusively.

This is the case of the Bike Town in Portland (United States) and other systems that have already been incorporated and expanded like that, such as Citibike, in New York.

The main motivations for operators to invest e-bikes refer to:

- Search for new audiences and more diverse user profiles;
- Search for new profiles and diversity of trips due to the electric-assist power, facilitating the achievement of longer trips and/or biking in uneven topography routes.

The operators' expectations are is that they will obtain a greater financial return even if costs for acquisition are higher as public systems and target audiences expand.

The first electric bicycles operated by a Brazilian company appeared in March 2019, incorporated by Tembici into the Bike Sampa system. Still, in a small number and on a pilot basis, it ended in March 2020. In September 2020, around 500 bicycles were incorporated into the Bike Rio system and are still operating (June 2021).

In December 2019, electric bicycles appeared in Brazil through the Jump dockless system, operated by the American company Uber in Santos (SP). In March of the following year (2020), the system also arrived in the city of São Paulo.

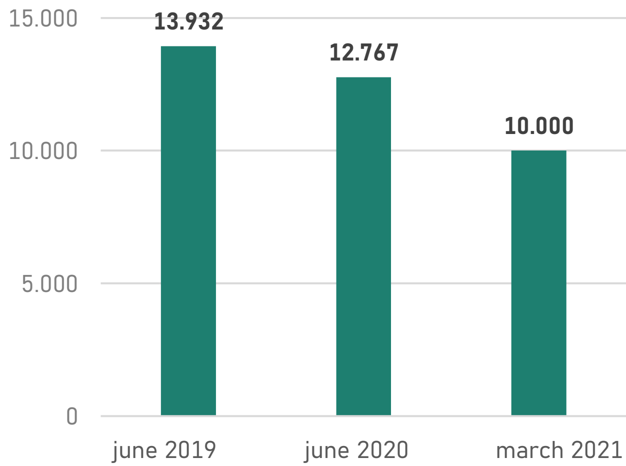
However, due to the Covid-19 pandemic, which hit Brazil in the same period, and for reasons of the global positioning of the operator Uber, Jump's electric bicycles left the Brazilian market in mid-July 2020.

Bike Rio's electric bicycle, operated by the Brazilian company Tembici. Source: Public domain.

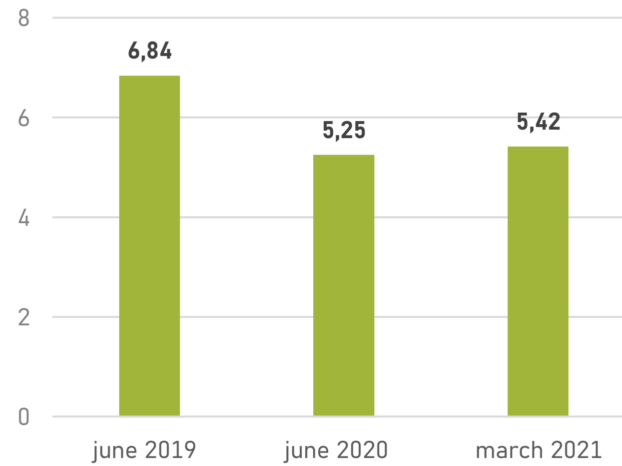
There are currently two main bicycle models: autonomous motorbikes (e-bikes) and pedal-assisted bicycles (pedelecs), whose motor is activated as the cyclist increases speed in pedaling. However, it does not dismiss the need for physical effort when the motor turns on. In Brazilian public shared micromobility systems, the available electric bicycles are exclusively pedal-assisted. According to Contran Resolution 465/2013, this model must reach a maximum speed of 25 km/h and not have a manual accelerator.

COMPARATIVE 2019-2021

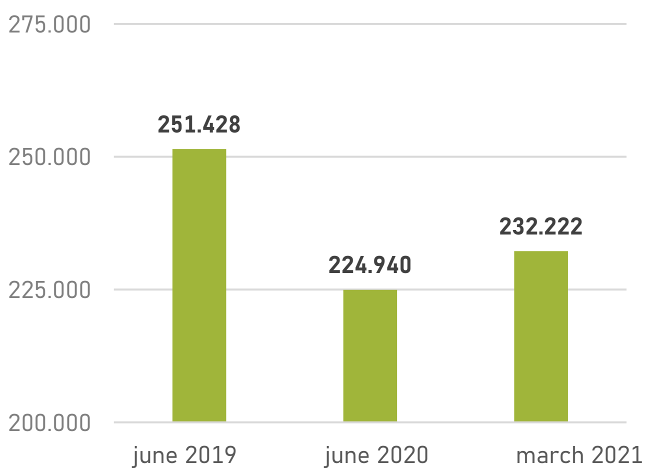
Total Bicycles



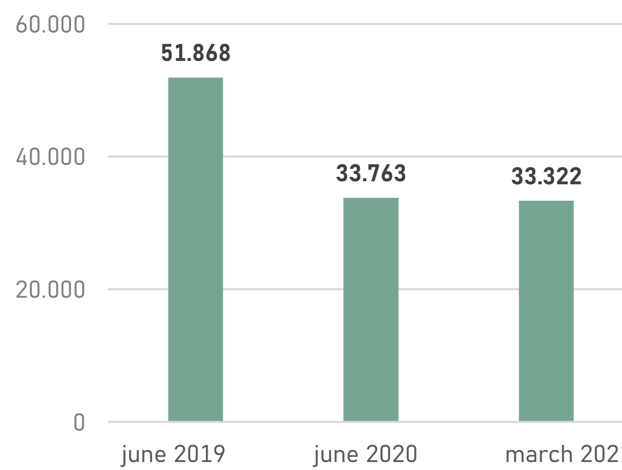
Savings (t/CO2e)



Distance traveled (km/day)



Daily trips



4. TRENDS & BEST PRACTICES

COVID-19 BACKGROUND

In March 2020, the micromobility industry underwent significant changes as the Covid-19 pandemic outbroke around the world. Furthermore, many of the trips made on shared public bicycles were no longer necessary because of social distance and quarantine recommendations. This context led systems to undergo a decline in usage and intensity previously existed.

In May, the frightened industry caught a breath when micromobility systems came to be recommended as a hygienically safer and more reliable alternative for those who could not avoid social distance. Then, several Brazilian cities began installing temporary bicycle lanes to encourage cycling during the most dramatic period. They were inspired by European cities and some in Latin America, such as Bogotá and Mexico City, that were applying the same measures simultaneously.

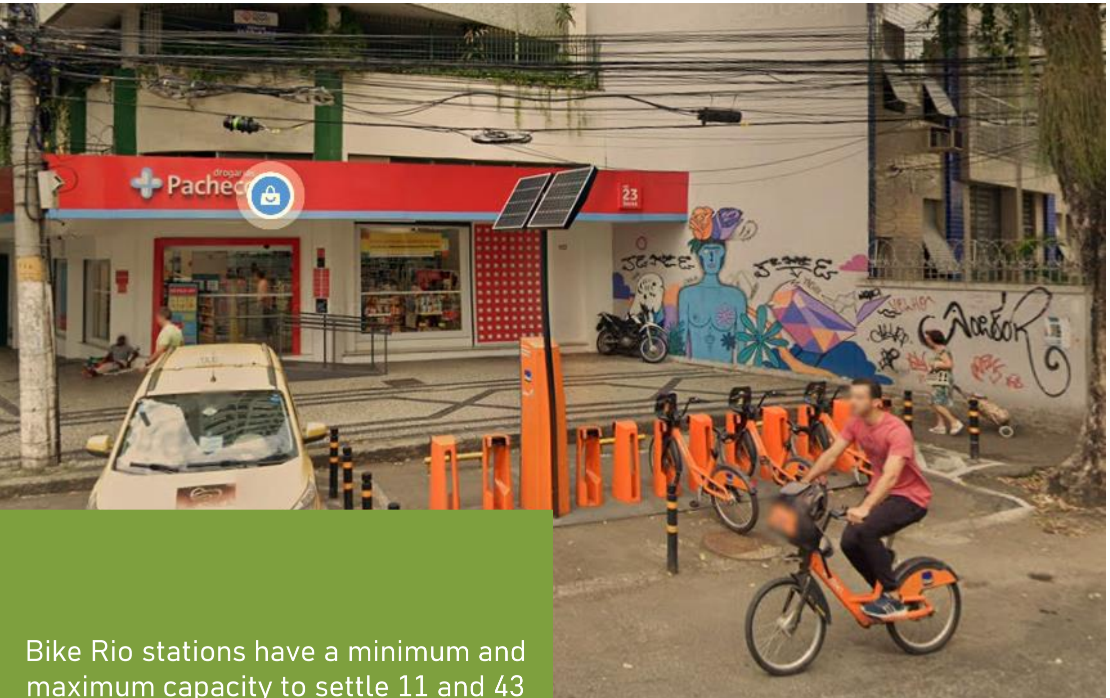
The city of São Paulo, for example, began installing the cycle lane on Avenida Rebouças and promised + 173km by the end of the year in cycling infrastructure. Belo Horizonte, Porto Alegre, and Rio de Janeiro were also exemplary by providing extra cycling infrastructure.

Rio has completed feasibility studies to provide newly bike lanes linking downtown to North and Southside, passing through Bike Rio stations. The initiatives continue to be debated in workshops with the participation of the local Traffic Engineering Company, civil society and interested entities.

Amidst the global crisis, the bicycle sector soared: only in São Paulo, there was an increase of up to 118% in bicycle sales during the pandemic. In addition, startup Tembici received a public contribution of nearly 50 million dollars to implement electric bikes and expand its current systems, foreseeing expanding the service to other places.

Notwithstanding the dramatic global panorama experienced by the pandemic, it has been a period in which the future of mobility began to be discussed even more. Micromobility systems gained ground as a key to reducing carbon emissions, transitioning the energy sources and improving public health indices – especially concerning cardiorespiratory disorders.

“BIKE RIO” SYSTEM, RIO DE JANEIRO (RJ)



Bike Rio stations have a minimum and maximum capacity to settle 11 and 43 docks, respectively. The system also includes temporary free-floating bicycles at peak times at busier stations close to transport hubs.

Bike Rio station located on Conde de Bonfim Street, next to Saenz Peña metro station – Rio's Northside. Source: Google.

Bike Rio is one of the most successful systems among the totally private micromobility arrangements in Brazil. In addition, it is a reference for helping locals out to accomplish their first and last-mile commuting journeys. Therefore, Bike Rio plays a crucial role in intermodality: its stations are located primarily along with medium and high-capacity transport, such as metro, trains, ferries, LRV, and BRT corridors. About 54% of the stations are close to medium and high-capacity transport. In addition, several Bike Rio docks are strategically positioned next to metro stations in the South Zone, Center, and Tijuca region, areas known for having the highest rates of urban density and mixed uses (residential, tourist and commercial). Bike Rio was also planned to be close to the cycling network in Rio: 92% of the stations are near to cycle paths, that is, at a maximum distance of 500 meters from some range of the cycle network, a factor that encourages including micromobility as part of the modal integration (LABMOB, 2020).

"BICICLETAR" SYSTEM, FORTALEZA (CE)

The city of Fortaleza (in Northeast Brazil) stands out for running a shared bicycle system that is expanding the diversity of accessibility to the Bicicletar system. One of the city's strategies is to rent for up to 14 hours overnight in places far from concentrated stations. As an advantage, the system allows users to travel longer without troubling them whether they will find stations or not to return the bicycle at the end of the journey. In addition, usage is facilitated through the system's smartphone app digitally integrated with the city's single-ticket. This payment facility promotes micromobility since it let people that don't have credit cards get a chance to enjoy bicycle rides. Besides, Fortaleza also runs the Mini Bicicletar system focused on inducing children to learn to cycle. The system's mission is to educate kids about sustainable and non-polluting ways to commute and acquaint them with our planet's challenges from an early age.

Source: Guia de Micromobilidade Compartilhada (2021).

Change of the system's rental time in Ceará increases diversity (2018). Source: Fortaleza City Hall.

Bicicletar system runs on a hybrid institutional arrangement: it is operated by a private company (Unimed) but counting on public resources. The City Hall's strategy is to collect financial resources from the rotating parking to finance the cycling system. This strategy had the approval of the Fortaleza City Council.

"VAI DE BICI" SYSTEM, PASSO FUNDO (RS)

A station-based dock managed by Vai de Bici system and operated by Mobhis in Passo Fundo (RS). Source: Passo Fundo City Hall.

In Passo Fundo (South Brazil), Vai de Bici System currently has 24,451 users. It is part of a City Hall-led program that sought to boost awareness among locals about the benefits of using the cycle path (opened in 2016). In addition, to encourage bicycle as a popular, sustainable and respected means of transport in traffic. The bicycle path and the shared bicycle system are part of the initiative transforming the city's profile in a few years.

From Passo Fundo (RS), the Vai de Bici system is a national reference for being financed entirely with public resources and operated by Mobhis. Opened in 2016, it works daily and provides 11 stations and 108 conventional bicycles for rental. The stations count on smart self-service docks. The release of bikes can be carried out upon free pre-registration. Vehicles can be picked up from 6:00 am to 10:00 pm, and later or earlier, users can only return them. Users are entitled to keep the bikes for at least two consecutive hours. Exceeding two hours, users must return the bicycle and only pick them again after a 15-minute break. Fines can be charged accordingly to the time exceeded. The system's long-term goal is to stimulate active mobility and reduce the use of private cars in a medium-sized city that plays the role of a prominent regional center regarding its agribusiness-related economy in the Rio Grande do Sul (RS) state.

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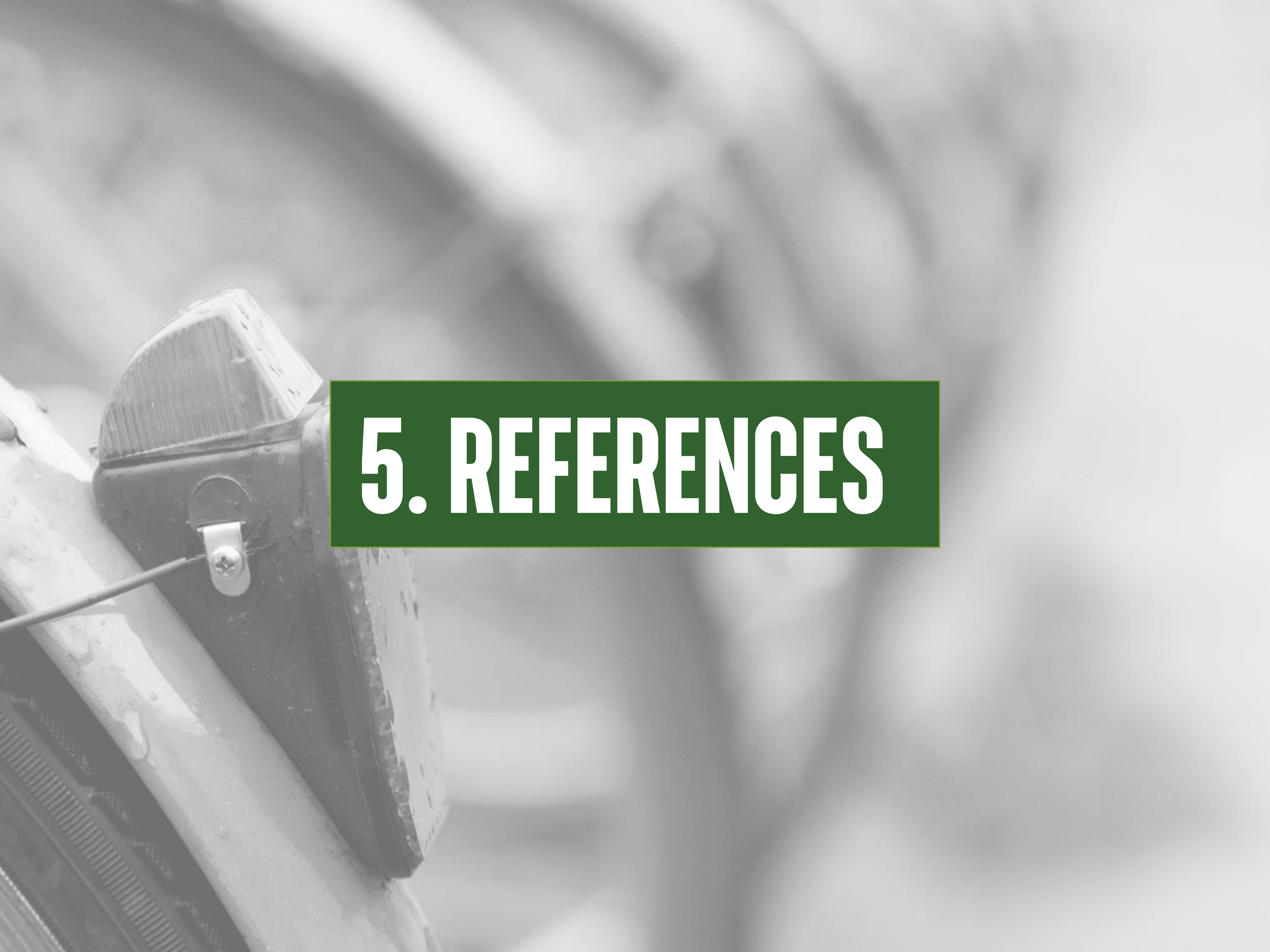

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