Public bicycles in Brussels

Synthesis 30 pages

A. Bike Share Market Trends 78 pages

B. Public Bicycles (PB) & Long-Term Rental (LTR) International Benchmark 88 pages

C. Public bicycles in Brussels: Assessment, Scenarios, Recommendations 122 pages

April 2024

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Benoît Beroud - MOBIPED

Bruno Van Zeebroeck - TML

Emanuela Peduzzi - TML

Commissioner

BRUSSELS-CAPITAL REGION

Funded by the European Union
NextGenerationEU

Consultancies

TRANSPORT & MOBILITY LEUVEN

Mobiped

Which future for the Brussels' public bicycles service?

Synthesis - April 2024

Benoît Beroud - MOBIPED
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Authors Benoît Beroud (MOBIPED)
Bruno Van Zeebroeck (TML)
Emanuela Peduzzi (TML)

Reviewers Christophe De Voghel (BRUSSELS MOBILITY)
Mathieu Nicaise (STIB-MIVB)

Translator Marthe Jansen (TML)

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RÉGION DE BRUXELLES-CAPITALE

Commissioning authority

Brussels-Capital Region | Brussels Mobility Regional Public Service
Organising Authority for Mobility
Place Saint-Lazare 2 | 1035 Brussels | https://mobilite-mobiliteit.brussels/en
Christophe De Voghel: cdevoghel@sprb.brussels

Partner

STIB-MIVB - Brussels public transport company
(Société des Transports Intercommunaux de Bruxelles –
Maatschappij voor het Intercommunaal Vervoer te Brussel)
Rue Royale 76 | 1000 Brussels | www.stib-mivb.be
Mathieu Nicaise: mathieu.nicaise@stib.brussels

Mobility research office

TRANSPORT & MOBILITY LEUVEN
Diestsesteenweg 71, 3010 Leuven | www.tmleuven.be
Bruno Van Zeebroeck: bruno.vanzeebroeck@tmleuven.be

Public bicycles expert

MOBIPED - Mobility of bipeds
Rue Jangot 10 bis, 69007 Lyon | www.mobiped.com
Benoît Beroud: benoit.beroud@mobiped.com

Contents

Glossary

B2C	Business to Customers
B2G2C	Business to Government to Citizens
BCR	Brussels-Capital Region
BM	Brussels Mobility
BS	Bike share | Bike sharing
e-SB	Electric Shared Bikes
LTR	Long-Term (bicycle) Rental
MaaS	Mobility as a Service
PB	Public Bicycles
PT	Public Transport
SB	Shared Bicycles
SGEI	Service of General Economic Interest
STIB-MIVB	Brussels public transport company (Société des Transports Intercommunaux de Bruxelles Maatschappij voor het Intercommunaal Vervoer te Brussel)

1. Context of the study

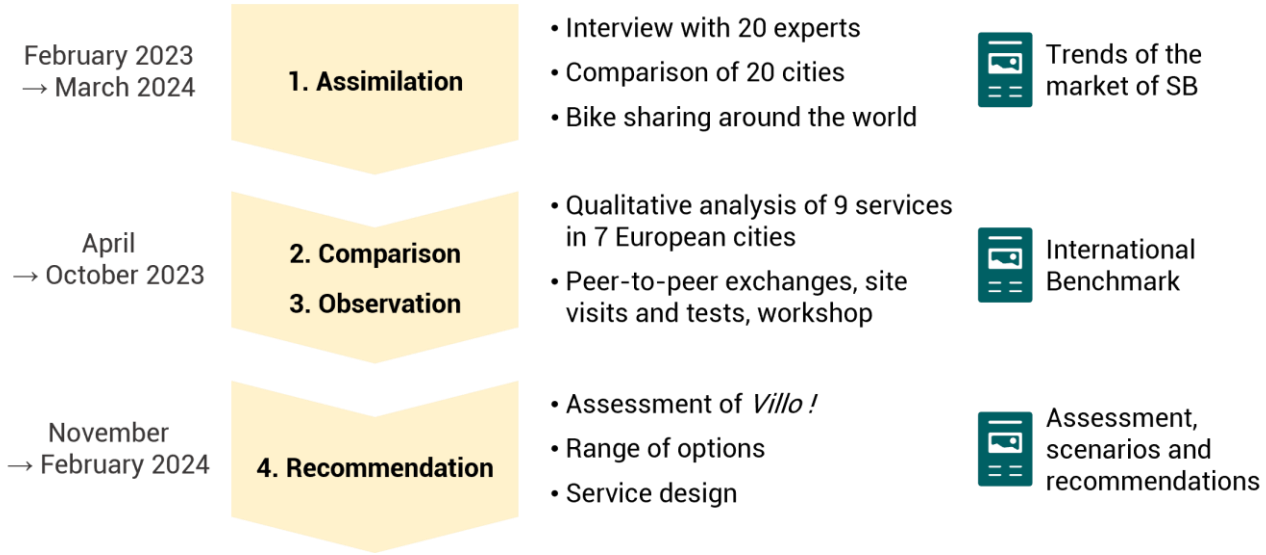
GOUVERNEMENT DE LA RÉGION DE BRUXELLES-CAPITALE
BRUSSELSE HOOFDSTEDELIJKE REGERING
GOVERNMENT OF THE BRUSSELS-CAPITAL REGION

"Public bicycles as the fourth pillar of public transport in Brussels (metro, tram, bus and bicycle)". This is the ambition of the Brussels-Capital Region Government to provide access to a bicycle and develop shared mobility, in line with Good Move, the 2020-2030 regional mobility plan.

BRUSSELS MOBILITY
BRUSSELS REGIONAL PUBLIC SERVICE

The *Villo !* concession with JC Decaux ends on 16 September 2026. Brussels Mobility's Organising Authority for Mobility supported this study to devise a more attractive public bicycle service and an appropriate governance. Benchmark feedback from Belgian and European metropolises lay at the core of the methodology *(Figure 1)*.

Figure 1: Study methodology



The scenarios and recommendations (chapters 7, 8, 9, and 10) are explorations by the consultants to stimulate reflection for future political and technical decisions.

2. One-page summary

Situation in 2024

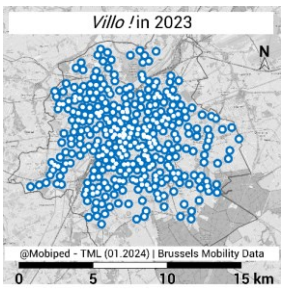
Villo ! is the Public Bicycle (PB) service in Brussels. It enables anyone to:

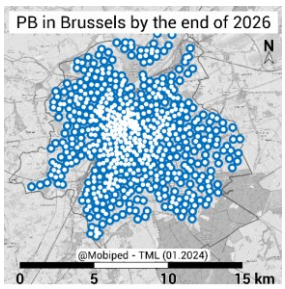
- Rent a bike 24/7 for a single trip, like a mobility insurance with no commitment.
- Ride a bike even when facing issues to buy, repair, or park their own bike.

The "Public Bicycle and outdoor advertising" concession is inadequate and outdated.

The 5,000 PB are not very attractive. Electrification with a removable battery is a failure and suffers from the comparison with private free-floating Shared Bikes (SB).

The 350 stations are very far apart: 390 metres on average between 2 neighbouring stations, compared to 290 in Antwerp and 280 in Paris.





The modal shift objective is not precise enough to be assessed properly.

Proposals for the end of 2026

After *Villo !*, the Region is offering a new, more attractive Public Bicycle (PB) service and a Long-Term (bicycle) Rent (LTR) service. LTR enables people to:

- Get trained to cycle in an urban environment.
- Experiment with a wider bike selection.
- Try a quality bike and a cyclist lifestyle.

PB has a dedicated contract of 8 to 10 years. LTR is considered separately.

7,500 e-PB, with integrated battery:

- Offer a better user experience.
- Attract new user profiles.
- Perform like in Luxembourg and Marseille.

The network will be densified, with 600 stations (350 existing sites + 250 new ones) to ensure competitive travel times. At the stations, e-PB can be charged with new and modular equipment.

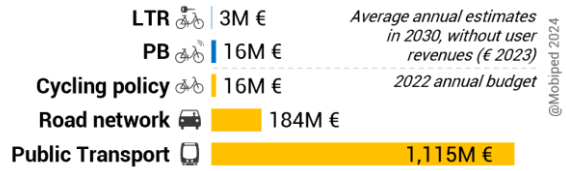
Public objectives of PB are appropriate, achievable, measurable, and assessed annually.

Outline of the future public transport service in Brussels

The public network

- 600 PB stations
- 66 bus lines
- 17 tram lines
- 4 metro lines

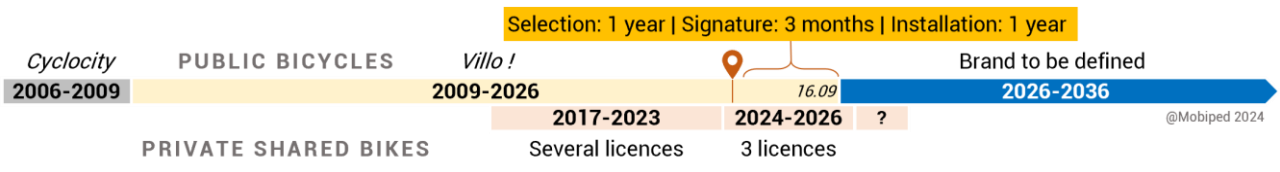
Annual budget



Roles

- Brussels Mobility defines the public service obligations (e.g., fares, accessibility, MaaS, etc.).
- The Regional Government consolidates funding.
- The STIB-MIVB coordinates the selection process and contracts with the PB provider.
- The STIB-MIVB supervises the contract and Brussels Mobility participates in the evaluation and development.
- The PB provider supplies, installs, repairs, and redistributes the bikes.
- STIB-MIVB interacts with customers (website, app, customer relations, communication, sales) to offer a unique Public Bike + Bus + Tram + Metro experience.

A tight schedule for smooth installation and operation



3. Public Bicycles rental services

Bike rental services

To access a bike, it is possible to buy, borrow, or rent one for a few minutes, hours, days, or months *(Figure 2)*. This study mainly focuses on back-to-many PB and broaches public LTR.

Public bicycles (PB): Bike Sharing (BS) services enable one-way trips by renting a bike for the length of the trip. It removes the obstacles associated with buying a bike, parking at home/one's destination, maintenance, and the risk of theft. 1,600 towns and cities worldwide have at least one PB service [11]. Public Bicycles (PB) are a type of BS because they benefit from public funding.

Long-Term (bicycle) Rent (LTR): LTR services enable people to rent a bike and accessories (basket rack, child seat) for several months and benefit from various services (repairs, insurance in case of theft). LTR services remove the obstacles associated with buying a quality bicycle and encourage people to adopt a cycling lifestyle before considering buying their own bike.

Complementary services

First, PB systems provide rapid access to a bicycle in public spaces, like a mobility "insurance". LTR enables targeted groups to try out a type of bike and experiment with a cyclist lifestyle before becoming a cyclist with their own bike. Second, PB has a quantitative impact on the number of citizens who cycle at least once a year. LTR has a qualitative impact on its customers' skills to cycle in an urban environment *(Figure 2)*.

Figure 2: Overview of bike rental services

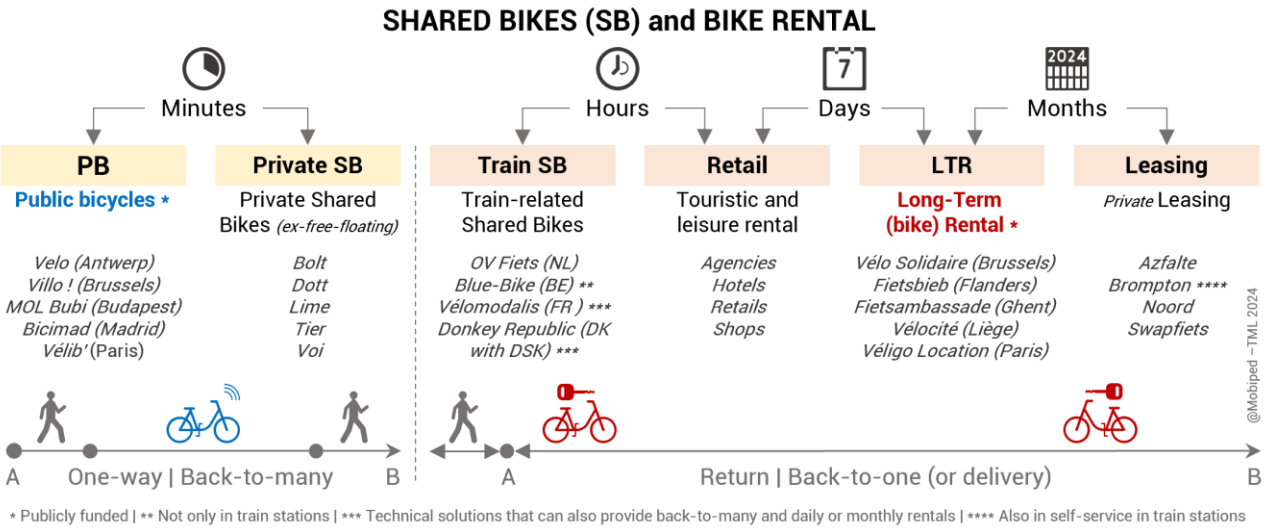
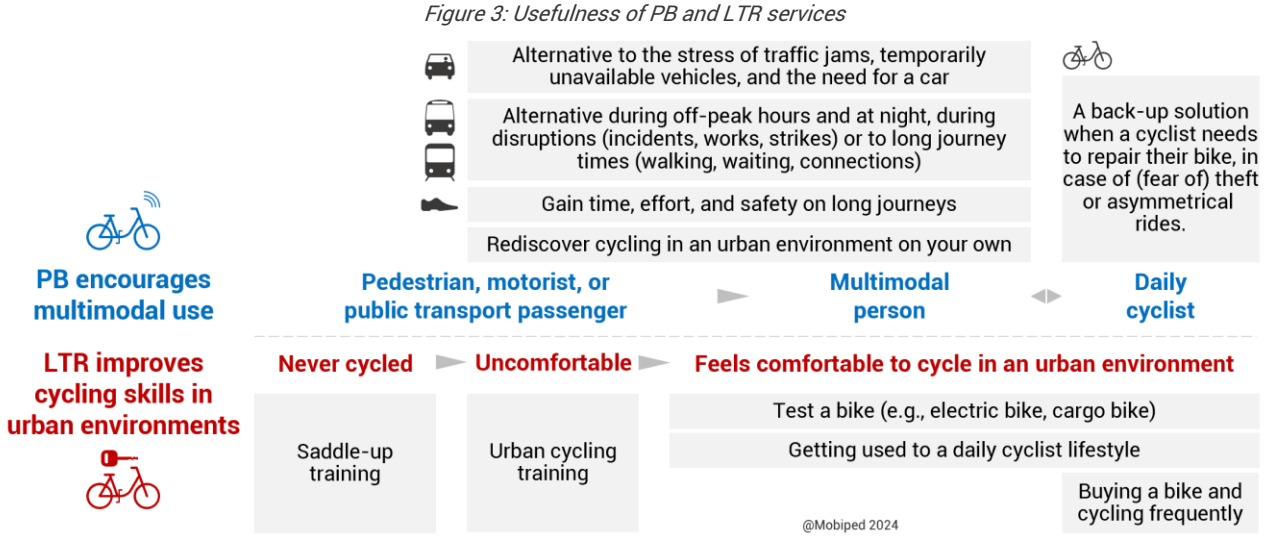


Figure 3: Usefulness of PB and LTR services



4. International lessons

A robust approach

Partnership with 9 European areas

Seven PB and two LTR services (both Belgian and European) were selected from 20 European cities and then analysed *(Figure 4 and Figure 6)*.

The Brussels delegation, made up of delegates from the Minister's office, Brussels Mobility, STIB-MIVB, and the consultants, visited services in Antwerp, Budapest, Madrid, Marseille, and Paris.

Discussions continued in Brussels at a workshop to share the results of the benchmark *(Figure 5)*.

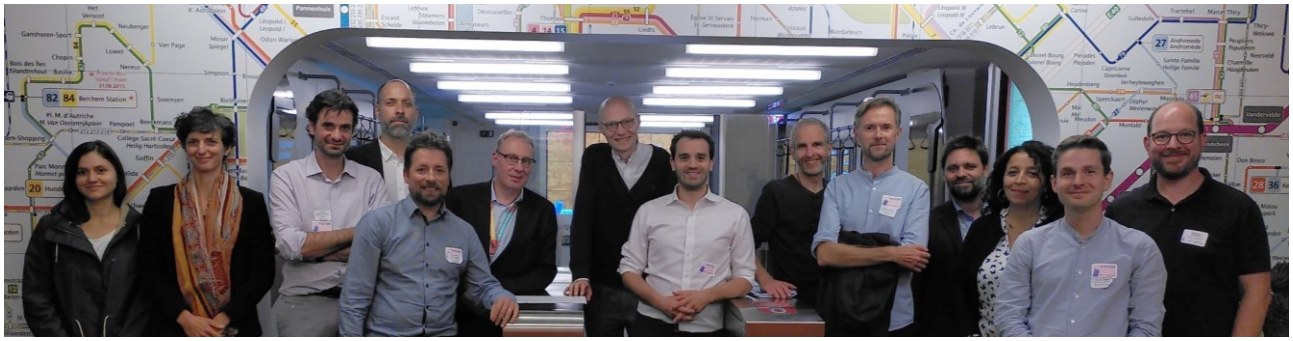
Immersion in the PB market

The consultants also:

- Read the reference publications.
- Participated in the main professional conferences in Europe.
- Observed and tested 30 other PB services.
- Interviewed 20 experts from 15 countries/4 continents and spoke to 40 service providers.
- Exchanged views with PB officers in 20 other cities: Amsterdam, Barcelona, Bern, Chicago, Geneva, Grenoble, Lyon, Milan, Munich, Vienna, etc. *(List of contacts and cities can be found in the acknowledgements section on page 29)*

Figure 4: Nine publicly funded bike rental services in seven European cities, studied in detail

Figure 5: Participants in the benchmark results workshop | 3 October 2023 | STIB-MIVB headquarters in Brussels



From left to right: I. Cabello, A. Gilette (ILE-DE-FRANCE MOBILITÉS), C. Mateo Martin (EMT MADRID), P. Dalos (BKK), C. De Voghel (BRUSSELS MOBILITY), D. Dumont (STIB-MIVB), M. Nicaise (STIB-MIVB), B. Beroud (MOBIPED), B. Van Zeebroeck (TML), J. Vanhee (FIETSAMBASSADE), M. Langlois (STIB-MIVB), F. Ulrich (SAVM), P. Jamin (GREATER AIX-MARSEILLE-PROVENCE) and M. Fierling (SAVM). Were also present: J. Kawan, S. Vandenhende (BCR MINISTER OFFICER), E. Peduzzi (TML), H. Lyssens and J. De Keyser (CITY OF ANTWERP), and C. De Bruyn (LANTIS) | Photo: E. Peduzzi (TML)

Figure 6: Main characteristics and indicators of the 9 services under study

	City Country Service	Authority	Supplier & Operator	Launch	Bikes	Stations	Bikes/ 10,000 residents	Rent/ bike /day	Rent/ 1,000 residents
	**Antwerp City** *Belgium* Velo Antwerpen	City of Antwerp	Clear Channel Clear Channel	2011	4,200	303	88	3.93	34.4
	**Antwerp Region** *Belgium* Donkey Republic	Lantis (Antwerp Transport Region)	Donkey Republic Donkey Republic	2022	2,150 (1,850 ⚡)	430	19	0.46	0.9
	**Brussels** *Belgium* Villo !	Brussels-Capital Region	JC Decaux JC Decaux	1| 2005 2| 2009	5,000 (1,800 ⚡)	345	34	0.67	2.2
	**Budapest** *Hungary* MOL Bubi	BKK Budapest Mobility Agency	Next Bike Csepel	1| 2014 2| 2020	2,200	190	23	3.71	8.4
	**Madrid** *Spain* Bicimad	City of Madrid	PBSC EMT	1| 2014 2| 2023	3,000 ⚡ 7,000 ⚡	264 611	23	3.15	6.2
	**Marseille** *France* Levélo	Greater Aix-Marseille-Provence	Fifteen Inurba	1| 2007 2| 2022	2,000 ⚡	200	23	8.60	6.9
	**Paris** *France* Vélib' Métropole	Syndicate Autolib' Vélib' Métropolis	Smoove (Fifteen) Smovengo	1| 2007 2| 2017	20,000, (8,000 ⚡)	1,443	38	7.12	23.3
	**Ghent** *Belgium* Fiets Ambassade	City of Ghent	Fiets Ambassade	1| 2002 2| 2017 under the Fiets Ambassade brand	9,000 LTR + 1,000 special bicycles	Long-term bike rental			
	**Paris** *France* Véligo Rental	Ile-de-France Mobilités	Fluow	2019	20,000 ⚡ LTR 1,000+ cargo bikes ⚡				

Photos: B. Beroud

Comparison of rentals and station density

Lower usage in Brussels

Villo ! is one of the least successful PB, with 0.55 trips/bike/day, whereas Paris and Barcelona have a ratio of 6.4. These figures are based on annual trips to avoid seasonal bias and on contractually stipulated bicycles, as the percentage of bicycles available for rent widely varies. In Marseille, there were on average 700 PB available for rent, whereas the contract expects 2,000 PB *(Figure 7 and* Figure *8)*.

Figure 7: Trips/contractually stipulated bike/day in 20 European cities in 11 countries in 2022

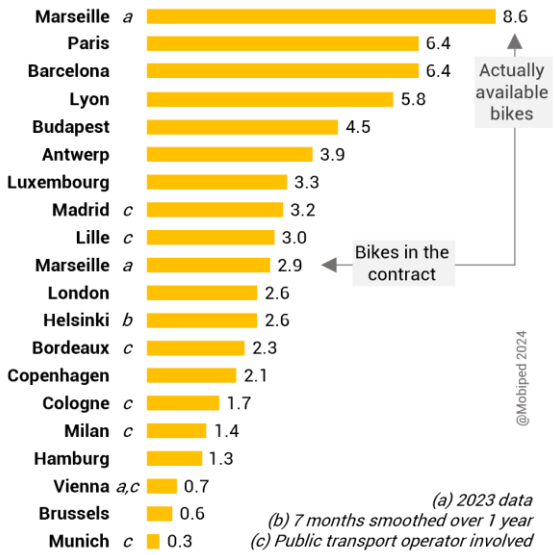
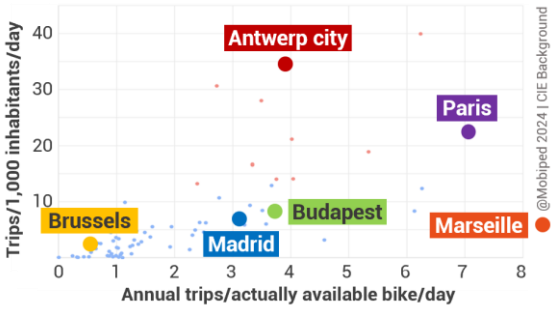


Figure 8: Trips/1,000 residents vs. trips/actually available bike/day (CIE background, all SB types combined [4])



PB is assisting the growth and development of a cycling culture (Madrid, Marseille, Paris). It is also very popular in Antwerp, where the cycling modal share is already very high (32%).

Key success factors for PB

- A dense network of stations
- A quality bicycle adapted to the area
- An easy user experience
- Simple and attractive pricing
- A strong identity linked to the region
- An engaged service provider
- Dedicated and long-term public funding

Due to insufficient density

The length of a PB trip depends on the distance travelled on foot (point A → picking up the bike), by bike (including the detour if a station is full) and on foot (dropping off the bike at point B). The average distance between two nearest stations is almost 400 metres in Brussels, while it is less than 300 metres in Antwerp, Paris *(Figure 9),* and Barcelona. Moreover, usage is higher in the city centre. A service that serves less populated areas or areas with less activity reduces its performance. The density of *Villo !* stations is insufficient in the city centre compared to other cities, and there is a lack of continuity on the outskirts *(white catchment areas 150 m around the stations, Figure 10)*.

Figure 9: Cross-analysis of "station density" and "average distance between two nearest stations".

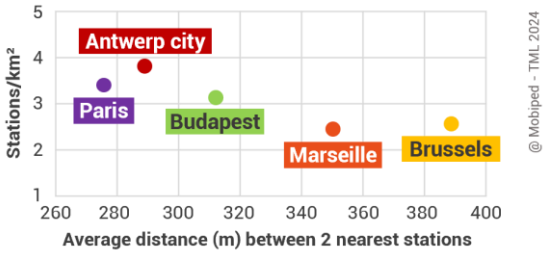
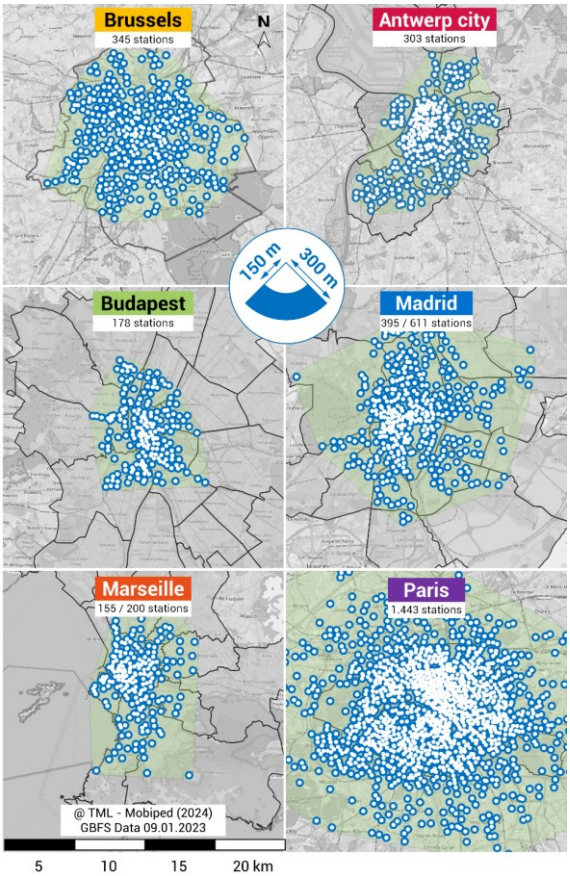


Figure 10: 150 m (white) and 300 m (blue) catchment areas around PB stations - Single map scale



Public intentions and impacts

Laudable intentions, but not assessed

With PB, the analysed public authorities target motorists (encouraging modal shift, reducing usage, offering an alternative), public transport passengers (facilitating the first and last mile, etc.), and new PB users.

But most of these intentions are not translated into objectives that can adequately evaluate the public policy and thus weigh up the real direct and indirect impacts. While PB removes the barriers to access a bicycle for hundreds of thousands of citizens and enables them to develop multimodal skills, its impact on mobility, viewed in isolation, is rather weak.

Audiences reached

PB reaches tens of thousands of residents, with annual subscription rates of 12% (Antwerp), 7% (Paris), and less than 2% for the other analysed cities. However, the underrepresentation of women and people with few qualifications, low incomes, and low digital literacy is an important challenge for this public investment.

Role in cycling

PB accounts for 20% of cycle journeys in cities where the cycling modal share is less than 3% (Greater Paris, Marseille, Madrid). The more people cycle in a city, the lower the PB share in cycling trips. No study seems to quantify the perceived causality of "users who ride their own bike after using PB".

Impacts on car use

As with many mobility services, the direct impact on car use is limited. The number of car km avoided at the metropolitan level represents less than 0.1% of car km (Brussels, Lyon [2]). On the other hand, PB appears to have an indirect impact on car use and ownership *(Figure 11)*.

Figure 11: Indirect impact of PB and LTR on cars [7]

	PB	LTR
Decline in car use	26%	49%
No need to buy a car	18%	20%
Parting with a car	7%	6%

Financing a PB service

Does advertising finance PB? Not really

On the one hand, PB and outdoor advertising are no longer linked. Public contracts now focus on PB only (Antwerp, Budapest, Marseille, Paris). In some cases, PB may be linked to the delegation of public transport services (Bordeaux, Lille) or included in a set of cycling services: PB, LTR, cycle services centre, parking (Nantes, Rennes).

On the other hand, "advertising finances PB" or "it's free for the city" are misrepresentations. In 2004, JC Decaux offered Greater Lyon 5.2 million (M) euro a year to operate outdoor advertising in public areas. Once PB service was included, the proposal dropped to 1.4M €/year [1]. This 3.8M €/year shortfall, which is invisible in the public budget, is in fact the price of the service for the public authorities. Moreover, mixing advertising and PB ensures that changes to the PB service require advertising space negotiations (Brussels).

Public service = Public money

As with public transport, PB is funded primarily by local authorities, with potential support from European funds (Budapest, 40M € in Madrid). Secondly, users pay part of the cost of the service, sometimes with the help of their employer via a mobility budget. Lastly, private funding can be sought through naming (MOL Bubi oil company in Budapest or banks like Santander Cycles in London and Citibank/bike in New York), advertising on bicycles (e.g., airline company in Milan), or financing of stations (Antwerp Region).

What is the price of a PB service?

Data from the benchmarked PB services

Price for the public authority: 1,000 to 4,000 € excluding tax/year/bike (mechanical or electric).

User revenue coverage: 26 to 66%.

Remaining expenses for the public authority: 450 to 2,800 € excluding tax/year/bike.

Financial ratios :

- 0.35 to 2.48 € excluding tax/trips (STIB-MIVB in 2022: 2.58 €/trip).
- 0.17 to 0.95 € excluding tax/km (STIB-MIVB in 2022: 0.38 €/passenger kilometre).

More than just a bike project

PB is a multidisciplinary project at the crossroads of cycling policy, shared mobility services, MaaS (digital, big data, customer databases), and public space (charging through the grid network, parking). Moreover, PB has a strong political and media resonance. It's easier to communicate about a service than an infrastructure (Budapest).

E-PBs, a game changer

While e-PBs with integrated batteries present several challenges (electrification of stations, battery charging, skilled human resources, risks of failure, fire, and theft), their impact is considerable. They are generating more trips than removable batteries (Bordeaux, Brussels, Lyon), attracting new users (women ↗ 9%, average age ↗ 7 years [7]), and increase the distances travelled (↗ 1 km in Paris). In mixed fleets, e-PBs are preferred to pedal bikes, which increases wear, tear, and costs and impacts the availability of charged bikes *(Figure 12)*. Finally, they are strongly transforming usage in hilly cities *(Figure 13)*.

Figure 12: Overuse of e-PBs in mixed fleets

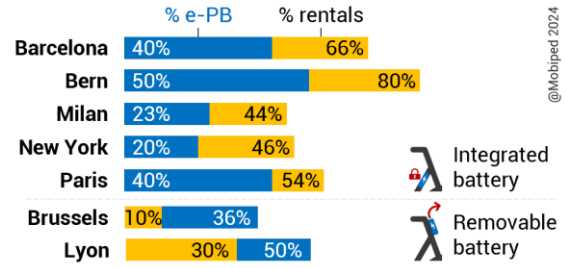
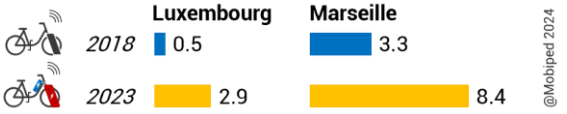


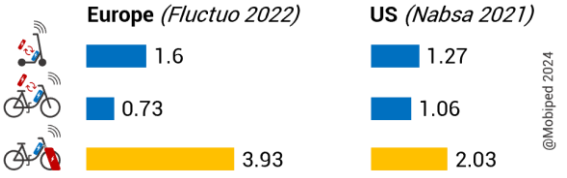
Figure 13: Annual trips/bike/day, before and after electrification of the PB fleet



Docking stations, a safe bet

PBs with docking stations are more widely used than free-floating PB and scooters in both Europe and the United States *(Figure 14)*.

Figure 14: Comparison of PB trips/vehicle/day for docked PB, dockless PB, and dockless e-scooters [5, 12]



Complex installation and operation, requiring careful preparation

Deadlines for a successful transition

To ensure a smooth transition, a minimum of one year is recommended to select the consortium, plus one year to order, deliver, assemble, and install, from the time the contract is signed to the last possible legal recourse. These timescales are crucial to avoid:

- A five-month suspension of the service (Budapest).
- Being affected by the elections (Madrid).
- Having only 30% of the bikes (Marseille).
- Losing 80% of rents in one year (Paris).

The operator, a partner to challenge

As PB is a complex project in terms of implementation and contract execution, it is preferable for the PB operator to be locally based (Antwerp). If the authority and the operator have to work in tandem, the authority carries out its own analyses without the filter of the operator, via field audits and duplicates of the operator's data in real time (Paris).

Cost control + Success management

Any self-service public space activity is structurally exposed to negligence, misuse, vandalism (Cologne), and theft (Marseille). These costs are provisioned in the applicant's initial price or in a dedicated budget, with any positive balance being reinvested in the service (Antwerp).

PB also deal with commuter flows, requiring a budget to rebalance bikes at stations on the outskirts or in single-function neighbourhoods (housing, employment, or shopping). Drop zones (racks or parking areas delimited by paint), overflow (overcapacity of a full station), or e-PB reduce but do not avoid this need for rebalancing.

Success disrupts the operator's economic equilibrium. The more bikes are rented, the more vulnerable the PB become. Beyond a certain threshold, maintenance costs soar, and the operator tries to reduce the number of rents (Paris). Changes in operator costs from additional usage are not specified in the original contract and are no longer covered by user revenues based on tariffs set by the government. Thus, once a certain level of success is reached, it is necessary to accept a deterioration in service provision.

PB and Public Transport (PT) complement each other

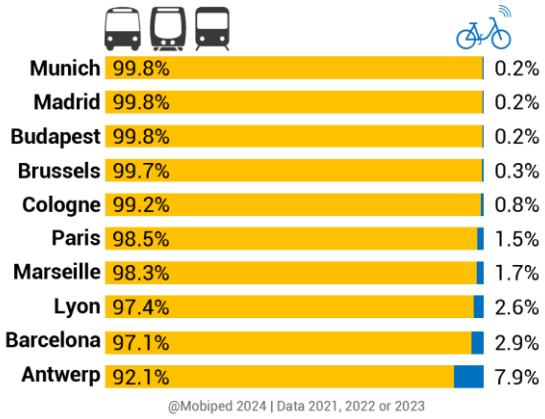
Inter- and multimodal users

As PB and PT customer databases belong to different owners, the GDPR does not allow a detailed analysis of inter- and multimodal journeys. However, surveys indicate that 80% of PB users are multimodal (Paris, Budapest) and more than 25% travel intermodally by train, metro, tram, and bus (Antwerp).

PB ⇔ 1% of the PT network

In a very simplified view, the PB network accounts for 1% of journeys *(Figure 15)*, 1% of human resources, and 1% of the annual budget of urban public transport networks. "Rather than being frightened by cycling, the public transport operator should put its energy into attracting multimodal subscribers. A cyclist is more likely to be a public transport passenger than a car driver" (Budapest).

Figure 15: Share of cumulative journeys by urban public transport and public bicycles



2 parallel and complementary networks

Unlike back-to-one BS, where bikes are taken and left at the same train station, back-to-many PB are not extensions of urban public transport. Instead, PB runs on its own network. Many stations cater for a maximum number of potential origins and destinations.

The proximity of PB stations to public transport stops enhances the mobility experience for both public transport passengers and cyclists by providing additional flexibility.

PT-PB integration is overvalued

As in the case of MaaS, the discourse emphasises the value of PT-PB integration without mentioning the multi-parameters of so-called total integration. The integration generally implies discounts for public transport subscribers or the use of the public transport network's ticketing system. The ultimate integration would consist of a single mobility ticket that enables all modes of transport to be used equally. This does not seem to have been implemented yet.

Two distinct operating businesses

Operating a public transport network involves carrying passengers according to a line-based logistics. Operating a PB network involves making bicycles available according to a diffuse logistics system that depends on individual users' rent. While support functions can be pooled (Madrid), there seem to be no economies of scale between PB and PT regarding operations. This is confirmed by:

- The separation of activities within the same public mobility service between Keolis and its subsidiary Cykleo (Bordeaux).
- The relocation of a PB warehouse previously located on a bus depot site also belonging to the transport public manager (Madrid).

Attention to governance

The best performing PB services in Europe *(Figure 7)* are run directly by the public authorities (Antwerp, Barcelona, Budapest, Marseille, Paris). Direct involvement of the public transport operator gives interesting results in the context of a public service (Madrid) or multimodal public service delegation (Bordeaux, Lille). It is less convincing in other cities (Cologne, Milan, Munich, Vienna).

Key success factors to involve the PT operator:

- Treats modes fairly.
- Makes the specificity of the bike their own.
- Gets involved in supervision without blindly trusting the PB operator, despite the low weight of PB compared to public transport.
- Respects the distribution of roles defined by a RACI matrix (Responsible, Accountable, Consulted, Informed).

Bike Share market trends

Diversification on all fronts

The BS market has diversified and expanded:

- Electrification of bicycles.
- Digitalisation of the user experience.
- The rise of shared micromobility.
- Diversification of pricing ranges.
- Customer acquisition with free rides.
- Contactless payment.
- Modular parking, sometimes uncontrolled.

Cities take back control

To regulate public space, some cities have banned free-floating, imposed a limited number of licences, charged fees (35 €/year/bike in Brussels), or provided dedicated back-to-many drop zones/mobility hubs (Budapest, Grenoble, Paris, etc.). Others have banned private scooter services (Paris, Barcelona) or private bike sharing services, retaining public services only (Luxembourg, Lyon).

2 competition-enhancing models

There are two business models *(Figure 16)*:

B2G2C players (Business to Government to Consumers/Citizens): Their customers are local authorities, for whom they contribute to the service delivered to citizens. The main international B2G2C players are suppliers (Fifteen, PBSC), operators (Clear Channel, Inurba, Serco, Serveo, Velogik), or both (JC Decaux, Nextbike).

B2C players (Business to Consumers): their customers are the end-users. The main operators are Bolt, Dott, Lime, Pony, Poppy, RideMovi, Tier, and Voi. They generally operate several types of micromobility vehicles in a free fleet without docking stations.

An unstable B2C market

After years of success in the quest for market share, with ever lower prices due to cheap money in the stock markets, the rise in interest rates put an end to easy money. Investors are now pressing these services to become profitable. Yet micromobility players are struggling to find their business model, as evidenced by the Dott-Tier/Next Bike merger in 2024 and the setbacks of Superpedestrian, Spin, and Bird in 2023. Profitability of scooters is already uncertain. The economic equation is even more perilous for private e-BS, which are 50% more expensive to buy, heavier, bulkier, costly to move, and less profitable.

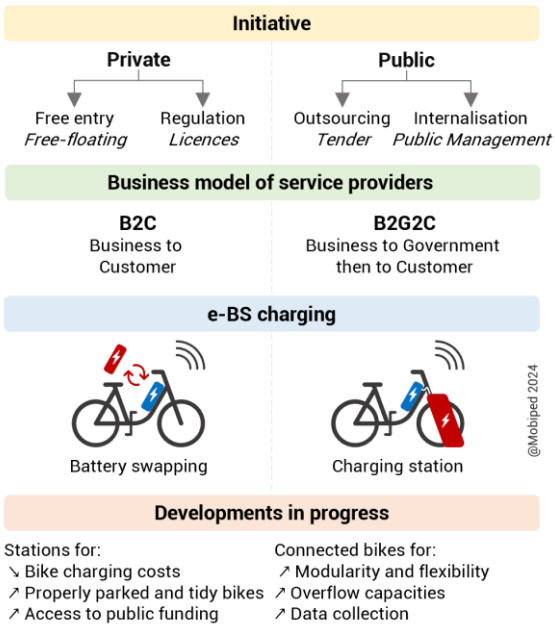
Multi-operator charging stations

To reduce the human resource costs involved in swapping batteries, free-floating operators are developing their own stations (Bolt) or free-floating bicycle manufacturers (Navee, Okai, Segway) are retrofitting their bicycles to be compatible with the new multi-operator stations (Knot, Metromobility, Noval, StandAB).

In search of public money

The Cycling Industry Europe's group of experts on shared bikes (B2C and B2G2C) has issued the following message: "BS is not a private service, but a public service that needs to be financed". Some players, such as Donkey Republic, are responding to tender calls in several "vervoerregio's" in the Flemish Region. For their part, Dott invites cities to create the best ecosystem for achieving public objectives, rather than having the best PB service. This can take the form of micro-subsidies (Molière Project in Brussels) or of a subsidy of 125 € excl. tax/e-PB/year (Ghent).

Figure 16: Main characteristics of bike sharing markets and their current developments



A blessing for Brussels

Brussels benefits from its visibility as the European capital. Moreover, the absence of a national oligopoly, as is the case in many countries, enables an attractive competition. Several B2C and B2G2C players have already expressed an interest in the Brussels project, which is to be one of the next major PB systems in Europe.

LTR, an inspiring service

The LTR market

Compared to PB, public LTR is less known and developed. The main examples can be found in:

- France: Véligo Location (Paris), MVélo + (Grenoble), Free Vélo'v (Lyon).
- Belgium: Fietsambassade for students (Ghent), Vélocité (Liège), Ottignies, Gembloux, Mons.

The average size of such services is around 35 to 40 bicycles per 10,000 inhabitants [8]. Grenoble is an exception, with a service that is growing year on year *(Figure 17)*.

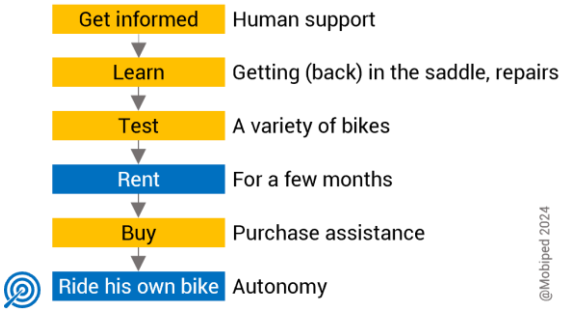
Figure 17: LTR service sizes in France and Wallonia.

	LTR/10,000 residents
Small towns in Wallonia	15
Average in France	33
Liège Vélocité	40
Grenoble	250

An integrated approach to mobility management

LTR at the Fietsambassade (Ghent) and Véligo Location (Paris Ile-de-France) help people become cyclists in various steps: get information, learn, test, rent, buy, be autonomous *(Figure 18)*. This way, the public authorities provide a one-off financial boost to try out a cyclist lifestyle on a quality bicycle. In Paris, the rental period is limited in time to encourage the beneficiary to buy and use their own bike without benefiting from any other public aid.

Figure 18: Integrating LTR into the pathway to become an autonomous urban cyclist



PB and LTR complement each other

PB and LTR are distinct and complementary services that coexist in several cities (Bordeaux, Lyon, Nantes, Paris).

A study of the situation in Paris provides some orders of magnitude *(Figure 19)* that admittedly should be considered cautiously, since *Vélib'* (PB) and *Véligo Location* (LTR) are two of the best-performing premium services in Europe. Véligo Location offers a 100% electric fleet, including home delivery or delivery points throughout the Ile-de-France region (80 km from north to south and 100 km from west to east). The costs are therefore higher than those of other LTR services in France.

Figure 19: Comparison of PB Vélib' Métropole and LTR Véligo Location in Paris (2022 data)

	PB	LTR
Offer		
Service	PB	LTR
Rental period	Minutes	Months
Number of bikes	20,000 (8,000 ⚡)	20,000 ⚡ + 1,000 cargo bikes ⚡
Uses in 2022		
Long-term subscribers	378,000	22,000
Trips	44.2 M	7.8 M
Average distance (km)	3.8 ⚡	4.1 ⚡
Km travelled	148 M	32 M
Parisian financial ratios		
Price paid € excl. tax/bike/year	2,571 €	~ 1,000 €
User revenues € excl. tax/bike/year	1,268 €	Unknown
Contractual relationship	Public contract	Concession
Remain to pay € excl. tax/bike/year	1,303 €	~ 1,000 €
€ excl. tax/km	0.18 €	0.63 €
€ excl. tax/trip	0.59 €	2.56 €
Financial ratios (French averages for mechanical and electric bicycles combined)		
Remain to pay (€ excl. tax/bike/year)	1,981 € *(b)* 1,490 € *(c)*	300-800 € *(a)* 225 € (b) 490 € (c)
€ excl. tax/km	0.56-1.35 € *(b)* 0.35 € *(c)*	0.10 € *(b)* 0.57 € *(c)*

a: ADEME 2016 [6] | b : ADEME 2021 [8] | c: AAVP 2023 [7]

5. Bikesharing in Brussels

Key dates

2005 The City of Brussels launched Cyclocity, with 250 bikes and 25 stations.

2009 The Brussels-Capital Region awarded JC Decaux the contract to supply and operate 5,000 *Villo !* vehicles, 360 stations, and 347 advertising spaces.

2017 Arrival of the first private, free-floating SB such as Billy-Bike and Obike, followed in subsequent years by Gobee.bike, Dott, Jump, Lime, Pony, Bolt, Dott, Voi, Tier, and Poppy.

2018 Ruling on private Bike Share.

30% of *Villo !* vehicles are powered by removable batteries.

2024 Awarding of 3-year licences to Bolt, Dott, and Voi to deploy a maximum of 7,500 bicycles in 3,000 drop zones shared with scooters (1,600 drop zones deployed by the end of 2023).

2025 5,000 *Villo !* + 7,500 private SB, together 12,500 contractually provided SB.

2026 16 September: End of the *Villo !* concession. The next step will be decided in 2024.

31 December: End of the 3 licences assigned to private operators.

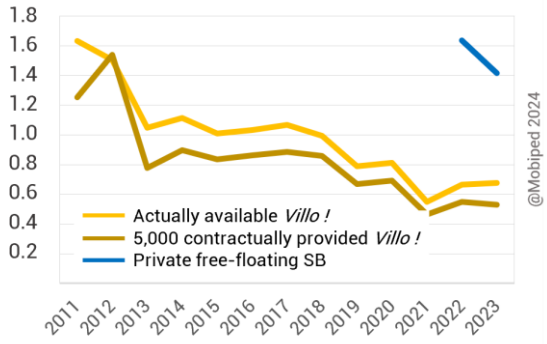
Constantly declining use

Since its launch, the number of trips/*Villo !* per day has been falling steadily *(Figure 20)*. In 2023, there were 970,000 trips, i.e.:

- 0.53 trips/contractually provided bike/day, for 5,000 contractually provided bikes (brown line).
- 0.67 trips/actually available bike/day for an average of 3,935 actually available bikes (yellow line).

With an average of 2,346 actually available bikes in 2023, private e-SB generated 1,212,000 trips, or 1.42 trips/actually available bike /day (blue line).

Figure 20: Contractually and actual PB trips/day/Villo ! from 2011 to 2023 and free-floating PBs in 2022 and 2023



Local associations (BRAL, GRACQ, FIETSERSBOND, CYCLO) in favour of PB and LTR

Villo !, a service that needs improving

Villo ! suffers from several issues: heavy bicycles that are not always in working order, users who are not listened to enough (customer service, user committee), poor image of the service, complex process for a single use/test.

Considering PB as a tool

PB can be a tool to facilitate acceptance of the traffic changes in the Good Move plan, for example by organising a consultation on the placement of stations. PB also contributes to the functionality economy. However, PB is not a means to get people who have never cycled before into the saddle.

PB, a public service

These associations prefer public governance to abandoning the service to the private market, with its more precarious working conditions. They warn that the digital divide must be taken into account, believe PB can be integrated into public transport provision, and call for consultation before setting up stations in popular neighbourhoods.

Diversifying investment in cycling

The associations are in favour of the idea of an LTR and call for continued investment in the cycling system as a whole.

Feedback from surveys of users and non-users of *Villo !*

Two surveys of micromobility users [15] and non-users [16] in 2023 identify the obstacles to *Villo !* use and possible improvements *(Figure 21)*:

- Access time as well as type and condition of the bike are the main obstacles to *Villo !* use.
- The image of *Villo !* is positive among users, but rather neutral among non-users. 62% of non-users consider it a positive thing to keep a PB service in stations.
- Non-users say they will use PB if the offer were more attractive and are positive about an integration with STIB-MIVB.
- 30% don't cycle because they don't have a bike. 70% don't because they feel unsafe cycling: risk of accident, lack of facilities.

Figure 21: Opinions of Villo !- and micromobility users and Villo !-non-users living in the Brussels Region (2023)

Survey participants	Barriers to using *Villo !* (1 answer)	Barriers to using *Villo !* (Several answers)	Villo ! image	Future user if …	Other comments
Regular users *Villo !* [15] *660 responses*	42% Bike condition 22% Access time 17% Bike weight	73% Bike condition 69% Access time 64% Bike weight	79% 15% 6%		87% of *Villo !* users cite "saving time" as a reason for using it. It is the main reason for 56% (*1,350 responses*).
All micromobility users [15] *2,411 responses*	30% Access time 24% Bike condition 12% Type of bike + No e-PB	50% Weight + bike condition 40% No e-PB 38% Access time	42% 36% 22%	61%: Rates < free-floating 56%: Pedelecs 35%: Basket	A declared interest in: > 60%: STIB-MIVB bicycles > 70%: PB + STIB-MIVB offers > 80%: PB in STIB-MIVB fares, shared mobile app, stations closed to the STIB-MIVB network.
***Villo !* non-users, BCR residents** [16] *304 responses*	33% Access time 18% Bike type 15% Bike condition	40% Transport of children and goods not possible 32% Bike weight 31% Bike type (No pedelecs)	33% 49% 18%	With a more attractive offer 35% 25% 40%	Keep a PB with docking stations: 62% | 23% | 15% Do not cycle because ○ 55%: Risk of accident ○ 32%: Weather ○ 30%: No bike ○ 25%: Lack of facilities

Disappointing results for *Villo !* but real opportunities for a future PB service

Villo !'s strengths

- Coverage of the whole region
- Good end-user value for money
- 16% of Brussels residents have tried *Villo !* [3]
- *Villo !* is a recognised brand
- 15 years' experience
- Allocated ground surface, with grid access

Villo !'s weaknesses

- Insufficient density of stations
- Unsatisfactory user experience
- Competition from free-floating e-BS
- Women and low incomes under-represented
- Low direct impact on car and bicycle use
- Disadvantageous contract for the public authority

Opportunities

- Identified weaknesses that can be improved
- 50% of Brussels residents could benefit from easier access to a bicycle
- Integration with public transport
- E-PB, a game changer adapted to the local topography
- Many interested service providers
- Complementary with LTR

Threats

- Feeling of unsafety when cycling in traffic
- Transition and electrification risks
- Competition from private SB in drop zones
- Unsecured budget and risk of vandalism
- Disregard for vulnerable profiles
- Lack of supervisory culture and associated budget

6. Possible objectives of a PB service

Avoid inappropriate targets

"Aiming for a modal shift towards soft mobility", as described in the *Villo !* concession, is too ambitious for PB alone. The modal shift is an objective at the level of the Good Move regional mobility plan [18], which includes measures to restrict car use and offers a wide range of alternatives, to which PB makes a modest contribution.

Moreover, owning a bike does not mean using it, especially for people with limited experience of cycling in traffic. Good cycling conditions and safety therefore remain necessary [19].

Precisely defined objectives that can be assessed

As part of a quality approach to PB *(Figure 22)* and in the spirit of BYPAD [13] and Good Move *(Figure 23)*, the objectives SMART (Specific, Measurable, Acceptable, Realistic, Time-bound) are proposed.

Figure 22: Quality approach proposal applied to PB in Brussels

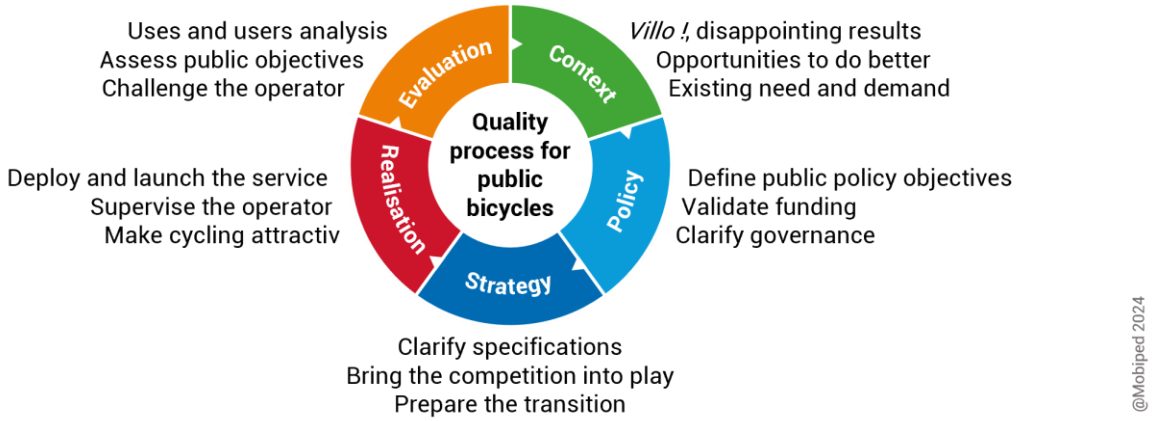


Figure 23: Possible examples of PB public policy objectives for each Good Move focus area

	Good Move focus	Objectives and criteria applied to PB, in the service's annual review
A	Good Neighborhood	**An useful service for Brussels residents**: 50% of subscribers are female. 10% of Brussels' residents are long-term subscribers.
B	Good Network	**A dense network**: 50% of households within 150 m of a PB station.
C	Good Service	**An efficient service**: PB trips account for more than 2% of STIB-MIVB journeys.
D	Good Choice	**Multimodal use**: 20% of STIB-MIVB subscribers use PB at least once a year.
E	Good Partner	**Federated local players** (elected representatives, STIB-MIVB, Sibelga, etc.) around and thanks to cycling.
F	Good Knowledge	**Continuous improvement**: assessment of usages and public policy.

7. Explored scenarios

Five scenarios analysed

One LTR scenario and four PB scenarios were analysed. PB bikes are 100% electrified, with the ambition of a public service: social fares, full coverage of the Region, continuity of the service, a public brand *(Figure 24)*.

Figure 24: Characteristics of 5 possible 2027 scenarios, at the end of Villo ! and the private BS licences

1 | LTR + Training + Sales

- Parking bays in public spaces and parking at home or at the destination
- At home or at the destination
- 1 B2G2C public service | Other private services remain possible
- Brussels (Vélo Solidaire), Liège, Paris (Véligo Location)

2 | Private e-SB in drop zones

- 3,000 drop zones in public spaces (as planned)
- Battery swapping
- 0 public B2G2C services | 3 private B2C services
- Amsterdam, Ghent, Geneva

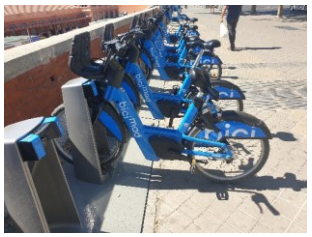
3 | Public e-PB in drop zones

- 3,000 drop zones in public spaces (as planned)
- Battery swapping
- 1 public B2G2C service | 0 private B2C services
- Gdansk, Rouen

4 | E-PB stations + drop zones

- 350 stations + 350 drop zones/bicycle racks in public spaces
- At station + battery swapping
- 1 public B2G2C service | 3 possible private B2C services
- Stuttgart

5 | E-PB charging stations



- 600 stations in public spaces
- At station
- 1 public B2G2C service | 3 possible private B2C services
- Luxembourg, Madrid, Marseille, Paris

Photos: 1 in Paris, 2 in Brussels, 4 in Stuttgart, and 5 in Madrid (B. Beroud) | 3 in Rouen (Inurba)

Questions and answers for each scenario

1 | Is LTR opportune? Yes.

Compared to private players, public LTR would make it possible to:

- Offer a variety of bike types/sizes/models: mechanical, electric, folding, cargo, adapted, children's, etc.
- Invite thousands of Brussels residents to adopt a cycling lifestyle through a range of services and human support (without commercial ulterior motives) to inform, train, test, rent, equip, and advise on the purchase of a bicycle. *Vélo Solidaire's* activities (saddle-up training, aid for bike purchasing) are perfectly in line with this approach.
- Investing public money in a more targeted way to reach vulnerable groups and avoid car-driven kilometres.

As this study focuses mainly on PB, a feasibility study of LTR is required.

2 to 5 | Is SB desirable? Yes.

More than 1,600 towns and cities around the world have BS, including some that were initially reluctant (Amsterdam, Ghent, Grenoble). The question is no longer "should back-to-many BS be deployed? but "what role should public authorities play?".

2 | Do private SB players provide a public service by themselves? No.

The presence of free-floating private SB might lead one to think that a publicly funded PB is unnecessary. But private SB do not seem to meet the ambitions of a public service on their own and illustrate several market failures:

- Uncertain service continuity.
- No upper limit in pricing policy.
- Widening the digital gap through exclusive use of smartphones and apps.
- Regulatory efforts to maintain territorial coverage are uncertain.
- Lower performance for free-floating than station-based services *(Figure 14),* except in Brussels. PB stations form a network industry, generating a natural monopoly to be regulated by local public authorities [1].

And even within the licensing framework, private SB seem to need public money.

3 to 5 | Is it worth investing public money in PB? That's a political decision.

As with all public policies and mobility services, PB has limits and benefits *(Figure 25)*. The remainder of the study explores this public investment.

Figure 25: Limits and benefits of investing public money in PB

	Limits	Benefits
	Cycling is very popular in Flanders and the Netherlands, despite theft and parking constraints. The PB budget could be invested in addressing barriers to using a quality bicycle by making it easier to acquire, maintain, and store a bicycle theft-free.	PB eliminates the barriers to access a bicycle for 100,000 to 500,000 Brussels residents, like a "mobility insurance". Even with massive investments in dismantling these barriers, many citizens will continue to face them. However, PB should not be a pretext for not investing in better cycling conditions.
	PB accounts for only a small proportion of bicycle trips compared to its share of the cycling budget.	Public investment in cycling is not in line with the objectives of increasing the modal share of bicycles compared to cars (e.g., leasing company cars, tunnels). And the €/trip ratio is lower for a well-used PB than public transport *(see page 10)*.
	Less efficient than LTR in terms of public euros excl. tax/km travelled.	Complementary to LTR and more effective in terms of the number of citizens reached.
	Widens the sociological gap, with underrepresentation of vulnerable groups.	Although underrepresented, several thousand of vulnerable people have access to a bicycle.
	Presence of private SB at lower public cost.	Makes cycling part of Brussels public transport and contributes to the culture of multimodality.
	Total carbon footprint potentially negative if low usages and few former motorists.	Total carbon footprint potentially positive, in contrast to much public funding.
	Negligible impact on avoided car kilometres.	Development of multimodal skills. Reduction of motorisation attractiveness [7].

3 | What if PB were only available in drop zones? Not so interesting.

Free-floating PB in the 3,000 planned drop zones, in place of *Villo !* and private licences, presents several economic and political risks, as described below.

First, this solution seemingly saves costs on stations. However, the cost to the public authorities would be close to a dock-based PB because of the operating and battery swapping costs (duplicate of batteries, human resources). Moreover, accessible pricing would increase usage and therefore swapping costs.

Second, drop zone parking increases the risk of theft, vandalism, and bikes lying on the ground or obstructing walkways. Technological solutions (GPS, cameras, photos, fall detectors) do not seem satisfactory at this stage, as they remain either imprecise, only available on a smartphone, or dependent on the responsiveness of the operator. And even with penalties, parking outside drop zones persists (5% in the Antwerp Region). Bikes branded "paid for with public tax money" lying on the ground or parked in a disorderly way would be difficult to accept for citizens and elected representatives.

4 | Is the best of both worlds possible? Hmmm, that's very uncertain.

The mixed scenario of "charging stations + drop zones with dedicated racks" is a tempting way of limiting investment and operating costs and ensuring orderly parking. Moreover, the market is moving in this direction with new charging stations and connected bicycles *(Figure 16)*. But many unknowns remain:

- No player does both jobs well.
- There is no experience feedback and no consensus among service providers on the optimal percentage between stations and drop zones with dedicated racks (10 to 90%).
- The investment is more expensive because of high requirements to both the bike (Internet of Things, shock resistance) and the station (secure parking, charging).
- There is confusion among citizens between parking facilities for personal bikes, PB, and private SB in drop zones.
- It is difficult to control whether the bike is properly attached to the dedicated rack, with the possibility for PB to lie on the ground or on footpaths.

5 | Is dock-based PB still an option? Eventually, yes.

With a 100% electrified fleet, the 100% charging stations option seems to be the most relevant and reassuring PB scenario in terms of:

- Performance, with more use for docking than free-floating *(Figure 14)*.
- Quality of service, with automated battery charging that is not dependent on human resources.
- Cost control, with less exposure to vandalism and theft, and no variable battery swapping costs.
- Image, with orderly PB.

There are, however, constraints to be anticipated:

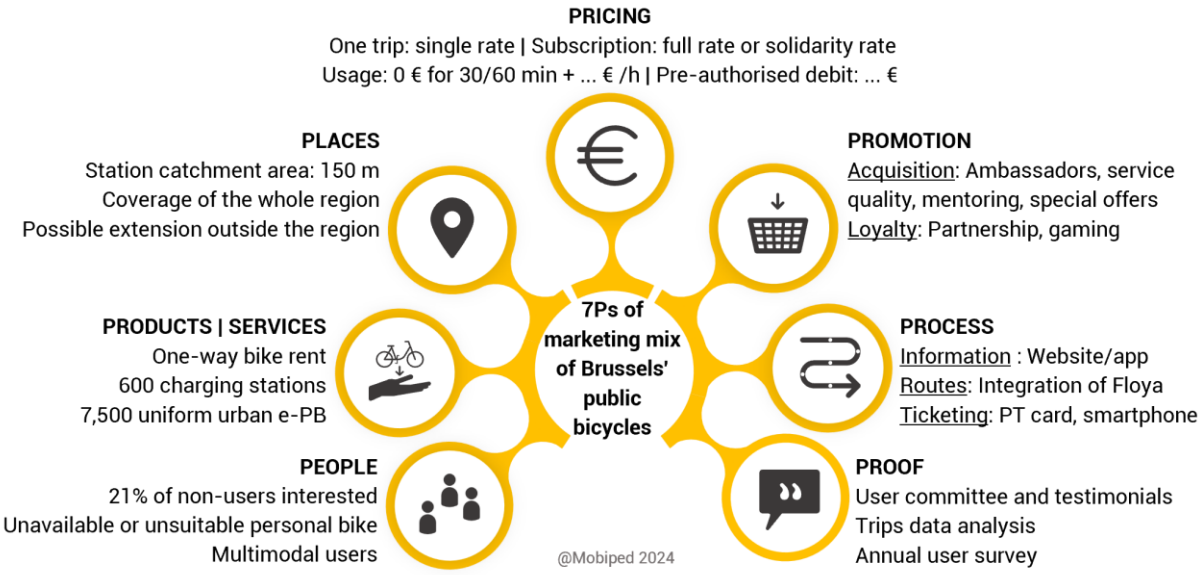
- Long and risky transition, as it relies on the decisions and timetable of the electricity grid operator and land planning authorities.
- Long contract to depreciate investment costs.
- Limited flexibility to move stations, but with possible intermediate solutions: station on platform, manned station at events.
- Limited station capacity and the cost of regulating between stations.

Scenarios 1 (LTR) and 5 (e-PB with charging stations) have been selected.

8. Marketing mix for a PB service

The proposals below are structured on the 7Ps of the marketing mix *(Figure 26)*.

Figure 26: Simplified view of the 7Ps of the user-centric marketing mix for future PB in Brussels.



PB meets the needs of many Brussels residents

Access to a bike for everyone

PB gives hundreds of thousands of Brussels residents the opportunity to use a bicycle, even if their environment makes it difficult to have permanent access to this mean of mobility *(Figure 27)*.

Tens of thousands of prospects

In addition to current *Villo !* users, several tens of thousands of residents are potential prospects if the service is improved *(Figure 28)*.

Figure 27: Percentage of the Brussels population unable to access a quality bicycle

Obstacles to getting a bike	Brussels residents
"I don't have a bike..."	... mechanical bicycle (53% of households), ... electrically assisted bicycle (89%) [17]
"I can't buy a bike"	6% of households do not own a bicycle for lack of financial means [20]
"I can't park my bike"	26% of households cannot easily store a bike (near) their home [17]
"I'm afraid of theft"	29% of cyclists had their bike stolen less than two years ago [14]
"I'm not used to riding a bike"	60% of Brussels residents did not cycle the previous year [17]

Figure 28: Potential market and prospects for PB in Brussels

Mobility practice	Potential prospects
"I already use *Villo !*"	23,000 *Villo !* subscribers and 45,000 rentals by non-subscribers by 2022 [9]
"I might be interested"	21% of non-users of *Villo !* in Brussels say they may be interested in PB [16]
"*Brupass* + PB? Ok"	9% STIB-MIVB subscribers are willing to pay an extra 17 €/year for PB and 21% are willing to pay 3 €/month of their choice [21]
"I travel less than 5 km"	60% of intraregional trips	48% of trips by car [17]
"I don't have a car"	54% of households do not have a car [17]

A public bicycle rental service

Rent a bike for the length of a trip

Users over 14 years old can rent a bike (or several bikes) 24/7 from a PB station in the public space. They rent the bike for the length of their journey and drop it off near their destination. Having a bike near you or a parking space close to your destination is not guaranteed, just as there is no guarantee to get a seat on public transport or to drive a car at the maximum speed allowed during rush hour.

100% electric public bikes

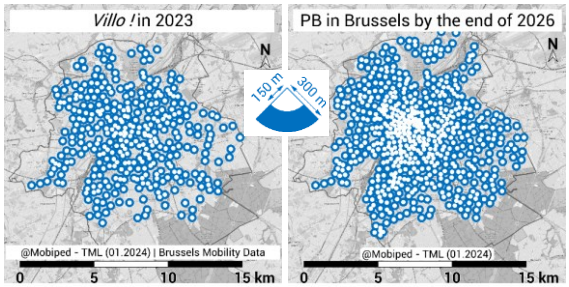
E-PB are justified in Brussels because of the hilly topography (including in the city centre), the competition from private SB, and the negative image of the current service that needs to be improved.

A homogeneous fleet, rather than a mixed fleet, is preferred in order to simplify the fare structure (on the user side), regulation and maintenance (on the operator side), and contractual monitoring (on the authority side). Cargo bikes could be included as an option, but it is technically unlikely that they could be parked and charged in the same stations. LTR is better suited to offer a variety of bike sizes and models.

100% charging stations

The stations are connected to the electricity grid, so there is enough capacity to charge each bicycle at the same time. Charging and secure parking are based on the three-part "Bicycle <> Hook <> Street equipment", the design of which is often interconnected. The current *Villo !* three-part is exclusively owned by JC Decaux and protected by patents. If the Region were to buy and keep the furniture, the outgoing incumbent would have an undeniable advantage, unthinkable under public procurement law. The future incumbent will therefore provide the entire "Bicycle <> Hook <> Equipment" three-part, with its own equipment to secure and supply the bicycles.

Figure 29: Catchment area for 350 stations in 2023 (left) and 600 stations by the end of 2026 (right)



A denser network of stations

To continue to cover the entire Region and reduce access times to stations *(Figure 29 and Figure 30)*, at least 600 stations are required:

- 350 current locations (in orange),
- 250 new locations (in blue): 35 in the pentagon, 70 in the first crown and 150 in the second crown *(Figure 31)*.

An extension to neighbouring towns may be considered, with specifications to be defined.

Figure 30: Average distance between 2 nearest PB stations

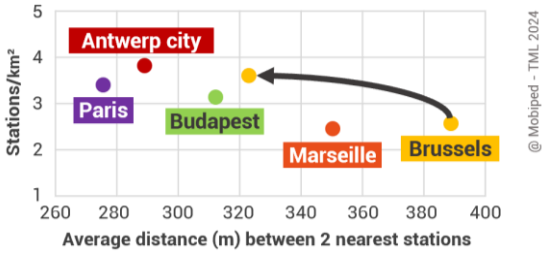
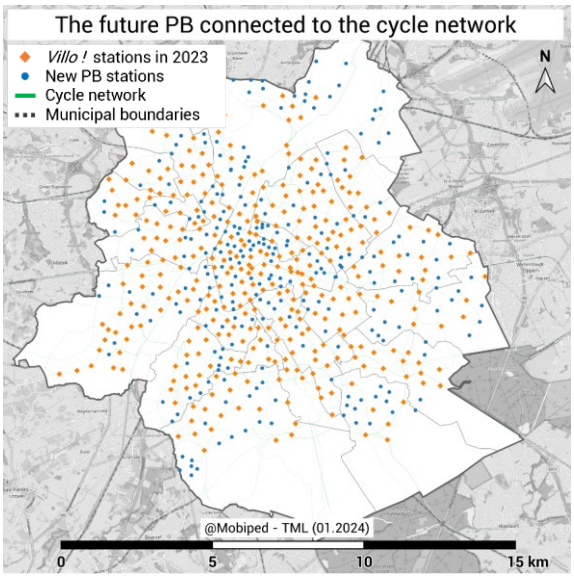
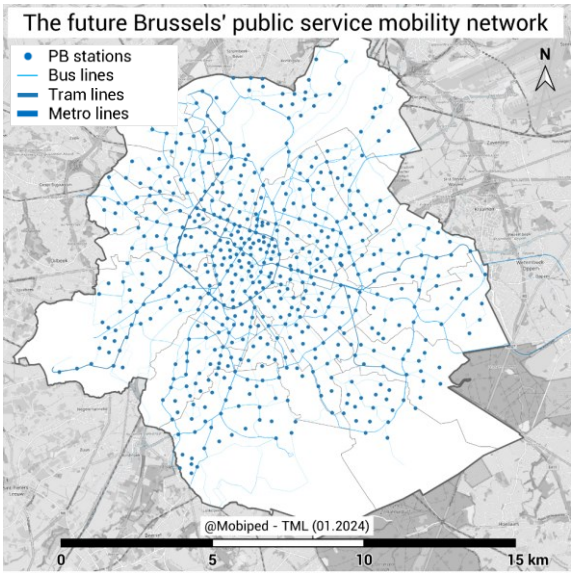


Figure 31: PB stations network in the cycling network (top) and in the public transport network (bottom)





Multimodal pricing

Pricing: a sensitive equilibrium

Ideally, pricing will be attractive, simple, equitable, incentive to return the bike, restrictive to prevent abuse (e.g., overuse by food delivery), adapted to encourage multimodality, and balanced to finance the service *(Figure 32)*.

Figure 32: Principles of a PB fare structure

Unlocking	One-way and return tickets Short packages (day, week) Full-fare or discount monthly/annual membership (Affordable, Public transport membership ticket holder) Extra cost if 3+ releases/day
Usage	0 € for 60 min + ... €/h
Payment	Pre-authorised debit (reserve frozen during rental period)

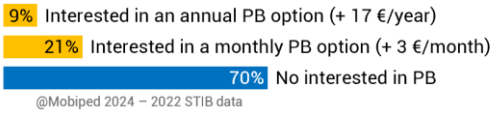
Towards a single multimodal ticket?

Ideally, one ticket would allow use of both PT and PB. But to charge for the duration of the rent period and reduce the risk of theft, users need to be identified. This cannot be done with anonymous paper tickets or Mobib basic tickets. Contactless payment would lead to paying twice. STIB-MIVB subscribers, however, are already identified on their digital pass or *personal Mobib* card. Activating the PB option could be done by giving consent to prepayment and acceptance of the General Terms and Conditions (GTC) (the latter also whenever they are updated).

What kind of tariff integration?

It is possible to integrate PB into the PT subscription with or without a price increase *(Figure 33)*. If PB is included in the basic PT subscription at the current fare, user revenue will not contribute to financing the service. If it is included with an increase justified by the upgraded mobility offer, each subscriber will contribute to financing the service, even without using it.

Figure 33: STIB-MIVB subscribers' interest in a PB option with their subscription [21]



Willingness to attract users

Acquisition of new user profiles

Attract	Save time: proximity, availability, and ease of use | Good value for money and quality of service
Communicate	Public branding: purchase of *Villo !* from JC Decaux [23], STIB-MIVB, naming, other? Multi-channel strategy with well-known ambassadors
Provide	Special commercial offers (e.g., 1st journey for free) and partnerships
Invite back in the saddle	Helping people who can cycle to feel confident with the service (bikes, fares, digital interfaces)

Building users' and cyclists' loyalty

Convert	Invite to subscribe after a test
Maintain	Relevant goodies for urban cyclists News and practical advice
Stimulate	Gaming and partnerships programs
Listen to	User Committee
Promote	Invite users to ride their own bike

An optimised user experience

Find out more	Digital: Website, app Human: STIB-MIVB agents
Register	Creating or using an account (eID, Floya's future "account-based identification")
Buy	Credit card: contactless on the bike or at the kiosk, online, in the App, etc. | Electronic wallet | Direct debit from bank account Option: Paypal, cash
Identify yourself	Possible ticketing media: digital (digital ticket, app) and non-digital (e.g., personal Mobib card) Option: bank card, text message
Book	Bicycle: 5 min maximum Parking slot: 30 min (premium service)
Choose	Information on the quality of the bike
Orientate yourself	PB maps, route search engines (PB app, Floya, Google Maps, private MaaS)
Parking	Smartphone-free bike return

Usage assessment

To improve the service and evaluate the public policy related to the initial objectives, it is essential to understand and know users. This can be done through a user committee, an annual user survey, and big data analysis to identify inter- and multimodal practices (only possible if there is a single owner of the PB and PT databases).

9. Sizing and budget

System size

600 charging stations and 7,500 e-PB

To maintain a good balance of bikes/station (10 to 14 in the benchmark) based on the recommended minimum of 600 stations *(Page 22)*, 7,500 e-PB would be contemplated, i.e., one PB for every 165 residents of Brussels.

Based on a simplified socio-economic analysis, the carbon and societal balances are positive only with high usage rates, a modal shift away from the car *(Figure 34)*, and a high average travelled distance.

*Figure 34: External impacts of a PB (*both investment and operation over a 10-year period included)*

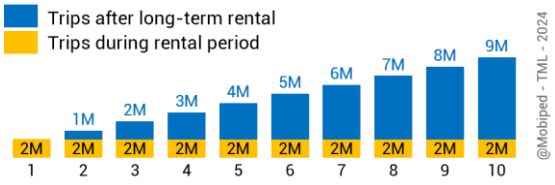
	😟	😊
Assumptions		
Trips/bike/day over one year	2	5
Users who would have used the car	7%	12%
Average distance per rent (km)	2.5	3.1
Impacts*		
External impacts (avoided km by car and public transport) [10] (M €)	9.2	31.2
Tonnes of CO_2 avoided [22]	- 60	155
Societal balance sheet (M €) : External impacts - € users - € public	- 9.2	17.5

4,500 LTR bicycles

With a reasonable target of 35 bicycles per 10,000 residents, 4,000 LTR bicycles would be provided, of which 60% electrically assisted and 40% mechanical. A further 500 mechanical bikes would be dedicated to training and discounted sales, in the *Vélo Solidaire* spirit.

After renting an LTR, around half of users will use their own bike. Over a 10-year period, this results in 20 million cumulative LTR trips and 40 million induced trips. The lack of reliable data for PB makes impossible to estimate its induced impact.

Figure 35: Trips per year during the LTR rental (yellow) and cumulative induced trips after the rental (blue)



How much would PB + LTR cost?

The BCR would pay 16 million € excluding tax/year for the 7,500 PB and 3 million €/year for the 4,500 LTR, excluding other sources of funding *(Figure 36)*. This would represent more than 50% of the annual regional budget dedicated to cycling (including facilities) and around 5% of cycle trips *(Figure 37)*. As acquiring a new customer costs 5 to 10 times more than building customer loyalty, the investment makes sense only if these services generate new cycling habits. The share of PB in the cycling budget seems high, but in reality, it is the budget devoted to cycling as a whole that is low compared with other modes (*Figure 37*) and the modal share objectives.

Figure 36: Financial aspects of PB and LTR in Brussels

	7,500 PB 😟	7,500 PB 😊	4,500 LTR
Per bike (€ excl. tax/bike/year)			
Public budget*	2,400	1,800	530
User revenue coverage	25%	50%	33%
Net expenditure**	1,800	900	
Per year (Millions of euros excl. tax/year)			
Public budget*	18,5	13,8	3
User revenue	4,5	6,8	1
Net expenditure**	14	7	2
Over 10 years (Millions of euros excl. tax)			
Public budget*	185	138	30
User revenue	45	68	
Net expenditure**	140	70	

* In case of a public contract and revenue collection, with a 10-year contract investment and operating | ** Without any European funding or naming.

Figure 37: Regional cycling budget versus bicycle trips

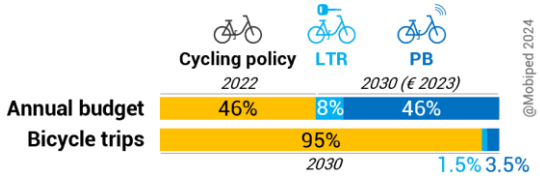
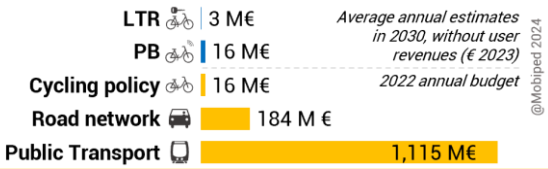


Figure 38: Regional mobility budget share in 2022



Go big or go home

To reach high levels of use that justify a public investment and to move beyond the current image of the *Villo !* system, a "supply shock" is required: densification of the current network, e-PB, quality of service, etc.

10. Possible governances

The content of the public contract

An 8 to 10-year contract focused on PB

The public contract would cover "delivery, installation, and operation on a B2G2C basis of a back-to-many public rental service of electrically assisted bicycles". An 8 to 10-year contract would enable the investment in the stations and bicycles to be paid for themselves, 10 years being the maximum duration for a Service of General Economic Interest (SGEI).

A dedicated PB tender would make it possible to:

- Focus the energy of the authority and the contractor on the quality of the PB service.
- Stimulate competition between B2G2C players and possible consortia combining charging stations players and B2C operators.
- Know the real price (Paris) and make it easier to evaluate the public policy.

It did not seem appropriate to link PB and:

- Advertising space, in the absence of economies of scale and the mistaken belief that advertising finances the service.
- Scooters in stations, because scooters could be profitable, there is no political procurement, battery models are different, and mixed operation/regulation is very complex (Chicago).
- Bicycle services (parking, long-term rent, training), because operations and contract duration differ.

The main PB stakeholders

Four stakeholders are involved in PB:

- **Citizens**: regular or occasional users, observers, people not attracted by PB, …
- **Brussels Mobility (BM)**: Organising Authority for Mobility of the Brussels-Capital Region.
- **STIB-MIVB**: Association under public law responsible for operating urban public transport within the Brussels-Capital Region.
- **PB provider(s)**: company or group of companies holding the PB contract.

Involvement of the STIB-MIVB

As a mobility manager authority, Brussels Mobility initiates the PB project, defines the public service obligations (e.g., fares, coverage, accessibility, MaaS, etc.), consolidates the funding of the service, and supports the project in conjunction with the cycling and mobility policies. Three governance options are being studied, concerning consultation, supervision, and customer relations *(Figure 39)*.

Figure 39: Governance options for the future PB

	1	2	3
Initiative	BM		
Financing	BM		
Consultation	BM	STIB-MIVB (BM supports)	
Supervision	BM	STIB-MIVB (BM supports)	
Supply	PB service provider		
Installation	PB service provider		
Operation	PB service provider		
Customer relations	PB service provider		STIB-MIVB

1 | Steered by Brussels Mobility

As with *Villo !,* Brussels Mobility issues the tender specifications and carries out the supervision. The outlook within the Brussels administration does invite the search for a route outside BM to guarantee sufficient staff to carry out this work properly. With the aim of integrating PB into the PT service in Brussels, the STIB-MIVB is the ideal partner for an approach similar to that for MaaS.

2 | The STIB-MIVB as technical coordinator

The STIB-MIVB would be responsible for the:

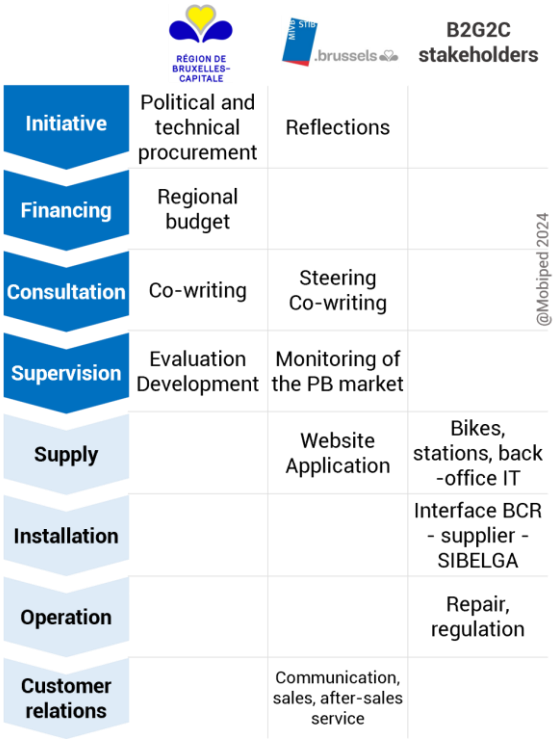
- Consultation, by bringing its technical experience to the selection process.
- Supervision of the contract on behalf of Brussels Mobility, with regular exchanges between the STIB-MIVB and Brussels Mobility about evaluation of the service (supply, use, service provider performance) and its improvement (fares, consistency with regional mobility policies).

The operation of the service would be entirely entrusted to a private service provider. The STIB-MIVB could, however, be a privileged partner for pooling ticketing media (e.g., personal Mobib card with *Villo !)* and offering cross-discounts for PB and PT subscribers.

3 | STIB-MIVB in contact with PB customers

In addition to writing the specifications and supervising (option 2), Brussels Mobility would ask the STIB-MIVB to act as the PB commercial showcase, integrating PB into its interfaces (website, app, passenger information, etc.) under the STIB-MIVB brand name. The possibility of a public service fully publicly managed is ruled out because PB and PT businesses are distinct and specialised white label service providers are more experienced *(Figure 40)*.

Figure 40: Role distribution at each stage



This option would have several advantages:

- Utilise the STIB-MIVB's reputation and goodwill to reach people who are not currently cycling.
- Consider the possibility of a single bicycle, bus, tram, and metro pass along the lines of the multimodal *Brupass*.
- Offer current and future STIB-MIVB customers an alternative during off-peak hours and at night, during disturbed situations (incidents, works, strikes), or long journeys (walking, waiting, connections).
- Propose common PT and PB Terms and Conditions of Sale to facilitate registration.
- Track inter- and multimodal journeys using connected databases.

An analysis of IT development costs in relation to customer benefits will indicate the optimal level of integration.

Under European regulations, the STIB-MIVB would be qualified as a co-operator. The awarding of this economic mission without going through a call for tenders would be qualified as state aid, requiring additional accounting transparency.

Option 3 preferred

The involvement of the STIB-MIVB offers the best perspective for a common PB, bus, tram, and metro experience.

Concession or public contract?

Responsibility for commercial risk determines the choice of contractual relationship. If the revenues are collected by the public authorities, the service provider is paid 100% by the public authorities under a public contract (Marseille, Paris). If the operator collects the revenues, a concession is signed under which it receives a fixed fee that does not cover all costs, and it tries to maximise its user revenues (Antwerp). The public contract is possible in all three options mentioned above. A concession would be unlikely in option 3 because the service provider has no influence on prices or communication.

Tender with competitive dialogue?

Given the complexity of PB, many cities (Madrid, Paris, Vienna) have adopted a competitive dialogue approach. This process consists in shortlisting candidates, submitting a set of specifications, discussing every aspect of the tender with each candidate under confidentiality, and then adapting the final version of the specifications. This procedure makes it possible to:

- Challenge the ideals of public authorities with the field experience of candidates.
- Balance budget and service levels.
- Lay the foundations for the future authority-provider-operator relations.

A tight schedule

The procedures need to be launched quickly in view of planning constraints:

- Selection of candidates: 1 year minimum
- Awarding of the contract, after possible legal appeals: 3 months
- Order, delivery, and installation: 1 year
- Opening: from September 2026

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Factsheets for each service (except Véligo Location)	FR or EN
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Synthesis	FR, EN, NL

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12. Table of figures

13. Acknowledgements

Brussels stakeholders

Support Committee

Members: P. Barette, C. De Voghel, M. Thys (BRUSSELS MOBILITY), D. Dumont, M. Nicaise (STIB-MIVB), J. Kawan, S. Vandenhende (TRANSPORTATION MINISTRY OF THE BRUSSELS-CAPITAL REGION), B. Beroud (MOBIPED), B. Van Zeebroeck (TML).

Special guests: F. Depoortere, M. Lefrancq (BRUSSELS MOBILITY), J. R. Dussart (TRANSPORTATION MINISTRY OF THE BRUSSELS-CAPITAL REGION), E. Peduzzi (TML).

Innov@talier contributors

M. Delens, G. Mercier, M. Caseau, A. Van de Zande (STIB-MIVB).

Brussels associations

T. Cassiers (BRAL), M. Verkaeren (CYCLO), F. Cuignet (GRACQ), T. Deweer (FIETSERSBOND), J. Fiasse (PRO VELO).

Brussels-based service providers

B. Dousselaere (BLUE BIKE), M. Naether (BOLT), S. Schlebusch (DOTT), J. Blanchevoye (JC DECAUX), J Nieuwenhuys (PRO VELO).

Belgian and international stakeholders

Benchmarked partner cities

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Other people met during Brussels delegation visits

Antwerpen: A. Lannoy (DONKEY REPUBLIC), R. Loeys (CLEAR CHANNEL)

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Interviewed experts

E. Anaya (UNIVERSIDAD DE BARCELONA), J. Cabanas (INURBA), J. Christiaens (MOBIEL 21), P. Dalos (BKK), A. Darbon (JC DECAUX), K. Delli (EUROPEAN PARLIAMENT), P. DeMaio (METRO BIKE), H. Deng (ITDP CHINA), R. Dilks (COMOUK), E. Fishmann (INSTITUTE FOR SENSIBLE TRANSPORT), C. Gioria (ILE-DE-FRANCE MOBILITÉS), M. Hertel (DIFU), M. Koucky (KOUCKY AND PARTNERS), J. Labaca (LE FACILITATEUR), K. Mayne (CYCLING INDUSTRY EUROPE), J. Mason (ITDP), L. Mercat (DONKEY REPUBLIC, LMC), V. Monatte (VÉLOGIK, AAVP, CARA), O. O'Brien (COLLEGE LONDON UNIVERSITY), C. F. Pardo (DESPACIO), V. Sauter (COORDINATION SUISSE BIKE SHARING), L. Signor (UITP), J. Sluijmans (INTERNATIONAL CARGO BIKE FESTIVAL), M. Szeiler (CVP), A. Verloes (STEER).

Discussions with market players

ARCADE CYCLES, B-CYCLE, BICINCITTA, BLUE-BIKES, BOLT, CLEAR CHANNEL, CYKLEO, DB BAHN, DONKEY REPUBLIC, DOTT, ECOVÉLO, FIFTEEN, FLUCTUO, FREDO, INTUITUM, INURBA, JC DECAUX, KNOT, MASTERCARD, METROMOBILITY, NAVEE, NEXTBIKE BY TIER, NOVAL, OKAI, PBSC, PONY, PUBLIBIKE, QCIT, SEGWAY, SERCO, SERVEO, SHARED MICRO MOBILITY, STREET-STUFF, SWAPFIETS, TEMBICI, URBANSHARING, VAIMOO, VELOCITY MOBILITY, VELOGIK, VOI, WORLDLINE, WUNDER MOBILITY.

Bike share related conferences

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NextGenerationEU is a temporary recovery instrument of over €800 billion to help repair the immediate economic and social damage caused by the coronavirus pandemic. Post-COVID-19 Europe will be greener, more digital, more resilient, and better adapted to current and future challenges.

The Recovery and Resilience Facility, the centrepiece of NextGenerationEU, is endowed with €723.8 billion in the form of loans and grants to support reforms and investments undertaken by EU countries. The aim is to mitigate the economic and social consequences of the COVID-19 pandemic and to make European economies and societies more sustainable, more resilient, and better prepared for the challenges and opportunities posed by the ecological and digital transitions.

The "Preparatory study for the public bicycles in the Brussels-Capital Region in 2026: Benchmark and Recommendations" is part of these priorities established by the Brussels Government and at European level, and particularly concerns the Mobility axis and the Acceleration of MaaS deployment component. More specifically, it aims to prepare the future public bicycle service in the Brussels-Capital Region. In financial terms, "The preparatory study for the public bicycles in the BRC in 2026: Benchmark and Recommendations" will receive €197,816.75 including tax.

A Bike Share Market Trends

April 2024

Benoît Beroud - MOBIPED

Bruno Van Zeebroeck - TML

Emanuela Peduzzi - TML

Commissioner

BRUSSELS-CAPITAL REGION

Funded by the European Union
NextGenerationEU

Consultancies

TRANSPORT & MOBILITY LEUVEN

Mobiped

Authors	Benoît Beroud (MOBIPED) Bruno Van Zeebroeck (TML) Emanuela Peduzzi (TML)
Reviewers	Christophe De Voghel (BRUSSELS MOBILITY) Mathieu Nicaise (STIB)
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Sponsor
Brussels-Capital Region | Brussels Mobility Regional Public Service
Organising Authority for Mobility
Place Saint-Lazare 2 | 1035 Brussels
https://mobilite-mobiliteit.brussels/en
Christophe De Voghel: cdevoghel@sprb.brussels

Partner
STIB-MIVB - Brussels public transport company
(Société des Transports Intercommunaux de Bruxelles –
Maatschappij voor het Intercommunaal Vervoer te Brussel)
Rue Royale 76 | 1000 Brussels | www.stib-mivb.be
Mathieu Nicaise: mathieu.nicaise@stib.brussels

Mobility research office
TRANSPORT & MOBILITY LEUVEN
Diestsesteenweg 71, 3010 Leuven | www.tmleuven.be/en
Bruno Van Zeebroeck: bruno.vanzeebroeck@tmleuven.be

Public bicycles expert
MOBIPED - Mobility of Bipeds
10 bis rue Jangot, 69007 Lyon | www.mobiped.com/en
Benoît Beroud: benoit.beroud@mobiped.com

Summary

Glossary

Cycling

BS	Bike Share (service or system)
e-PB	Public e-Bicycles (Public pedelecs)
e-SB	Shared e-Bicycles (Shared pedelecs)
GBFS	General Bikeshare Feed Specification
LTR	Long-Term (cycle) Rental
PB	Public (funded) Bicycle
SB	Shared Bicycles

Stakeholders

BCR	Brussels-Capital Region
STIB	Brussels Inter-Municipal Transport Company

Other vocabulary

BLE	BlueTooth Low Emission
ET	Excluding Tax
IoT	Internet of Things
MaaS	Mobility-as-a-Service
PSD	Public Service Delegation
PT	Public Transport
UN	Underground Networks

1 Access to a bicycle

1.1 Own or rent a bike

The aim of the Brussels study is to facilitate access to a bicycle and, ultimately, increase cycling. With this in mind, it is important to make a clear distinction between access to a bicycle (ownership, loan, rental) *(Figure 1)* and the use (in working order, practicality, reassuring and attractive cycling conditions). While many solutions offer access to a bike *(Figure 2)*, this does not mean it will be used, since each type of bike is designed for different types of journeys. The rest of the study focuses on rent-a-bike-services.

Figure 1: Preferences between owning and renting micromobility in Germany, the US and China (Source 19)

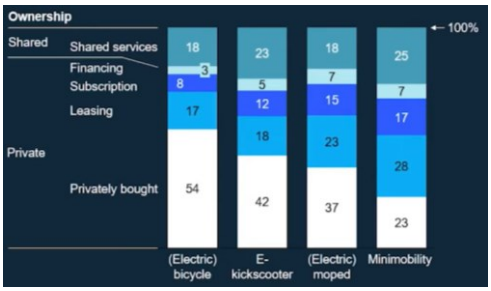
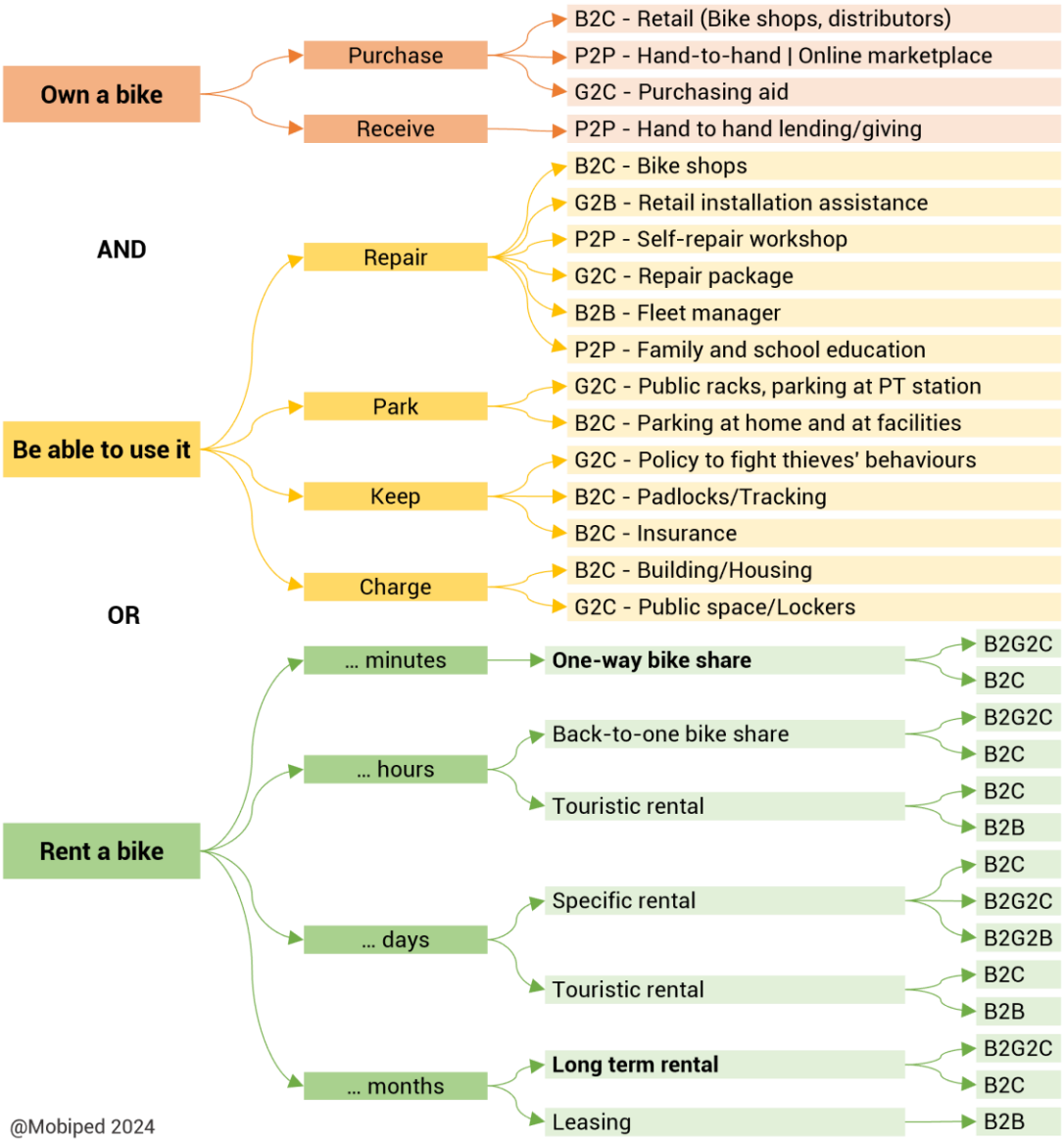


Figure 2: Overview of how to access a bike in good condition



1.2 Rent-a-bike diversity

Bike rental services are differentiated according to:

- rental periods of minutes, hours, days or months *(Figure 3, Figure 4 and Appendix 9.1)*. Some players offer hybrid rental periods: Fifteen has a service that combines city PB, train station SB and LTR. Donkey's price range extends from a per-minute offer to several days. Brompton offers rentals from a few hours to a few months.
- target groups and bike types *(Figure 5, Figure 6, Figure 7)*.

The study briefly looks at Long-Term (cycle) Rental (LTR), before going into more detail on Bike Share (BS).

Figure 3: Overview of rent-a-bike diversity

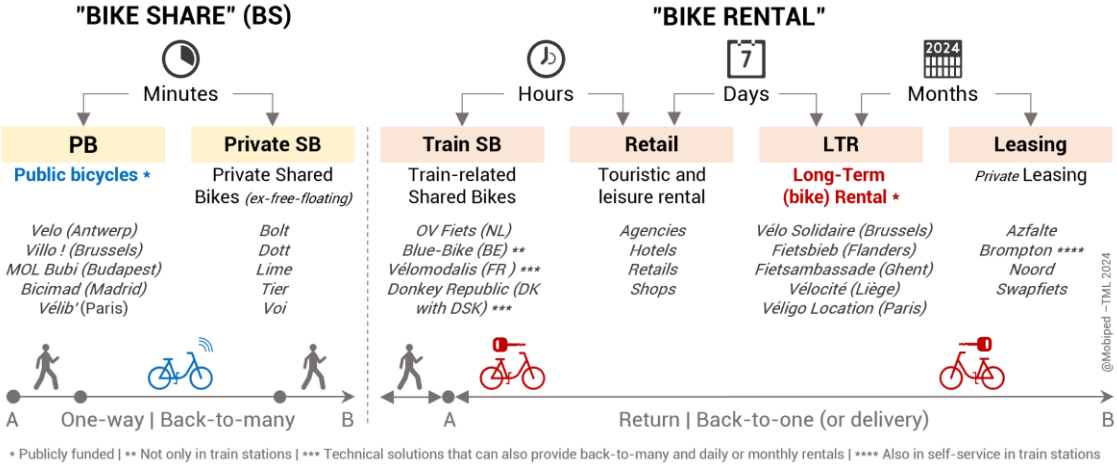


Figure 4: Examples of rent-a-bike services

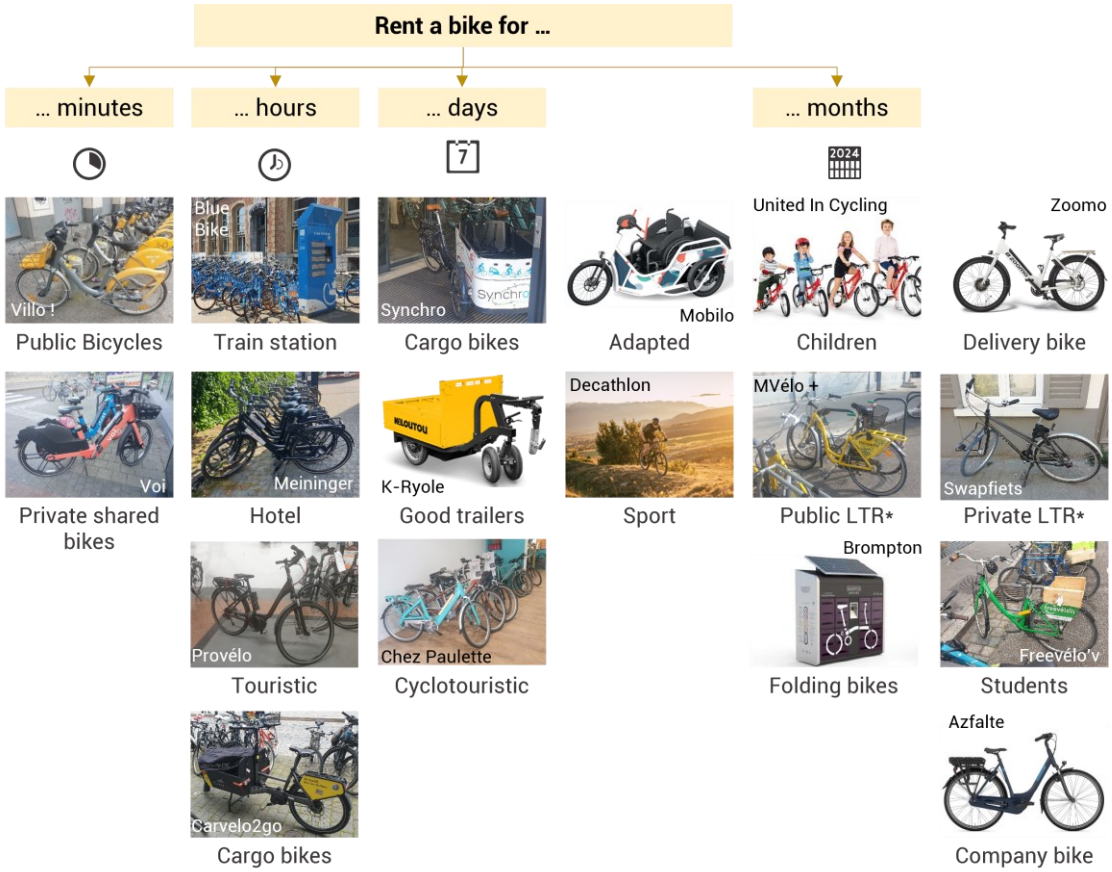


Figure 5: Accessories for a one-way tourism rental (Chez Paulette)

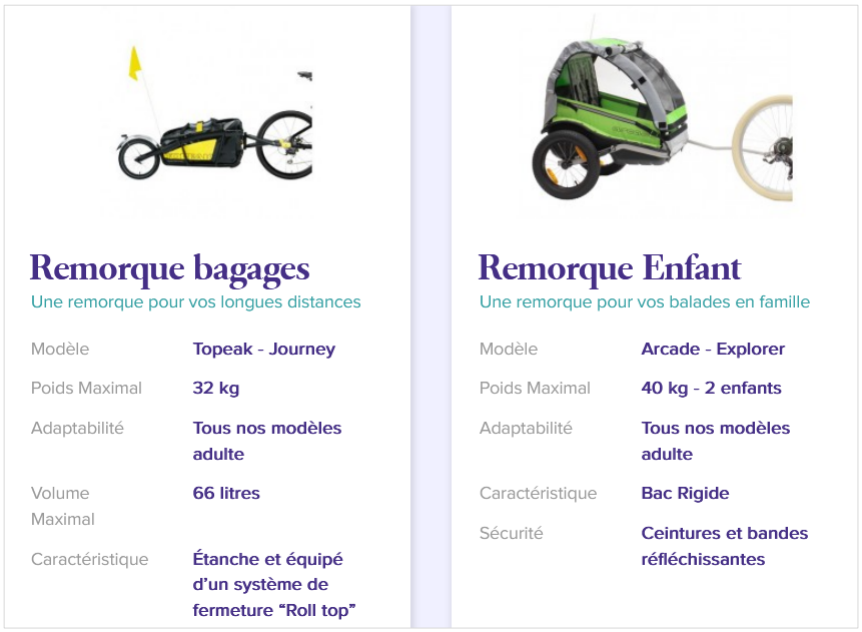


Figure 6: Long-term rental (LTR) of bicycles for employers (Azfalte)

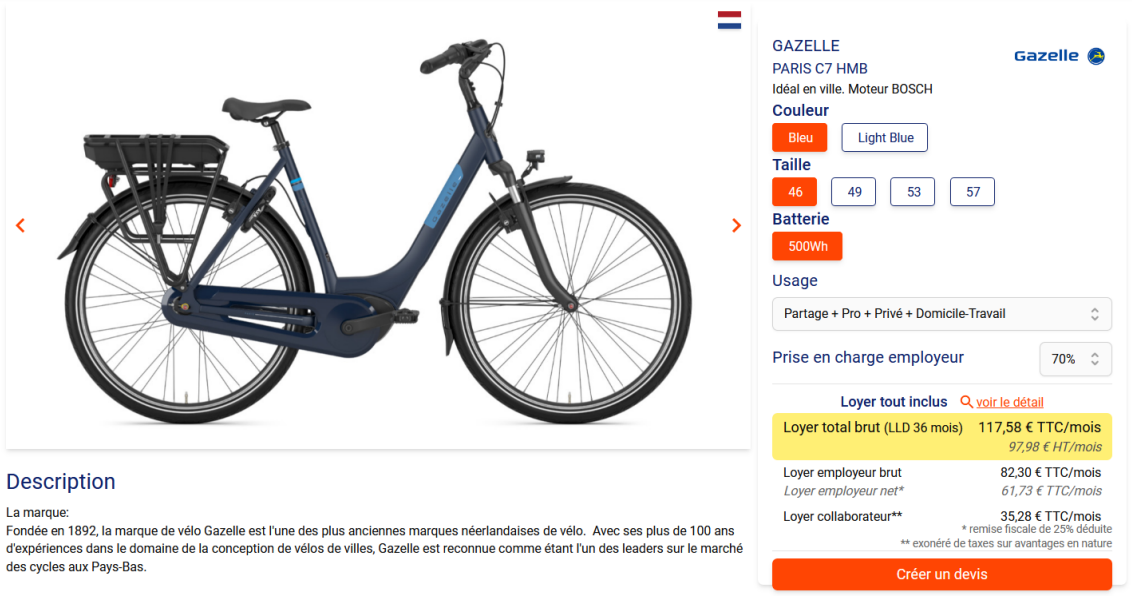


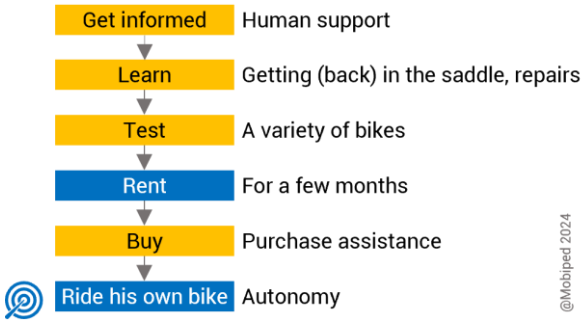
Figure 7: Overview of adapted bicycles (Praxie Design)

1.3 Focus on Long-Term (cycle) Rental, named LTR

1.3.1 Definition

An LTR service allows users to rent a bike and accessories (luggage rack, child seat) for several months, and benefit from services (training, repairs, insurance against theft). LTR invites people to adopt a cycling lifestyle by accessing a quality bicycle, before considering purchasing a bike. An LTR service such as Véligo Location 2 in the Paris region is part of an overall mobility management approach *(Figure 8)* to help beneficiaries to become everyday cyclists with their bike.

Figure 8: LTR in the mobility management chain



1.3.2 Public LTR markets in France and Belgium

Unlike bike share services, which have conquered the entire world, the market for publicly funded LTR services is mainly concentrated:

- in France: Véligo Location (Ile-de-France Mobilités), MVélo + (Grenoble), Freevélo'v (Lyon). Many new services are launched every year *(Figure 9)*.
- in Belgium: StudentEnMobiliteit became Fietsambassade in 2017 (Ghent), Vélocité (Liège), Fietsbieb (Flanders), Vélo Solidaire (Brussels) or in Ottignies, Gembloux, Mons.

The services can be distinguished by the diversity of bikes on offer, the services provided, pricing adapted to different audiences, renewable or non-renewable rental periods, support via (returning to) cycling training and with the option of buying the bike *(Figure 10 and sources 17, 21, 22, 23 and 24)*. Free services are considered to be bicycles provision and not rental services.

Figure 9: Yearly creations of Public Bicycles, Long Term Bicycle rental and purchase aids (Source 9)

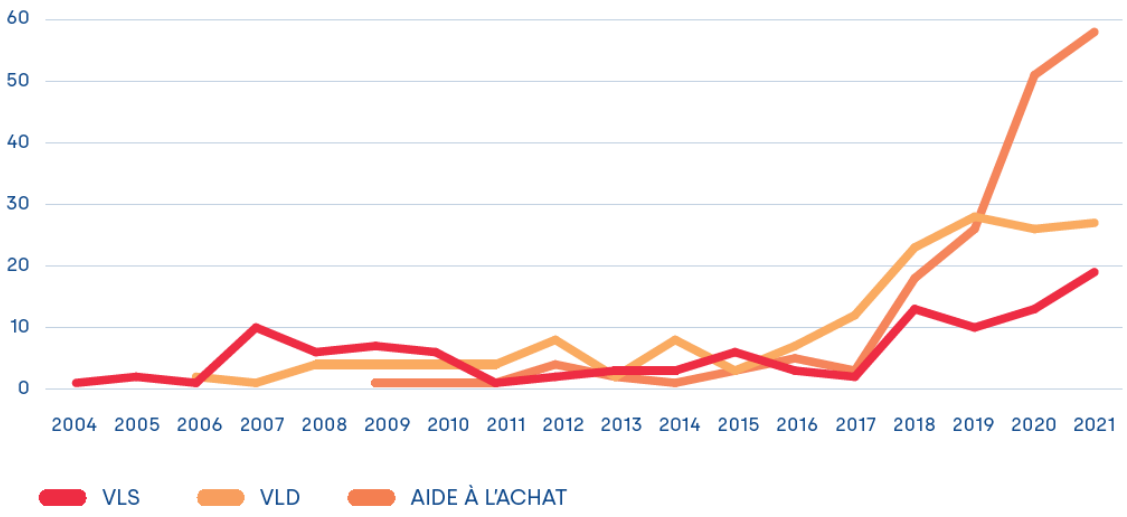


Figure 10: Illustrations of LTR (Photos: Vélo Solidaire - Provelo, others B. Beroud)

Mobility centre where people can rent LTR (Bordeaux)

Graduated annual rates for students (Strasbourg)

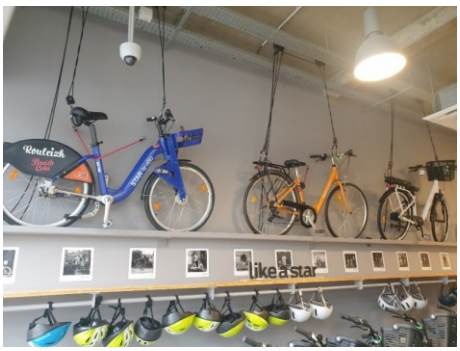
Visibility of LTR in racks in front of the train station (Grenoble)

LTR in different colours (Toulouse)

Vélo Solidaire training (Brussels)

Fietsambassade bikes (Ghent)

Freevélo'v parked in bicycle racks (Lyon)



PB and LTR on display at the bicycle centre, accessible on the station forecourt (Rennes)

1.3.3 Some public LTR players

- Cycle suppliers: Arcade cycles, Second Cycle, Fifteen.
- Operators: Cyclo, Cykleo, Inurba, Consortium members of Fluow, Nextbike, Provelo, Swapfiets, Velogik.
- Training: Ateliers de la rue Voot, FietsAmbassade, Mobiel21, Provelo.

2 Bike Share (BS) concept

2.1 Introduction

Bike Share allows people to rent a bike for the duration of their one-way trip. By dropping off the bike close to its final destination, the user discharges responsibility for parking and maintaining the bike. Bike share removes the obstacles to buying a bike, parking at home and at the destination, maintenance and the risk of theft. Several semantics are used in each language. The adjective "Public" is sometimes added to qualify the notion of public funding or service, legally considered as such in Brussels, France and Hungary *(Figure 11)*. A number of publications are available on the topic *(Figure 12)*, and in addition to national conferences, several conferences in Europe deal with the subject *(Figure 13)*. "The Meddin Bike-sharing World Map" also lists bike share worldwide. At the end of 2022, there were over 1,900 bike share services in 1,600 cities *(Figure 14, Source 28)*.

Figure 11: Bike share, public bicycles and other related names

French	English	Dutch	Spanish
Vélo(s) en libre-service (VLS)	Bike-sharing (BS)	Deelfietsen (DF) (openbare/ publieke fietsen)	Bicicleta publica
Vélo(s) public(s)	Bike share (BS)		Bicicleta en libre servicio
Vélo(s) partagé(s)	Shared bike (SB)		Servicio de bicicleta compartida (SBC)
Cyclopartage	Public bike/bicycles (PB), City bikes		
Location en trace directe	Back-to-many		
	One-way		

Figure 12: Some must-read documents on shared bicycles

2001 and 2004 DEMAIO [11]	2015 RICARDO [33]	2021 DIAMOND [12]
2005 FIERLING	2015 FISHMAN [14]	2022 CAUPD [6]
2006 BEROUD [3]	2015 HERAN [20]	2022 COMOUK [10]
2010 SHAHEEN [35]	2016 ADEME [17]	2022 GIZ [18]
2011 ANAYA and CASTRO [1]	2016 ROLLAND BERGER [34]	2023 AAVP [21]
2011 OBIS [32]	2019 CEREMA [7]	2023 CIE [8]
2012 ANAYA and BEROUD [4]	2019 T4AMERICA [36]	2023 NABSA [31]
2013 ITDP [25], updated 2018 [26]	2021 ADEME [22, 23, 24]	2024 FLUCTUO [16]

Figure 13: Main international conferences in Europe visited during the study

Cycling Industry Europe	Brussels	9 March 2023
Autonomy	Paris	22 and 23 March 2023
Cargo Bike Sharing Europe	Cologne	24 May 2023
Velo-city	Leipzig	9 to 12 May 2023
Micromobility	Amsterdam	8 and 9 June 2023
Shared mobility rocks	Brussels	6 February 2024

Figure 14: Shared bikes worldwide from the Russell Meddin map

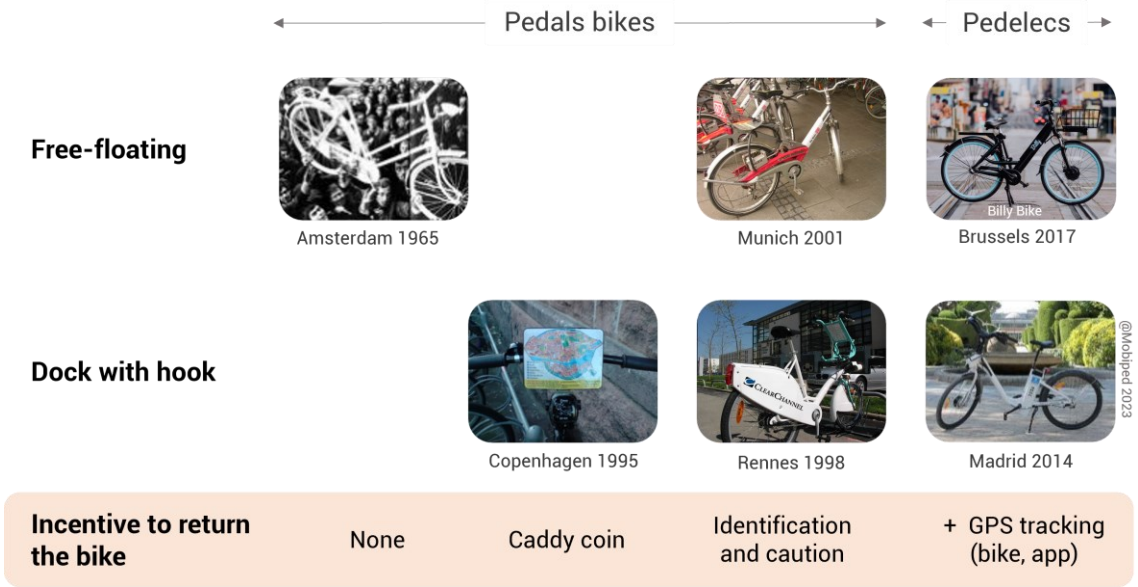
2.2 Background

Figure 15: Milestones in the history of bike share

1965	In Amsterdam, Whites Bikes (Witteﬁetsenplan) were bicycles that had been salvaged, repainted and placed on the street for free use: full free-floating. Bikes were kept or thrown away.
1995	In Copenhagen, the Caddie system was an initial incentive to bring back and share the bicycles. At the University of Portsmouth, Bike About developed the first automated service.
1998	In Rennes, Clear Channel included in its advertising space offer the first automated bike share service in the public space (with identification of the user, obliging them to return the bike), enabling it to enter JC Decaux's domestic market.
2000	In Munich, Deutsche Bahn proposed dockless bicycles, using GSM technology.
2005	In Lyon, Vélo'v was the first large-scale one-way public bicycles (PB) rental service [3].
2007	In Paris, Vélib' inspired by Vélo'v accelerated a worldwide trend.
2014	In Madrid, launch of a dock-based PB service with pedelecs.
2015	In Beijing, Ofo offered smartphone-based free-floating shared bikes (SB), which rapidly spread to European cities in the following years.
2017	In Key Biscayne, LimeBike launched free-floating e-SB. In Brussels, Billy bike launched free-floating e-SB. In Paris, Vélib' 2 offered bicycles with on-board electronics. In Santa Monica, Bird launched shared e-scooters.
2019 - 2022	Cities were looking at how to deal with free-floating shared vehicles (scooters, bikes, scooters), and were introducing bans or restrictions on the number of players, regulations, calls for expressions of interest, and more or less virtual parking zones.
2023	In Paris, 100,000 citizens voted in a referendum to stop shared e-scooters, upsetting the industry, which lost its most profitable market.
2024	Tier merged with Dott and Nextbike regained its independence.

2.3 The generations

Figure 16: Bike share main generations



2.4 Bike share, a self-service public space service

To accommodate as many journeys as possible by picking up a bike close to the point of departure and dropping it off close to the final destination, shared bikes are accessible from the public space for reasons of estate economy, human resources and speed. This implies:

- automated services in 99% of cases, with self-service access and no need for a human being to conduct an inventory.
- structural exposure to misuse, neglect, vandalism and weather conditions *(Appendix 9.2)*.

Parking at the end of the rental period is either totally free with *free-floating*, or restricted in certain areas with *back-to-many (Figure 17 and Figure 18)*. For *n* stations, there are n^n travel options. The more stations there are, the greater the chance of meeting a travel need. And the density of stations and proximity between them are also decisive factors in reducing access times on foot.

Figure 17: Free-floating (2019) and back-to-many (2020) parking locations in Paris (source ?)

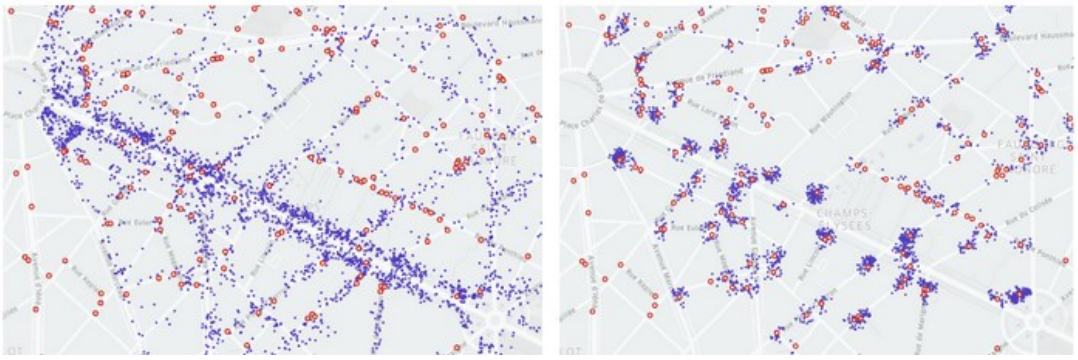
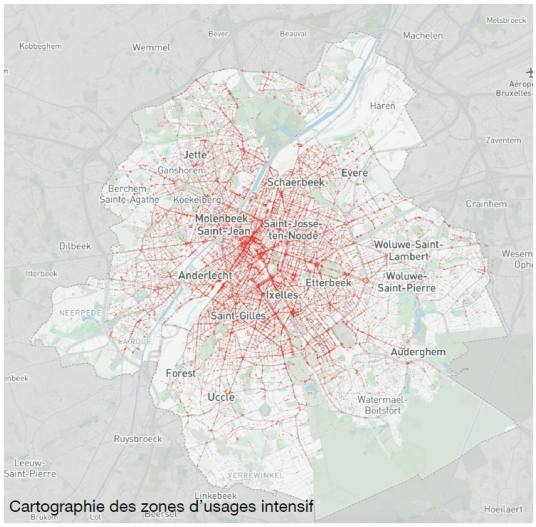


Figure 18: Flow of free-floating micromobility (left) and dropzones locations (right) in Brussels



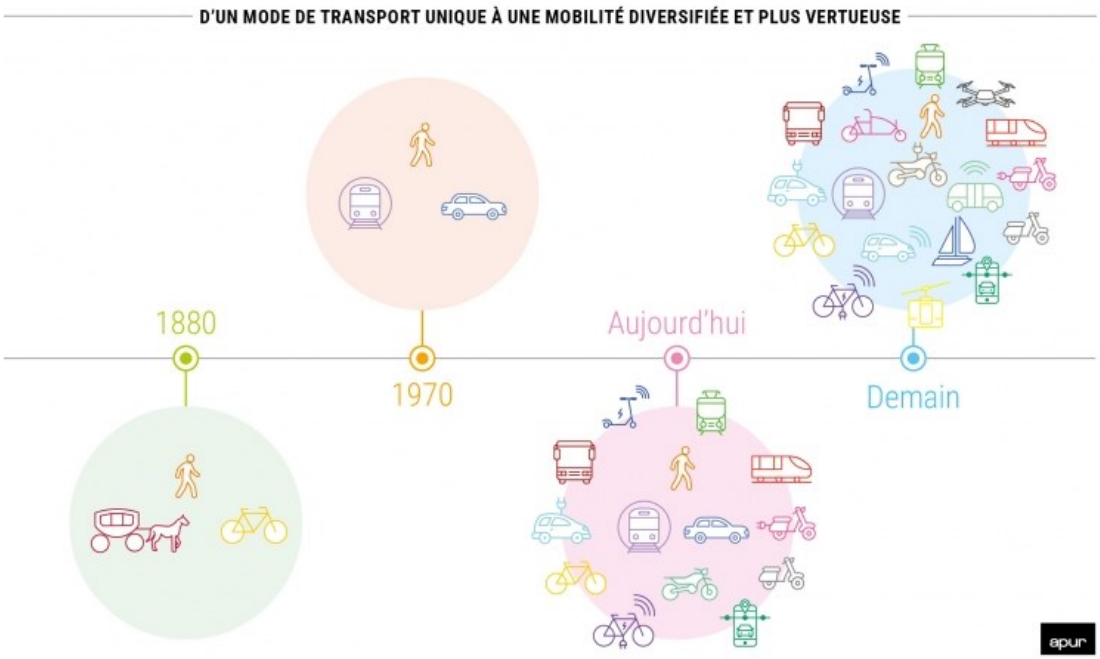
Intensive use zones, May 2022 | Source: Guide Dropzone en RBC, December 2022 | Author: Vraiment Spa Park

1,600 dropzones deployed or in progress
Data: Brussels Mobility
Author: Mobiped-TML, November 2023

2.5 Bike share, a complement to the multimodal offer

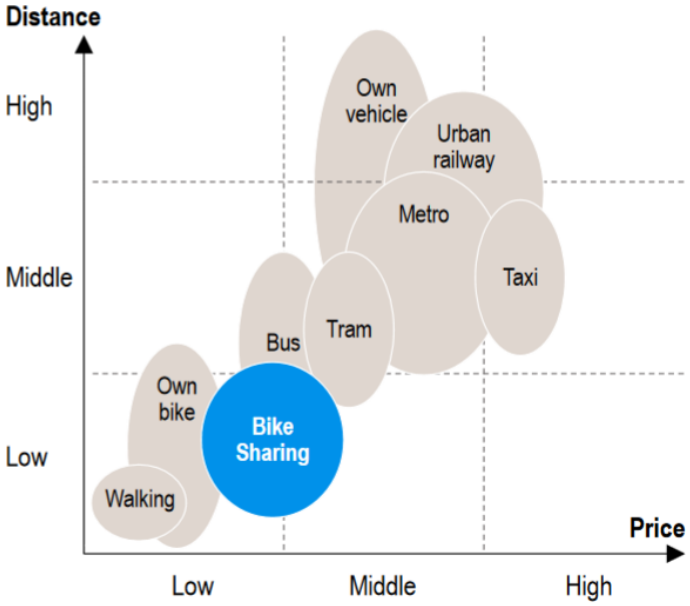
Bike share contributes to the diversity and attractiveness of multimodal alternatives to the private car *(Figure 19)*.

Figure 19: An increasingly diversified mobility offer (Source 2)



Generally speaking, the cost of using shared bikes is higher than that of using a personal bicycle and closer to that of public transport. Compared with personal bicycles, the range of distances covered is shorter *(Figure 20)*.

Figure 20: Simplified representation of bike share in relation to other modes (Source 34)

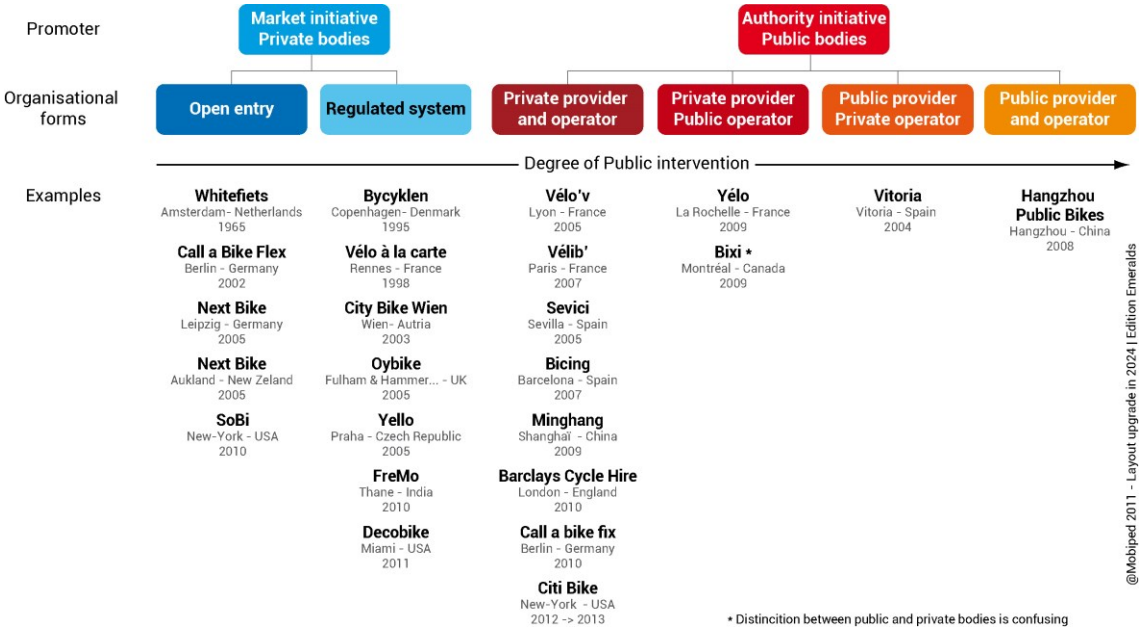


3 Governance and business models

3.1 Governance models

As early as 2011, bike share services were the result of both private or public initiatives, with varying degrees of government involvement *(Figure 21)*. While in-house public management is possible (Hangzhou, La Rochelle, Madrid), supply and operation are generally the responsibility of private players *(Appendix 9.3)*.

Figure 21: Historical view of bike share governance models worldwide in 2011 (source 4)



3.2 Cities regulate private initiatives

After the surge of thousands of free-floating shared bikes from the mid-2010s, cities became aware of the hidden costs (order, aesthetics, civic pressure, political image, parking space management). To regulate public space, they intervene to a greater or lesser extent *(Figure 22)* by:

- imposing dedicated parking zones called *dropzones* or *mobility hubs* (Brussels, Budapest, Grenoble, Paris, etc.) and banning total free-floating.
- launching calls for expressions of interest to grant a limited number of licences, or even requiring payment of a fee (€35/year/bike in Brussels). Grenoble granted a monopoly for shared e-scooters and a monopoly shared e-bicycles (e-SB).
- prohibiting private shared e-scooters (Paris, Barcelona) or private e-SB (Luxembourg, Lyon).

Figure 22: Different models of government intervention (Source: M. Benett, S. Schwartz)

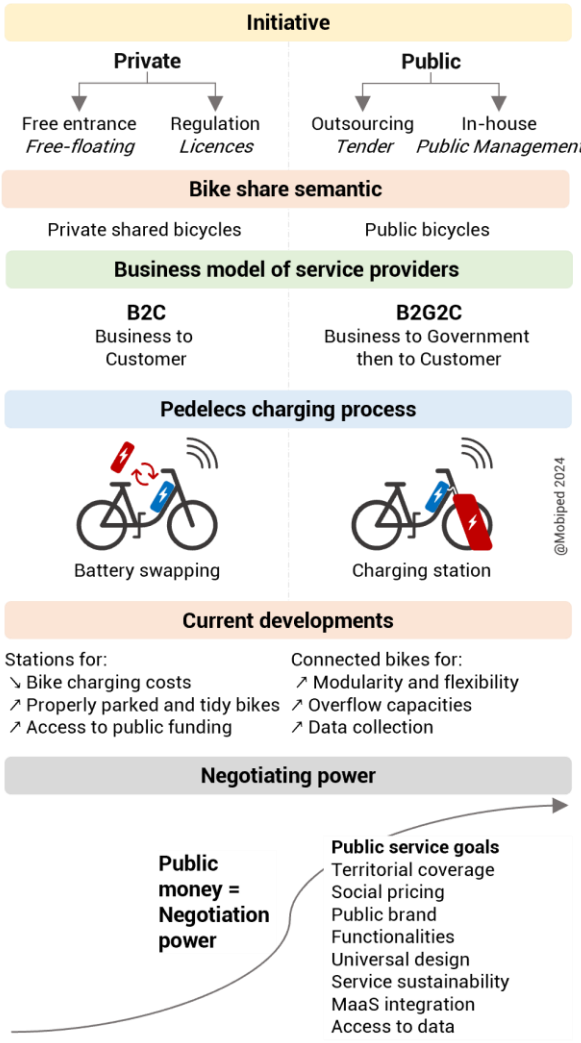
3.3 Two business models for private players

- **Public bicycles B2G2C business model**: their customers are local authorities, for which they contribute to the service delivered to citizens. The main international B2G2C players are suppliers (Fifteen, PBSC), operators (Clear Channel, Inurba, Serco, Serveo, Velogik) or both (JC Decaux, Nextbike). They are regularly main sponsors of Velo-city, the world conference on cycling policies.
- **Private shared bikes B2C (Business to Consumer) business model**: their customers are the end-users. They generally offer free-floating services like Deutsche Bahn in Munich in 2001, Nextbike in Leipzig in 2005, then Mobike, Ofo, Gobeebike around 2015, followed by Bolt, Dott, Lime, Pony, Poppy, RideMovi, Tier, Voi in the late 2010s. The latter usually operate several types of free-floating micromobility vehicles. Some players, like Nextbike, changed their business model and developed stations.

3.4 B2C players in search of public money

The business model of B2C micromobility players is based on the pursuit of hypergrowth at a "loss" to kill off competition, achieve a monopoly and thus raise prices to generate profits *(Source 38)*. But after years of success in the quest for market share, deploying services in numerous cities by raising funds on the stock markets and offering exceptional commercial offers to attract customers, the rise in interest rates put an end to easy money. Investors are urging these services to become profitable. However, micromobility players are struggling to find their business model, as evidenced by the Dott-Tier merger in 2024 and the setbacks experienced by Superpedestrian, Spin, Bird in 2023. Profitability of shared e-scooters is already uncertain. The economic equation is even more perilous for e-SB, as they are less profitable, 50% more expensive to buy, heavier, bulkier and more costly to regulate. B2C players are currently developing station-compatible solutions, while B2G2C players are developing connected bikes *(Figure 23)*.

Figure 23: Characteristics and current developments of the private and public bike share markets



At the end of 2022, the co-founder of Micromobility Industries explained that companies used to believe that their customers were the end-users, whereas in reality, their real customers were the public authorities *(Source 39)*. The Cycling Industry Europe's B2C and B2G2C bike share expert group delivered the message that "Bike share is not a private service, but a public service to be financed". Some players, such as Donkey Republic, respond to calls to tender in several of the Flemish Region's "*vervoer regio's*" territories. Dott calls on cities to create the best ecosystem for achieving public goals, rather than having the best Public Bicycles service. This can take the form of micro-subsidies (Molière project in Brussels) or a subsidy of €125 excl. VAT/e-SB/year (Ghent).

4 Bike share systems trends

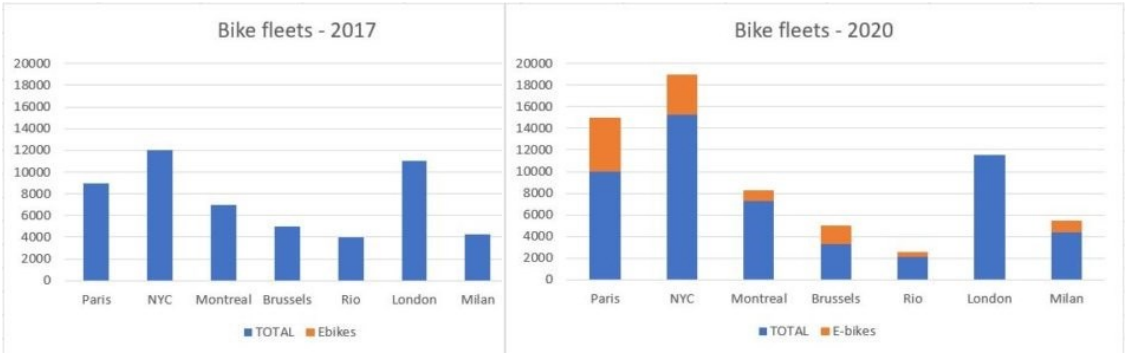
4.1 Bicycle electrification

4.1.1 More and more mixed fleets, for city initiatives public bicycles

In 2014, the first PB service with pedelecs was deployed on a large scale in Madrid. In 2016, 11 cities worldwide had more than 100 pedelecs *(Source 5)*. Between 2017 and 2020, PB fleets gradually integrated pedelecs *(Figure 24)*. The percentage of mixed fleet is the result of a financial arbitrage linked to higher purchase and operating costs (more costly, time-consuming and complex maintenance and electricity costs). Some territories, such as Luxembourg, Madrid and Marseille, have a 100% electric fleet, justified by the slopes, particularly in city centres.

At the beginning of 2023, 41 bike share services worldwide had more than 1,000 pedelecs in their fleet, for a total of 90,000 pedelecs *(Source 28)*

Figure 24: Electrification of PB fleets between 2017 and 2020 (Source 40)



Pedelecs with integrated batteries present a number of challenges: electrification of stations, battery charging, skilled human resources, risks of motor controller and wiring failures, fire and theft. However, their impact is considerable. They generate more rentals than bikes with portable battery (Bordeaux, Brussels, Lyon), attract new customers (women ↗ 9%, average age ↗ 7 years [18]) and increase the distances covered (↗ 1 km in Paris). In mixed fleets, pedelecs are preferred to pedal bikes *(Figure 25)*, increasing wear, costs and the unavailability of loaded bikes. Lastly, they contribute to the growth of rentals in hilly areas *(Figure 26)*.

Figure 25: Overuse of pedelecs in mixed fleets

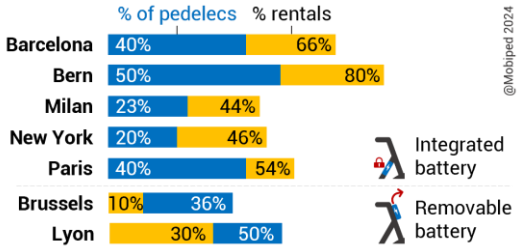
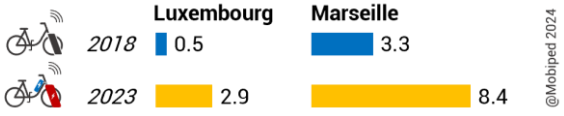


Figure 26: Annual rentals/actually available bikes/day, before and after fleet electrification.



4.1.2 100% electric fleets for private SB

After pedal free-floating SB from Asian companies, free-floating e-SB from European and North American companies appeared in 2017. These services directly offer a 100% electric fleet, with the exception of Donkey Republic, which still offers some pedal bikes. In China, the current trend is towards the development of lightweight electric motorised two-wheelers, also known as e-bikes (Meituan, picture on the right).

4.1.3 Larger and more connected Bikes

With connected locks in particular, technology is increasingly present in the bikes, and less so in the terminal and stands when there are any. The integration of these electronics (IoT, communication with servers, communication with the user's smartphone, GPS, sensors for preventive maintenance, credit card terminal for tapping) will probably be rationalised in terms of benefits/costs:

- The presence of electronics, sensors and wires increases the likelihood of breakdowns and bike stoppages, particularly in the event of intensive use, low and high temperatures.
- Electronics make bikes even more attractive to thieves, so they need to be reinforced.
- The frames and bikes are larger *(Figure 27)*. The bike is heavier with a battery. In the absence of assistance, its manoeuvrability decreases when sitting on the bike, on foot when parking it and when handling it in regulation shuttles *(Figure 28)*.
- GPS as a guidance aid requires a lot of batteries with a continuous signal. But a GPS tracking system makes it possible to identify the bike's location in the event of theft. While this data generates useful operational data, it can also be monetised for commercial purposes independent of bicycle use.
- IoT usage generates recurring and costly subscription fees over the long term.
- Pedelecs dock-based system increases the economic risk for start-ups with no significant large-scale experience (Copenhagen, Madrid, Paris, Stockholm).
- Remote control makes it possible to monitor the bike's charge level and remotely lock the electric assistance or connected lock.
- Electrification requires the bike to be permanently connected.
- A bank card reader on the bike enhances the user experience with contactless card payment *(Figure 29)*.

Figure 27: Shared bicycles, a larger overall size

SB versus private bicycles (Paris)

2000's lightweight Clear Channel bike (Antwerp)

SB produced by Segway (Brussels)

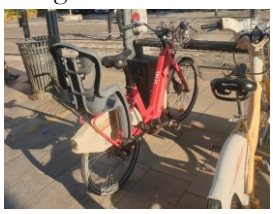
Figure 28: A customized shuttle to avoid lifting pedelecs (Barcelona)

Figure 29: "Tap and ride" solution developed by MasterCard and YelloBike (Photo Mastercard)

4.2 Diversification of bikes, with seats or cargo bikes

4.2.1 Two-seater bikes

Baby seats are often in demand but seem to be more of a communication tool than a service. No usage statistics could be obtained from Vienna and Milan. Parents of young children have logistical constraints that require certainty regarding the availability of the bike. To target parents with children, long-term rental with accessories or cargo bikes purchase assistance would seem more appropriate. On the investment side, the frame is a reinforced specific one. On the operational side, they do not seem to suffer less vandalism and require double regulation to distribute these bikes throughout the network.



Child seat (Milan)

Child seat (Vienna, Photo C. De Voghel)

Pony two-seater bike (Bordeaux)

Tandem (Rosario) (photo Rosario noticias)

4.2.2 Shared cargo bicycles (SCB)

Unlike bike share, SCB are "back to one" (except Baqme). The European Cyclists' Federation monitors cargo bikes, with a particular focus on SCB. In 2022, 70 cities had a SCB service, compared with 21 in 2017 *(Source 41)*. As the market is still in its infancy, SCB are rarely designed for intensive self-service use. Instead, the cargo bikes come from the B2C market. The main SCB operators in Europe are Baqme, Beryl, Call a Bike, Cargoroo, Carvelo2go, Nextbike, Tink and Sigo. If shared cargo bikes are included in a public bicycles tender, there is a risk that the choice will be between the thousands of PBs rather than the quality of the SCBs.

Figure 30: Shared cargo bikes in Europe (Source 41).

SCB mainly target parents with small children, owners with their dogs for leisure journeys, and students or entrepreneurs for transporting small goods. They are mainly used by women and avoid the need for a car. They probably need awareness and training campaigns. Visible in public spaces, SCB are a milestone in the maturing of local cycling culture.

Cargo bikes (Hamburg) (photo StadRad)

KVB (Cologne) (photo F. Strompen)

Baqme (Ghent)

Sigo charging station (photo Sigo)

Cargo Vélo'v, Cargoroo white-label (Lyon)

Carvelo2go (Bern)

Tink (Velocity 2023)

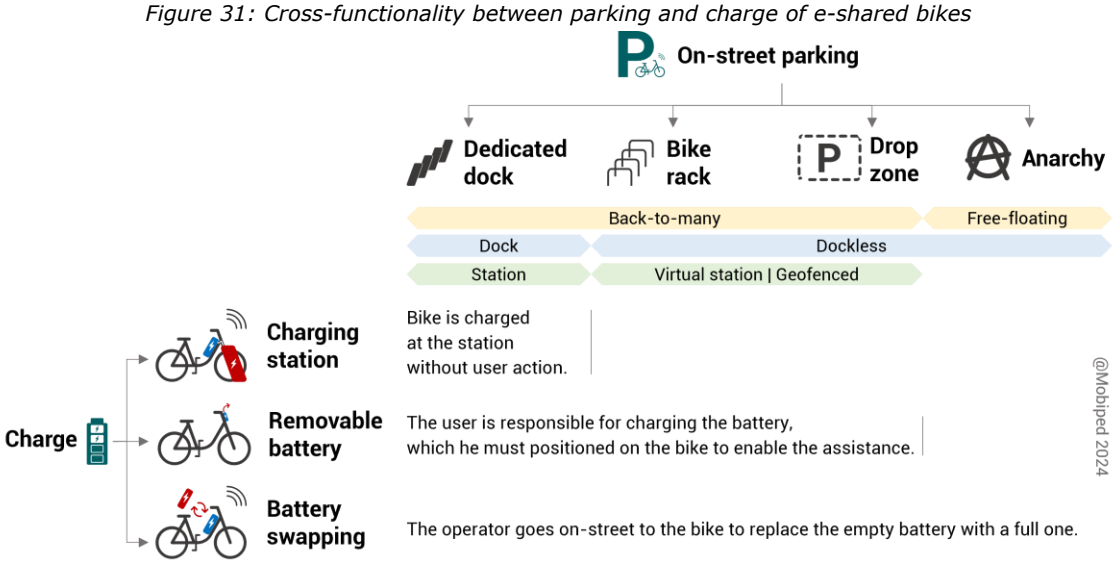
Nextbike (Velocity 2023)

4.3 Station parking and electrification

The success of e-bike share depends on:

- **A secure bicycle parking in public spaces.** This can be done at a dedicated station using the "Bike <> Lock <> Parking furniture" triptych, or via a connected lock to park the bike in a dropzone, or with a cable to be wound into a bike parking rack.
- **The charge of the pedelecs** at a charging station, with a removable battery handled by the user, or by regular battery replacement by the operator (*Figure 31*). Charging stations, swapping and hybrid formats all have their advantages and disadvantages *(Appendix 9.4)*.
- **The respect of the parking zone**. Technological solutions are improving. But GPS remains inaccurate. The camera on the bike has a cost and raises questions about data use. The photo taken by the user requires the use of a smartphone. Bluetooth Low Emission signals seem to blur in the presence of many bicycles, generating significant deployment costs. Even with penalties, parking outside dropzones persists, with 5% in Antwerp Region.
- **The bike's stability** over time in the face of wind, misuse and incivility. Fall detectors have been developed, but depend on the operator's responsiveness.

Figure 31: Cross-functionality between parking and charge of e-shared bikes

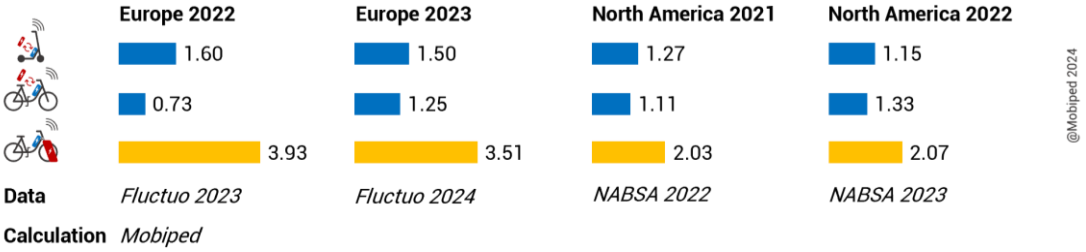


4.3.1 Pedelecs charging

(Charging) stations

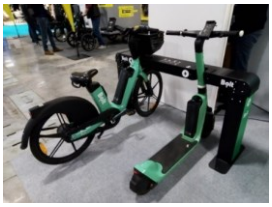
In Europe and the U.S., public bicycles with stations generate more journeys per vehicle than free-floating shared bikes and shared scooters *(Figure 32)*. Pricing alone cannot explain this difference, since a 20-minutes journey in New York costs around $10, whether on a Citi Bike or a Lime. Charging stations reduce operating costs compared with swapping, organise public space, reduce the number of thefts and increase the likelihood of recharging.

Figure 32: Comparison of rentals/vehicle/day between bike share in station, or not and shared e-scooters [15, 16, 30, 31]



To reduce the human resources costs involved in swapping batteries for B2C operators, free-floating bike manufacturers (Navee, Okai, Segway) are adapting their bikes to be compatible with the new multi-operator stations (Knot, Metromobility, Noval, StandAB), which use a Charging as a Service approach *(Figure 33)*. The challenge is to identify the vehicle, the type of battery and the type of charging. Some stations accommodate both shared e-bikes and shared e-scooters, but dedicated shared e-scooters stations are also being developed.

*Figure 33: Photos of bike share charging stations (photos: * company quoted, others: B. Beroud)*


BOLT


DB Rent (Stuttgart)


*Duckt**


Fifteen (Saintes)


JC Decaux (Luxembourg)


King Meter


Knot


Metromobility


Nextbike (Barcelona)


*Noval**


*PBSC (Chicago)**


OWII


*StandAB**

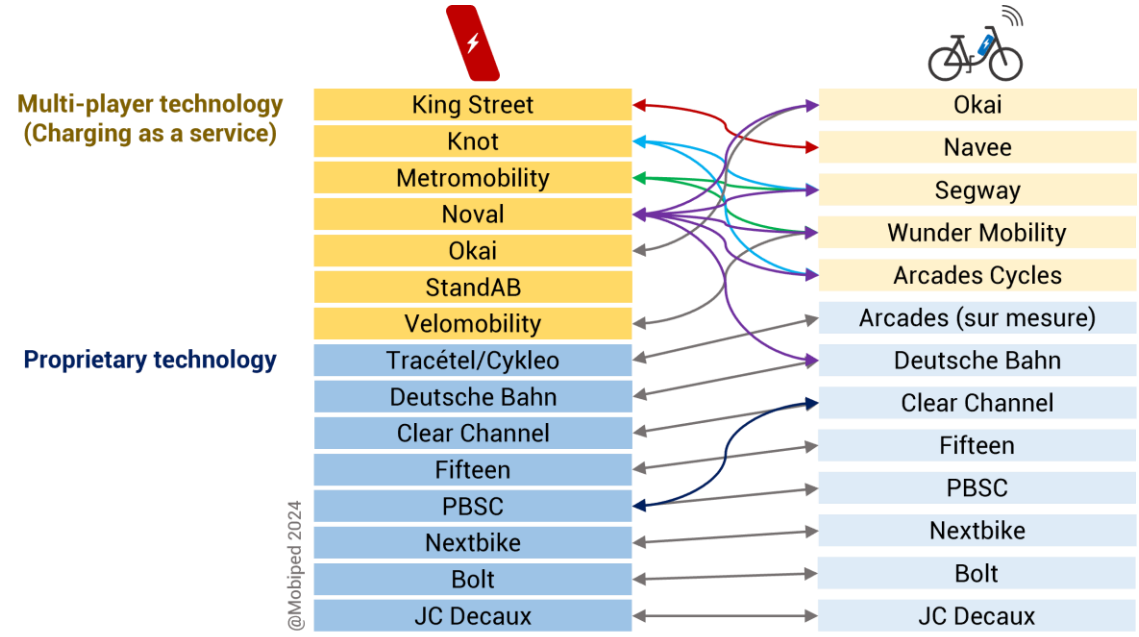

Street Stuff


VelocityMobility


Waimoo

Historic station suppliers prefer to develop their own products and bikes. A universal station for all the bikes on the market seems illusory, but some stations are compatible with several bikes *(Figure 34)*.

Figure 34: Compatibility of charging stations with shared bicycles



As in Vancouver and Quebec City, electrifying a few stations would reduce swapping costs for mixed fleets. In New York, electrifying 20-30% of stations would reduce battery swapping by 75-80%, according to Caroline Samponora, Head of Lyft's Transport and Micromobility Unit *(Source 42)*. From the perspective of a hybrid system with and without stations, the different players put forward very different figures, ranging from 10% to 90% of charging stations for a 100% electric fleet.

A battery can be integrated into the station to assist the launched of the service when there are delays in connection with a building or the grid operator *(Figure 35)*.

Figure 35: Different options for delivering electricity to stations (Station Fifteen)

User-removable battery

Removable batteries (JC Decaux and Cykleo types), which are under the user's responsibility, have insufficient energy autonomy. In addition, the JC Decaux battery fire necessitated the recall of all batteries and the shutdown of this functionality. Even during free trial periods in Brussels, this format did not reach a wide audience, unlike pedelecs with integrated batteries, which are more popular than pedal bikes *(Figure 32 previous page)*. The battery boxes developed by Okai, in a similar vein to Gogoro, where the users themselves exchange the battery, seem illusory when the bike is also self-service.

Removable battery
(JC Decaux - Brussels)

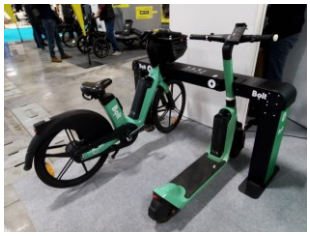
Removable battery slot
(Cykleo - Bordeaux)

Battery cabinet
(Okai - Photo Okai)

Swapping by the operator

Swapping involves replacing directly on the bike an empty battery with a full one. In general, everything becomes swappable: the batteries on the bike, spare parts (Part-as-a-Service), the bikes (change a bike if it is faulty), the station battery (Fifteen), the station extensions (Fifteen, PBSC). Similar battery for both shared e-bikes and shared e-scooters requires 48 V batteries as the ones for e-scooters. Thus, bikes become heavier than those with 36 V batteries with is sufficient for bikes.

Swapping at non-charging stations allows some pedelecs to be included in the fleet (London, Milan, New York), and facilitates overflow if the pedelecs allows it. The swapping option can also be used to create and open a virtual station, even if the electrical connection is not yet complete.



Identical shared e-bikes and e-scooters batteries (Bolt 2023)

SB with e-scooter battery (left) and with e-bike battery (right) (Navee 2024)

Cargo bike full of batteries
(Dott - Brussels)

Cargo bikes
(photo Serco - West Midlands)

Swapping vehicle
(photo Donkey R. - Antwerp)

4.3.2 The many forms of bike share parking


SB parked on a cycle track (Paris)


Dropzone on sidewalk (Berlin)


Virtual station with other bikes on kickstands (Geneva)


Free-floating with bikes on the ground (Frankfurt)


SB and e-scooters in dropzone with ground markings (Antwerp)


Surface paint (Photo Bolt - Nijmegen)


Dropzone with demarcation and purple ground markings (Bern)


PB attached to its dedicated rack (Rouen - @Inurba)


PB racks used for personal bicycles (Rouen - @Inurba)


SB, LTR and personal bikes in bike racks (Ghent)


Individual lightweight furniture (Ecovélo - Agen)


Collective lightweight furniture (Nextbike - Lucerne)


Compact station (Fifteen - Marseille)


Light easement, but used by shared e-scooters (Milan)


Clear Channel Retrofitted bicycles at a PBSC station (Santiago)


Station with individual stands (Cykleo, Lille)


Young people in contact with the service (Lyon)

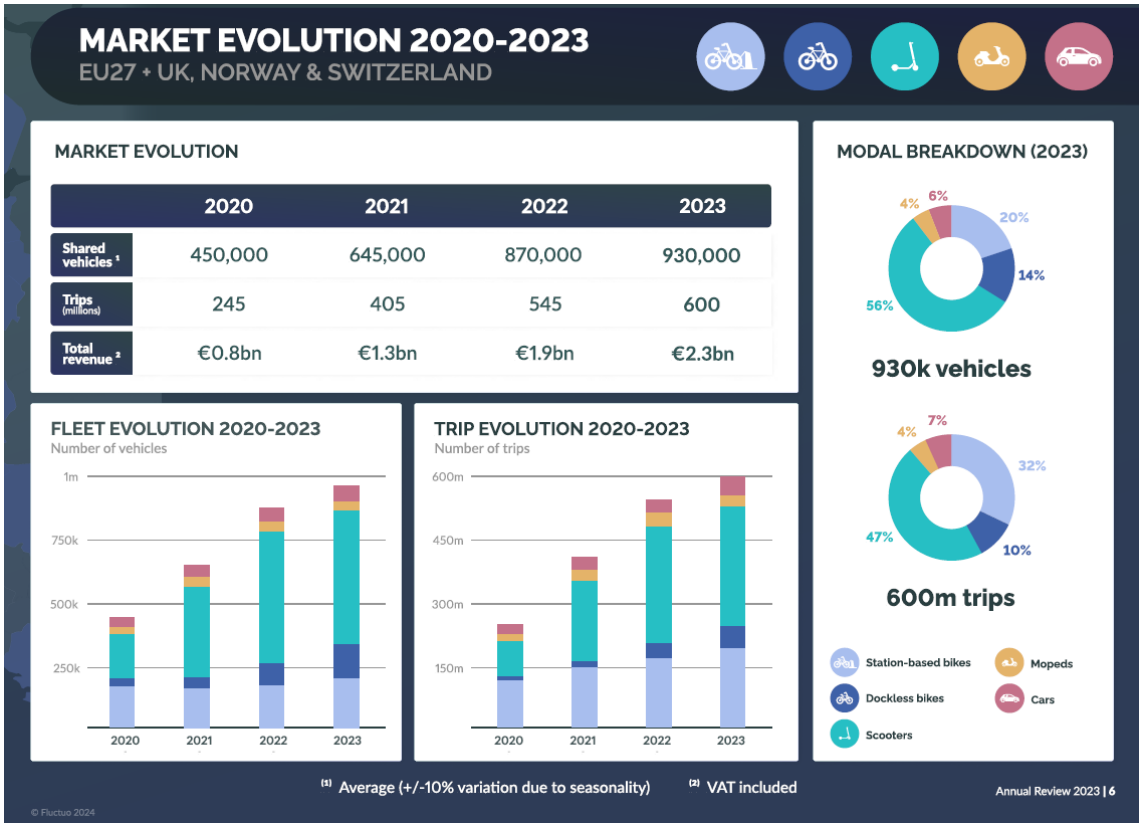

Private SB parked next to a PB slot (Paris)

5 The bike share industry

5.1 A market integrated with shared mobility

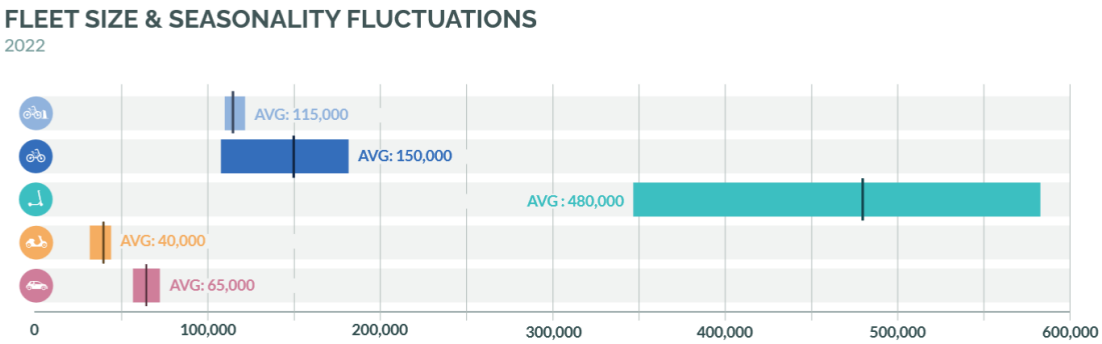
The shared bicycles bike market has been turned upside down by connected locks and the use of smartphones. In this way, bicycles can be secured without the need for infrastructure. This development has tipped bike share into the shared micromobility market. The European market is dominated by e-scooters *(Figure 36)*. The North American market is fairly balanced *(Appendix 9.59.4)*. The micromobility market should continue to grow, given that users seem to prefer pedelecs *(Appendix 9.6)*.

Figure 36: Development of the micromobility market in Europe from 2020 to 2023 (Source 16)



In 2022, fleet growth was fairly stable for station-based PB, but more volatile for free-floating shared e-bikes and free-floating shared e-scooters *(Figure 37)*.

Figure 37: Seasonal trends in shared mobility fleets in 2022 (Source 15)



Parking for micromobility is increasingly part of a mobility hub approach, as in Budapest and Vienna *(Source 37)*. What have historically been known as cycle paths are becoming facilities for a variety of users: cyclists, runners, wheelchair users and e-micromobility users.

5.2 PESTEL analysis of the bike share industry

The PESTEL analysis provides an overall view of the sector's current and future context *(Figure 38)*.

Figure 38: PESTEL analysis of the bike share industry in 2023

	Risks	Opportunities
Policy	• Geopolitical interdependence for supplies of raw materials, frames and spare parts in a climate of international tensions (war in Ukraine, conflicts in the Middle East, Taiwan).	• 2024: Year of Cycling under the Belgian presidency of the European Commission.
Economy	• Inflation in raw materials, energy, freight, electronic components and human resources (salaries, more skilled labour on pedelecs) and rising interest rates, which impact investment amounts. • Risk of bankruptcies linked to pedelecs surplus stock post Covid-19. • Bike share is a niche market in the bicycle industry that is not highly valued. • Unattainable profitability for hypergrowth business models.	• Prospect of partial production relocation to Europe (but probably still with Chinese capital). • Bike-as-a-Service. • Consolidation of market players.
Society	• Difficulties in finding qualified, stable and occasional labour.	• Climate awareness • Circular economy
Technology	• Insecure supply of electronic components (station, bike) and uncertain responsiveness between contract sign and installation dates. • Battery recycling challenge.	• The beginnings of a battery reprocessing and production chain for European batteries. • Electrification of bicycles with different types of charging *(Tiler, Clip and bike)*. • Using AI to optimise routes.
Legal framework	• 2026: Prospect of "carbon" duties on EU importation.	• The European Cycling Strategy voted by the European Parliament (2024) mentions bike-sharing three times *(Figure 39)*.
Environment	• Negative carbon footprint if usage does not replace individual car journeys.	• Life cycle assessment of suppliers.

Figure 39: Articles on bike sharing in the European Cycling Strategy (Source 13)

Chapter V: Improving road safety and security: 22. Improving security at public bike parking spaces (including bike sharing and multimodal hubs), and increasing efforts to tackle the issue of bike theft.

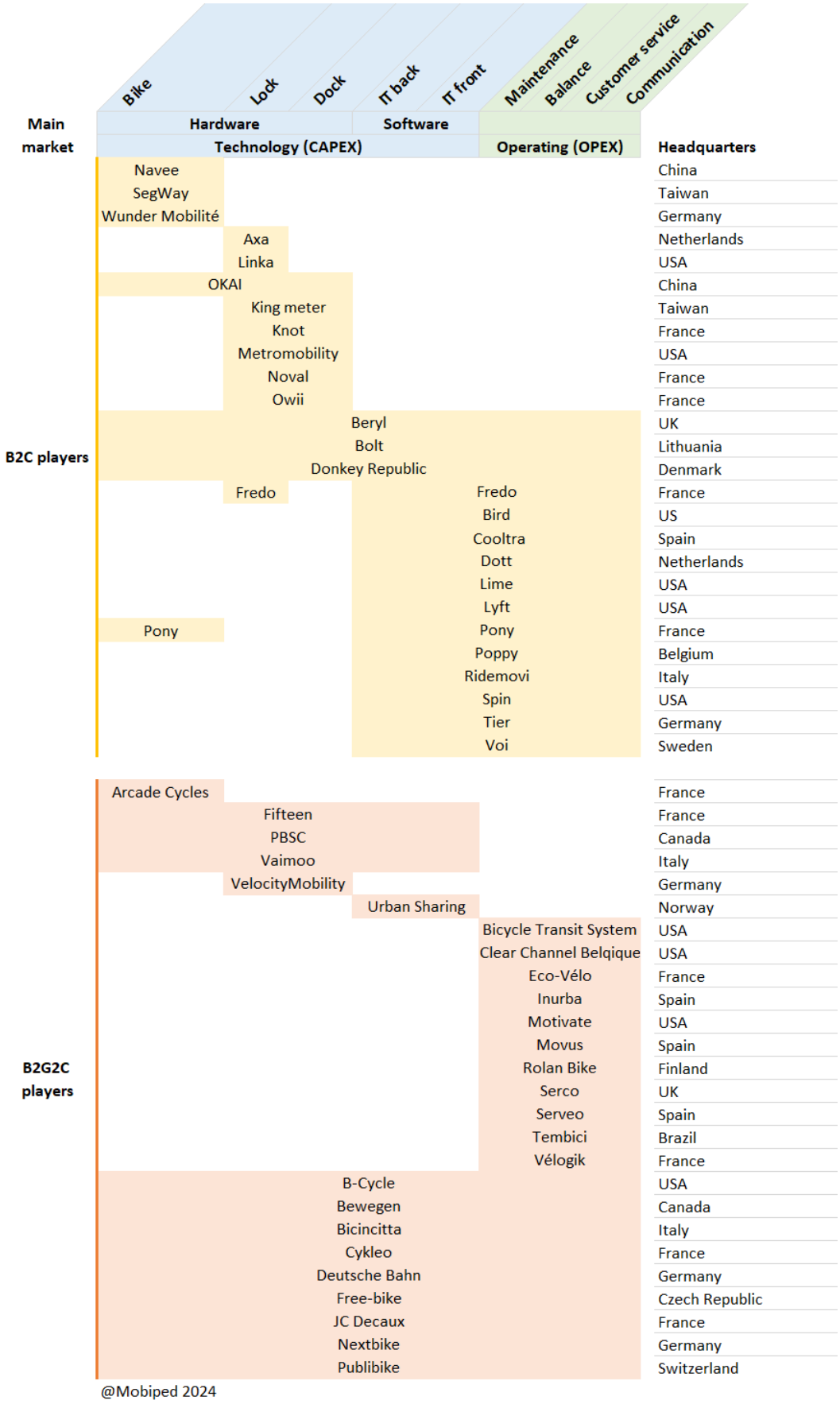
Chapter VI: Supporting quality green jobs and the development of a world-class European cycling industry 29. Supporting cycling service industries, such as bike sharing and cycle logistics, especially in cities, including by strengthening the integration of cycle logistics into the logistics system.

Chapter VII: Supporting multimodality and cycling tourism 31. Supporting bike sharing schemes as a solution to first and last mile access to public transport services.

5.3 Positioning of players in the value chain

Numerous players are positioned throughout the bike share value chain *(Figure 40)*.

Figure 40: Positioning of bike share players in the value chain



5.4 News from some players

5.4.1 Market positioning

- The traditional players in outdoor advertising (JC Decaux and Clear Channel) have lost a number of contracts. JC Decaux acquired all Clear Channel activities in Italy and Spain in 2023. JC Decaux has won the Toulouse contract, which is now back on the PB market. Clear Channel now only operates the Antwerp service.
- PBSC is the world's leading supplier of PB systems. Fifteen has developed a condensed, stacking parking offer that can be used for PB, PB + Train and LTR.
- Fleet suppliers for B2C players include Okai, Segway, WunderMobility and Navee.
- Inurba chose a solution (PBSC, Fifteen, Waimoo, OEM, Segway) according to the city's needs.
- Velogik, which once specialised in repairs, is now refocusing its business as an operator.

5.4.2 Some changes in the capital structure of companies

- By 2023, several micromobility players went bankrupt: Bewegen, Superpedestrian, Spin and Bird.
- After acquiring Nextbike, Wind and Spin in 2022 and 2023, Tier merged with Dott in early 2024 and spun off its Nextbike business.
- Lyft bought Motivate in 2018 (the New York and San Francisco operator, for $250 million) and PBSC in April 2022 for US$163.5 million. In August 2023, Lyft's new president suggested that the micromobility division generates 5% of revenues but 25% of expenses, and was therefore thinking of spinning it off.
- At Fifteen (ViaID Group), the Zoov solution has taken over from the historic Smoove solution.
- In Switzerland, Public Bike and Velospot have merged.
- In China, Mobike has become Meituan Diaping.
- Pony offers resident investors the chance to own a scooter (€1,090) or a bike (€1,790), and to recoup 50% of the earnings generated by "their" electric vehicle on each trip. Pony then takes care of operations (logistics, charging and maintenance).

5.4.3 Other players in the bike share industry

Fluctuo	Data aggregator and provider of white-label user MaaS APIs such as MDMS (Multimodal Digital Mobility Services).
ID now	Identity or helmet verification app.
Indeez	Insurance for operators and customers.
Joyride	White-label platform for micromobility vehicle services.
Nowos	Repair and recycling of bicycle batteries.
Qcit	Software publisher specialising in predictive logistics (from 0 to 24 hours) for the field operations management of micromobility systems.
Urban Sharing	White-label micromobility fleet management and user interface platform.
Vianova	Aggregator of shared mobility data for better management.
Yuwway	App for comparing and booking daily transport offers.

5.4.4 Some challenges for bike share operators

Bike share operators face several challenges.

Economic balance	Success upsets the operator's economic balance. The more bikes are rented, the more fragile they become. Beyond a certain threshold, maintenance costs soar, and the operator seeks to reduce rentals (Paris). Operating cost impact of an additional rent is not specified in the initial contract and is not covered by user revenues, as fares are set by the public authorities. Once a certain level of success has been achieved, it is necessary to accept a deterioration in service.
KPIs requested	Some operators include penalties amount in their initial offer for unreachable KPIs.
Vandalism (see Appendix 9.2)	A self-service activity in the public space is structurally exposed to neglect, misuse, vandalism of opportunity or fashion (Cologne) and theft (Marseille). These costs are funded by the candidates in their initial price or in an envelope whose positive balance is eventually reinvested into the service (Antwerp).
Human Resource management	• Operations are first and foremost a matter of human resources management, with the occasional risk of absenteeism in low value-added jobs. • The feminisation of the repair professions has enormous room for improvement. • The social representations of technicians are an obstacle to sharing the operation of several modes. Mechanics who work in heavy transport or cars are unlikely to work on bicycles. Similarly, bicycle mechanics are not interested in scooters. Operating several modes with the same teams requires time and energy to train, support and convince them to change their job slightly, with no guarantee of results.
Commuter flows	Bike share is not immune to commuter flows, requiring a budget to rebalance bikes at stations on the outskirts or in uni-functional neighbourhoods (housing, employment or shopping). Dropzones (racks or demarcated parking areas), overflow (overcapacity of a full station) or pedelecs reduce but do not avoid this need for rebalancing. Artificial intelligence is starting to be used mainly for flow prediction (different from forecasting), and to support logistics, repair and maintenance (Qcit and Urban Sharing). Segway integrates it to detect bad behaviour (parking). However, "The best AI won't be able to do much to fix a poor quality supply" *(Source 43)*.
Process industrialisation	Operations are moving towards a service-based approach, with the industrialisation and digitisation of services, which will be reinforced by the entry of automotive (and even aeronautical) players into the bicycle industry, as they anticipate restrictions on car use.
Electrification	The electrification of fleets is having an impact on operators' business, particularly for mixed fleets, with: • Overuse of pedelecs compared with pedal ones, which accelerates wear on spare parts and increases breakdown rates. • More complex, longer repair cycles, more skilled labour. • The complex management of batteries, in terms of both investment and lifespan, but also in terms of the complexity of charge cycle management and safety conditions in the face of fire risks. • Increase acquisition, maintenance and operating costs.

6 The user experience

6.1 Users experience several services

Potential bike share users can use several services in the same city, or the same service in several cities. As each service has its own way of working, users may experience a certain amount of confusion. They must then deconstruct their habits to use another service, such as returning a bike to a station rather than parking it unattached. Meanwhile, they develop adaptive skills.

6.2 Digitalisation of the customer journey

Digital interfaces now play a central role in the customer experience. Sometimes, the experience requires users to download the app even before knowing the conditions of use, the locations or the price range of the service. Identity can sometimes be verified (Bird), or a photo of the parked bike can be requested when the bike is returned via the app (Dott).

6.3 Diversification of price ranges

While free fares for the first 30 minutes have often been the trend, the range of prices is becoming increasingly varied and complex:

- Unlocking fees (Vélib' in Paris), sometimes unlimited with a special package (Dott).
- Pay-as-you-go per-minute usage fees.
- Stages of 15, 30 or 45 minutes depending on the type of subscription.
- 24h unlimited pass (Pony).
- Pedal bikes and pedelecs.
- The first journey free (Dott).
- The number of bikes that can be rented with a single account, and the corresponding deposit.
- Pricing from several hours to several days (Donkey Republic).
- Prices for public transport users, for customers of the parent company (New York) or for customers of partner organisations (Montreal).
- Different prices for different drop-off locations (Leipzig).
- The creation of a personal wallet (Bolt).
- Insurance against theft (Donkey).

The price ranges of 12 bike share services are compiled in *Appendix 9.9*, with a few extracts *(Figure 41)*.

Figure 41: Price range diversity (Montreal, Leipzig, Dott Brussels)

Promo code beneficiaries

- Olympic Park visitor
- Communauto members
- OPUS subscribers (PT)
- CAA Quebec members
- Vélo Quebec members
- Montreal card Access

Montreal

Leipzig

Dott Brussels

7 Public Bicycles and Public Transport integration

7.1 Similarities and differences between these two worlds

While there are many differences or complementarities between Public Transport (PT) and Public Bicycles (PB) *(Figure 42),* here are a few points they have in common:

- direct track services, with no return constraint.
- more or less close audiences with low car use.
- constant operational challenges in providing quality service at controlled costs.
- contribution to multimodal services to reduce the impact of individual car use.
- need for government intervention: network industries, unprofitable in low-density areas, insufficient coverage by user revenues.
- service available in public spaces, and therefore subject to vandalism.
- media and political exposure.

Figure 42: Differences and complementarities between PT and PB

		
SEMANTICS		
Mode	Bus, tram, metro, train	Bike
Category	Mass Transport or Public Transport (PT)	Bike share (BS)
Public service	Public transport (PT), considered as such in European legislation.	Public bicycles (PB), in national or local legislation.
OFFER		
Action	Transport	Travel
Driver	Licensed and salaried driver	Users/customers
Preventing vehicle misuse	Driver training and telematic monitoring of deviant behaviour.	Random care under the user's total responsibility in the absence of a joint inventory, and permanent exposure to vandalism.
Waiting time	A few minutes, with passenger information on timetables or waiting time	Uncertain, random and dependent on the behaviour of other users.
Accessibility	~ 6.00 AM to 12.00 PM	24/7/365
Anonymous use	Possible	Identification linked to the credit card but not to the user.
Payment	Pay-as-you-go, no authentication required for tickets	Identification, deposit, pre-authorisation for post-payment
Intra-mode competition	Monopoly	Personal bikes and private SB
Cover	Metropolis	Mainly limited to the centre
Catchment area	Trains: several kms | Metro: 800 m | Tram: 600 m | Bus: 300-500 m	PB: 150-200 m
Spacing between two stops of the same line	Metro: 590 m | Tram: 409 m | Bus: 417 m line (STIB)	PB: between 200 and 300 m
Network	Linear	Scatter graph
USES		
Journey volume	Hundreds of millions a year	A few million a year
Transfer	Possible	Direct to destination

		
Exclusion	Agoraphobic, young children alone, dedicated solution for people with reduced mobility and great difficulties	Children, visually impaired, and wheelchair users
Seasonality	Stable throughout the year, excluding school holidays	More use in summer, less in winter
User revenue coverage rate	20 - 40 %	30 - 50 %
Empty journeys	Possible	No
OPERATION		
Core activity	Carrying passengers on a set route at fixed times	Moving ready-to-use bikes to different locations
Regulation	Real-time positioning tracking with information on journey times on a fixed and controlled route	Random, user-specific use. Only the user knows where he will put the bike. The operator only has the information once the bike has been returned to the system. AI enables predictions.
Maintenance	Fairly well mastered, in the PT sector	Seasonal and variable, in the bike sector
Risk management	Variable costs are fairly fixed and well under control	Variable costs depending on usage volumes
Local employer	Thousands of jobs	Dozens to hundreds of jobs
Rolling stock service life	Several decades: Metro (5,400,000 km), Tram (2,500,000 km), Bus (800,000 km)	Several years: PB (~ 12,000 km)
INDICATORS		
	Number of lines	Number of bicycles
	Number of stops	Number of stations
	Passenger seat/km	Parking slots per bicycle
	Commercial speed	Trip average length
	Number of trips	Number of rentals/bike/day

7.2 Two parallel networks which strengthen each other

Unlike SB + Train (back to one with pick-up and drop-off at railway stations only), one-way urban PB are not an extension of urban PT lines. In fact, PB operates on its own network. In this way, a large number of stations cater for a maximum number of potential origins/destinations. Density is particularly necessary in the hypercentre, where travel demand is concentrated.

The proximity of PB stations to PT stops enhances the mobility experience for both PT passengers and cyclists, by providing additional flexibility.

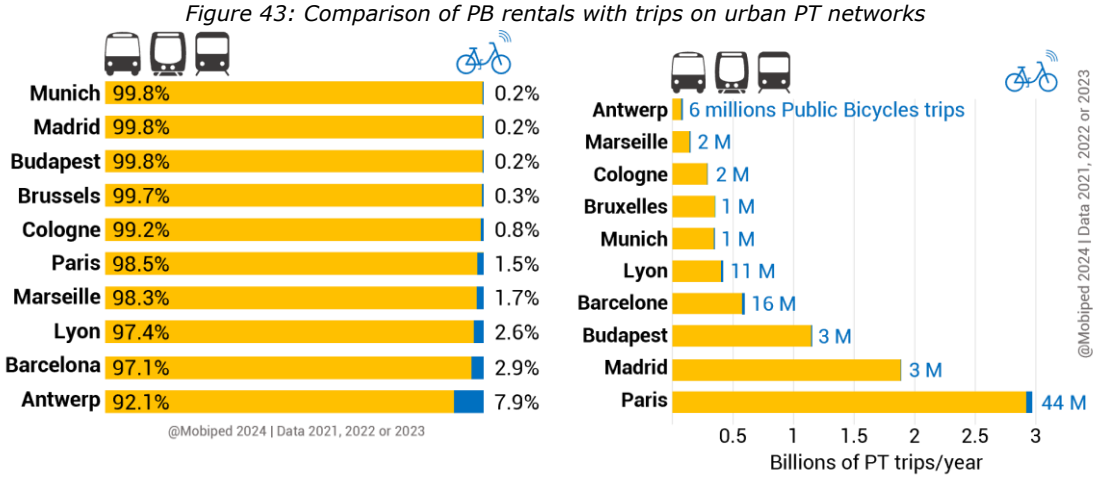
Hoping that an PB service will make it possible to reduce the PT with very low ridership (e.g. line ends at staggered times) seems illusory, given that:

- People who use these PT lines are probably not experienced and motivated cyclists.
- Areas concerned are likely to have little or no cycling infrastructure, especially when visibility is poor at night.

7.3 PB, ~ 1% of the PT network, a double standard

In a highly simplified view, the PB network represents 1% of journeys *(Figure 43)*, 1% of human resources and 1% of the annual budget of urban PT networks.

Figure 43: Comparison of PB rentals with trips on urban PT networks



7.4 Travel practices

As PT and PB user and journey databases are separate, the GDPR does not allowed to link journeys and obtain precise data on multimodal and intermodal practices *(Figure 44)*. Data below are therefore taken from user surveys, with percentages of users and not journeys *(Figure 45)*. In addition, the type of PT is rarely specified, whereas the type of mode must be distinguished for a precise analysis. Intermodality seems more plausible on long-distance journeys with heavy PT modes than with urban bus lines. In Munich, the average journey time by PT is 2.06 times longer than by car. When PT and micromobility are combined, this ratio drops to 1.69, making PT more attractive in terms of time access *(Source 29)*.

Figure 44: No communication between PT and PB customers and trips databases

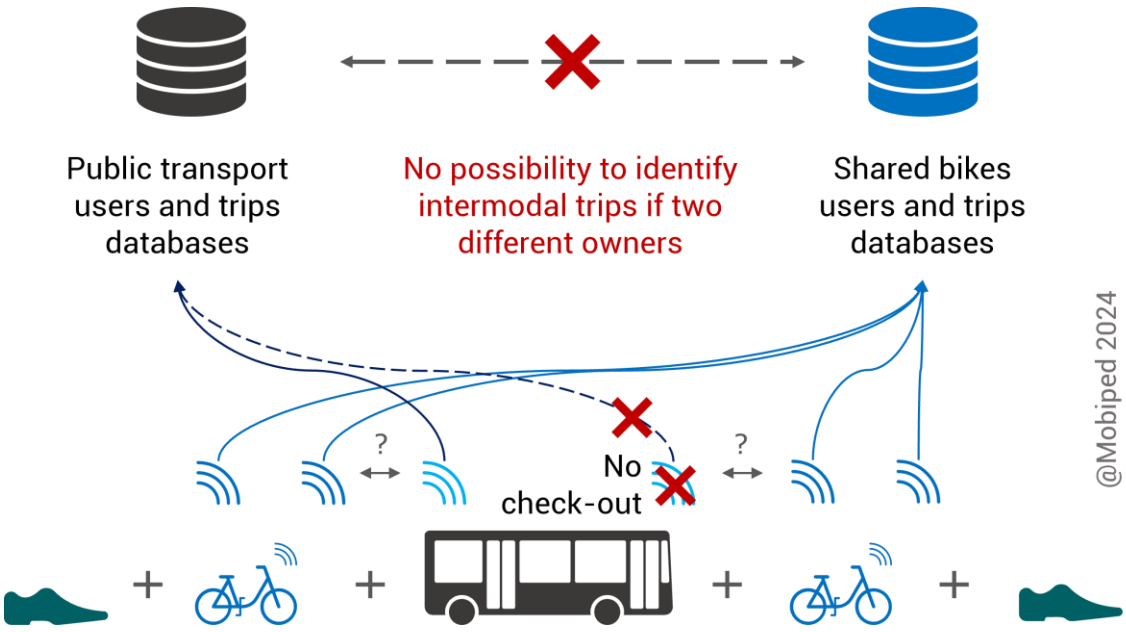


Figure 45: Data on multimodal and intermodal use of PT and PB

Multimodality	
Budapest	80% of PB users travel mainly by PT (2022).
France	55% of PB users have an annual PT subscription (2017).
Mexico City	Between 40% and 45% of users also use the bus and metro.
Milan	34% of annual PB subscribers also have an annual PT subscription.
Paris	22% of PB users use it as their main mode of transport.

Intermodality	
Antwerp	> 25% of PB users combine it with the bus, tram, metro or train.
Brussels	47% of users are intermodal (30% at start, 17% at end of journey) (2017)
France	62% of PB users combine their journeys with urban transport (CEREMA, 2017).
Helsinki	55% of PB users use the metro before or after.
Taipei	> 70% of PB users connect with PT.

7.5 Challenges of creating a unique experience

The ideal of a single experience for all PT and PB subscribers faces with certain challenges *(Appendix 9.8)*. Certain parameters appear to be structural, linked to service access conditions *(Figure 46)*, capabilities *(Figure 47)* and age *(Figure 48)*.

Figure 46: Difficulties in transferring from one service to another

	• Allow the potential collection of a deposit • Allow post-payment (based on actual usage time) • Accept the Terms and Conditions • Deposit generally higher than the €50 open-payment limit • 24-hour service (partial with night buses) • Possibility of reserving a place (except Transport on Demand)
	• Incognito access to the service without a guarantor or a bank imprint with balance verification • Cash payment • Open payment limited to €7.50 (Brussels)

Figure 47: Comparison between bike share, LTR and PT according to capacity

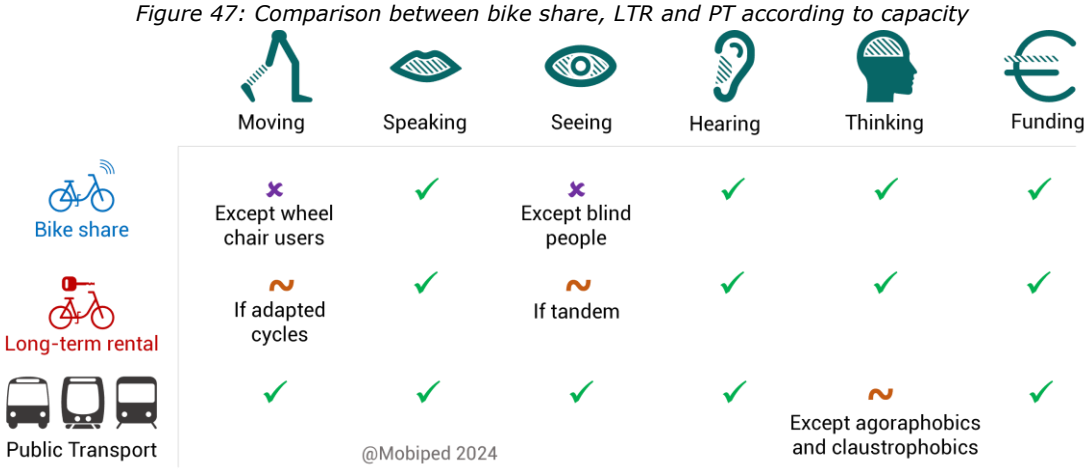
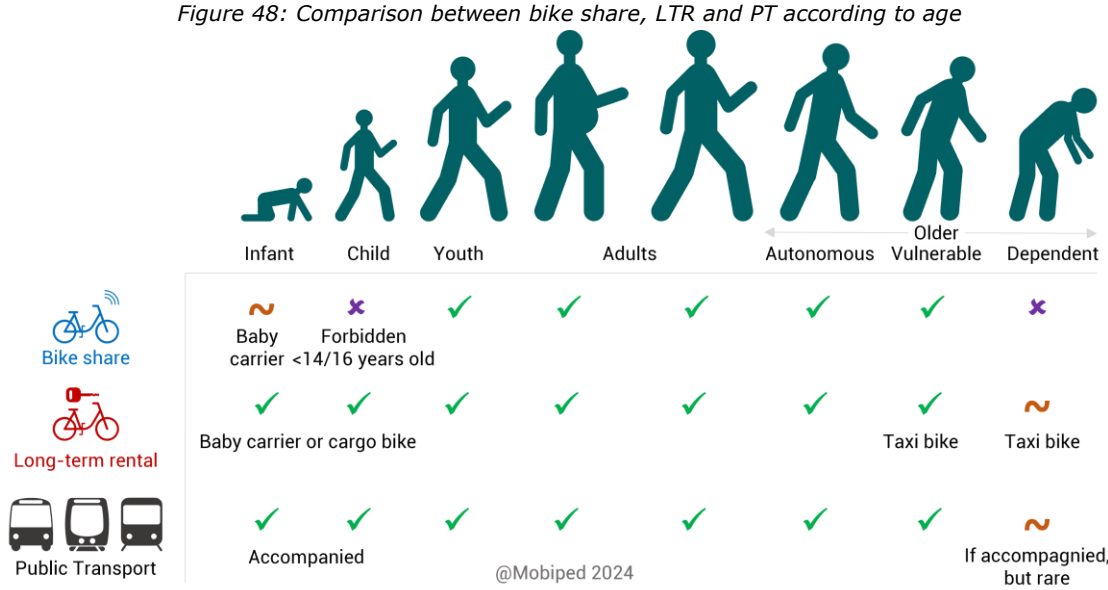


Figure 48: Comparison between bike share, LTR and PT according to age



7.6 Overvalued PT-PB integration

The players discourses value PT-PB integration without mentioning the levels of integration for each parameter *(Figure 49)*. Integration is generally limited to discounts for PT subscribers and use of the PT ticketing system. The ultimate integration would involve a single mobility pass that allows all modes to be used equally *(Figure 50)*.

Figure 49: Three levels of integration for each theme

	Sub-theme	None	Intermediate	Full
People	Customer databases	Two owners	Whitelist	One owner
	Practices	Monomodal	Intermodal	Multimodal
Products/Services	T&C	Two separate T&C		Single T&C
	Action	Rent or travel		Travel
	Transfer	Separate	X	Included
Places	Walking distance	> 50 m	25 m	Side by side
	User flows	Separate	Cohabitation	Sharing
Price	One journey	Separate	Same price	Single ticket
	Subscription	Separate	Discount	Single subscription
Promotion	Brand	Separate	Varied	Single
	Semantics	Specific	Hierarchical	Universal
	Communication	Separate	Hierarchical	Equitable
	Advertising	Separate	Alternating	Integrated
	Sells	Separate	Partnership	Integrated
Process	Website/App	Separate	One, but multiple clicks	Direct access
	Usage	Purchase identified		Anonymous
	Payment	Bank card/Direct debit	Open payment	Cash
	Ticketing (support)	Separate	Shared	Identical
	Itineraries (offers)	Monomodal	Multimodal	Intermodal
	Routes (research)	PT only	PB unchecked per default	PB checked per default
Proof	Customer survey	Separate	Intermodality analysis	Unique barometer
	Data analysis	Separate	Overlaid	Automated

Figure 50: Marketing mix for a total PT and PB integration

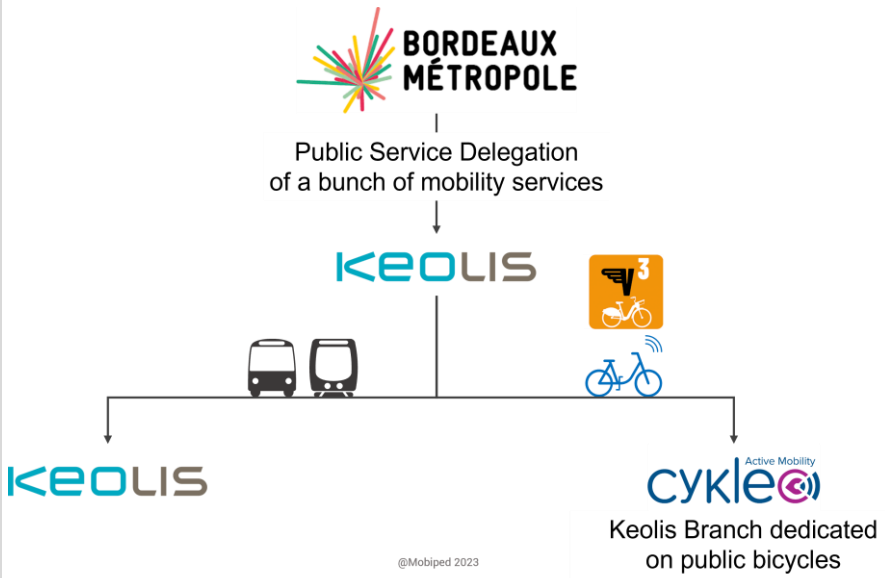
7.7 Involvement of the PT operator in the governance

7.7.1 Governance models

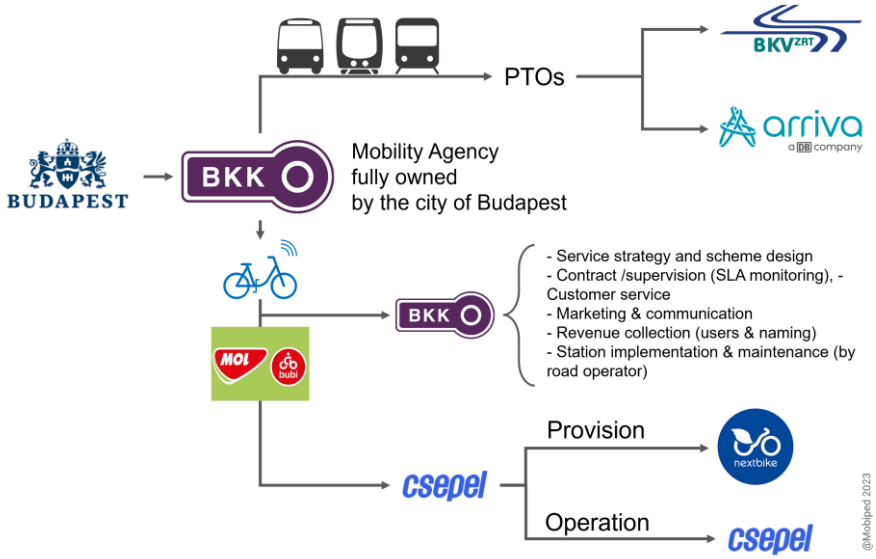
Governance diagrams have been produced for the Madrid, Milan, Bordeaux, Budapest and Vienna services. Each diagram illustrates a diversity of approaches and adaptation to the local context *(Figure 51)*.

Figure 51: Five governance models in Europe involving the PT operator

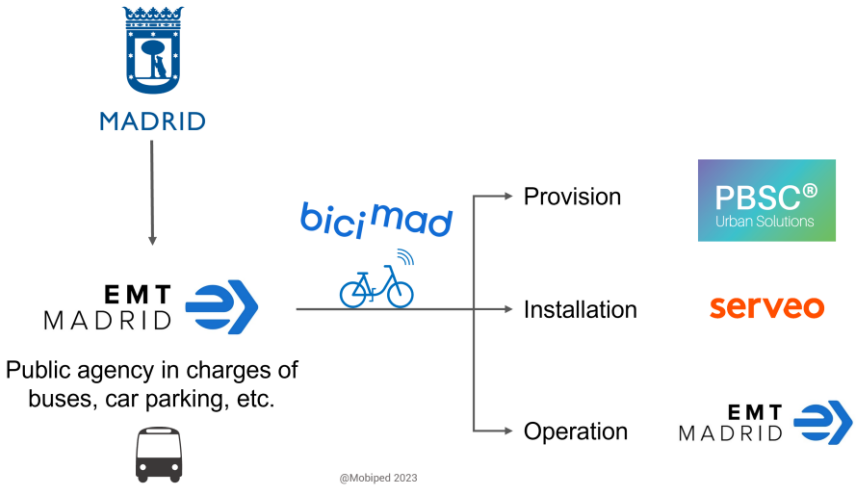
Bordeaux



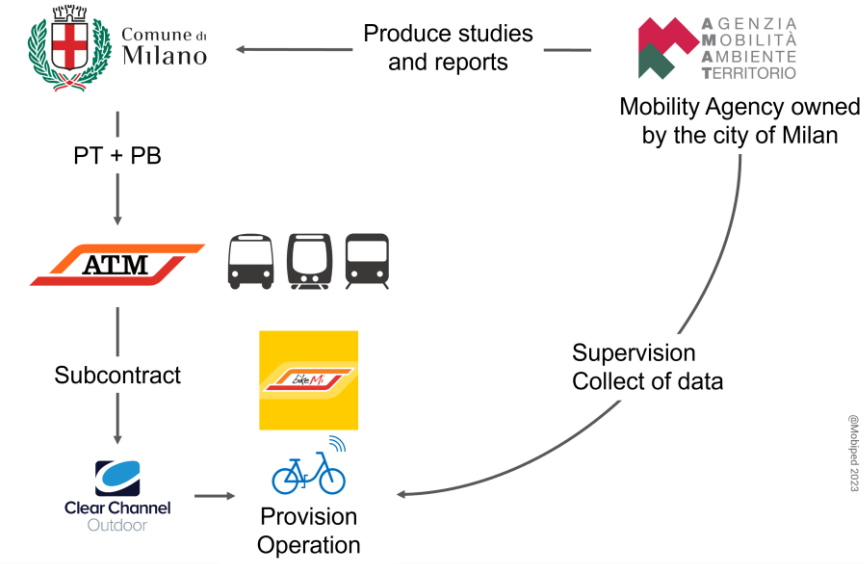
Budapest



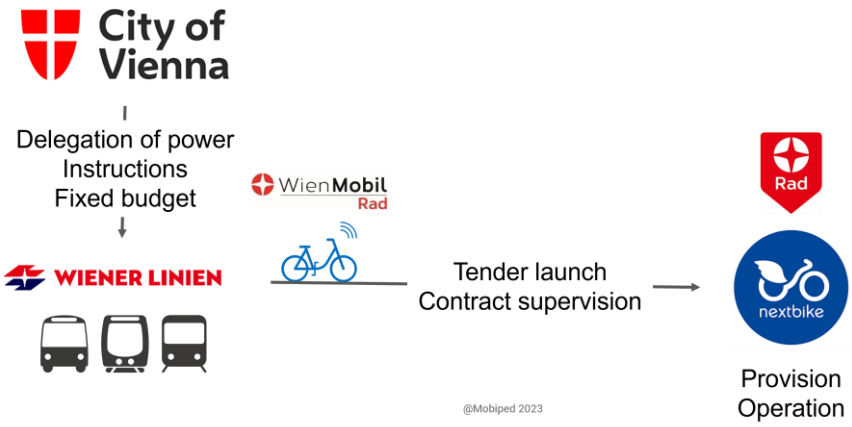
Madrid



Milan



Vienna



7.7.2 Opportunities and Threats

Opportunities

Strategic interest for the PT operator

- Develop revenue by inviting subscriptions to both services (but with possible discounts).
- Enhance the PT brand image and increase its visibility in public spaces (Cologne, Vienna).
- Initiate the cultural shift from PT operator to mobility public service operator (e.g. Budapest, Madrid), which is reflected in the communication approach (Dijon).
- Improve the quality of land coverage.
- Attract audiences reluctant to use PT.

Business skills

- Ability to supervise contracts.
- Agency and distribution networks.
- Land availability for potential mini-warehouse or battery charging.

User experience

- Users in favour of easier intermodal and multimodal experience (Brussels).

Threats

Unequal treatment

- Loss of interest in PB, with a drop in energy and dedicated resources, as PB represents 1% of PT (flows, budget, revenue), with cycling relegated to second place *(Figure 52 and Figure 53)*.
- Fear of having journeys "stolen" from them, when the user chooses an offer that better meets their mobility needs.
- Believe that the presence of PB in the PT field will lead to give priority to bicycles rather than PT in urban development projects.
- Absenteeism of human resources and lack of appropriate human resources.
- Few real economies of scale in operations (Bordeaux, Madrid).
- Time-consuming and energy-intensive change management, with no guaranteed results in terms of a cultural bridge between PT and PB mechanic workers, or in considering bicycle services as a way out for staff at the end of their careers.

Governance

- Negotiation and supervision of PB is buried at the end of the meeting in relation to PT and carried out by senior decision-makers without the presence of the PB officers in the discussions (Bordeaux).
- Addition of an intermediary and a lack of direct exchanges between the needs of the authority and the reality on the ground (Milan).
- Belief that delegating supervision to the operator will avoid the need for the authority to supervise the service.
- Legal framework to be defined.

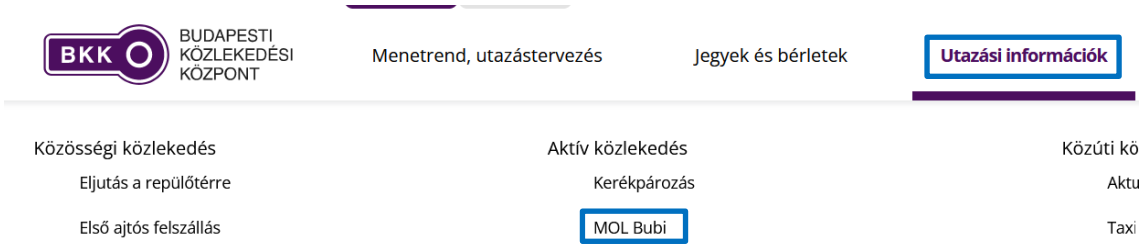
Uncertain results

- Low (Cologne, Milan, Munich, Vienna) or fairly good (Bordeaux, Lille) turnover rates.

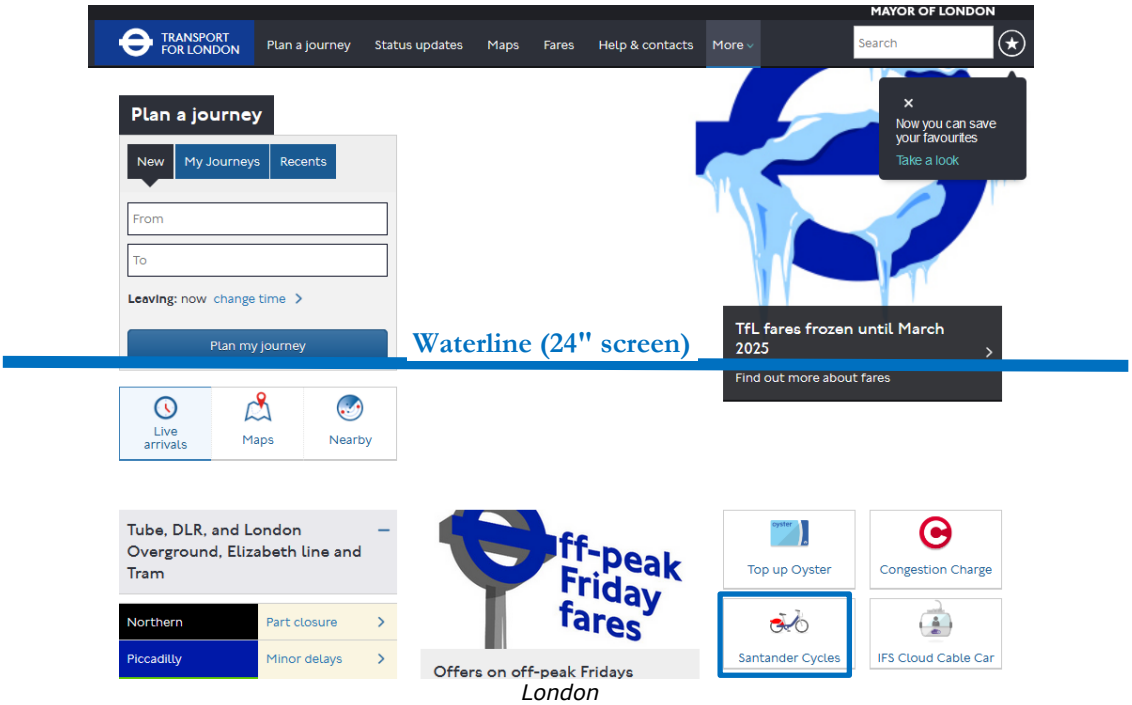
Figure 52: Rare good practice of direct access to the PB page from the home page (Dijon)

Figure 53: Efforts required to access information on PB (Vienna, Bordeaux, Budapest, London)

Vienna Bordeaux



Budapest



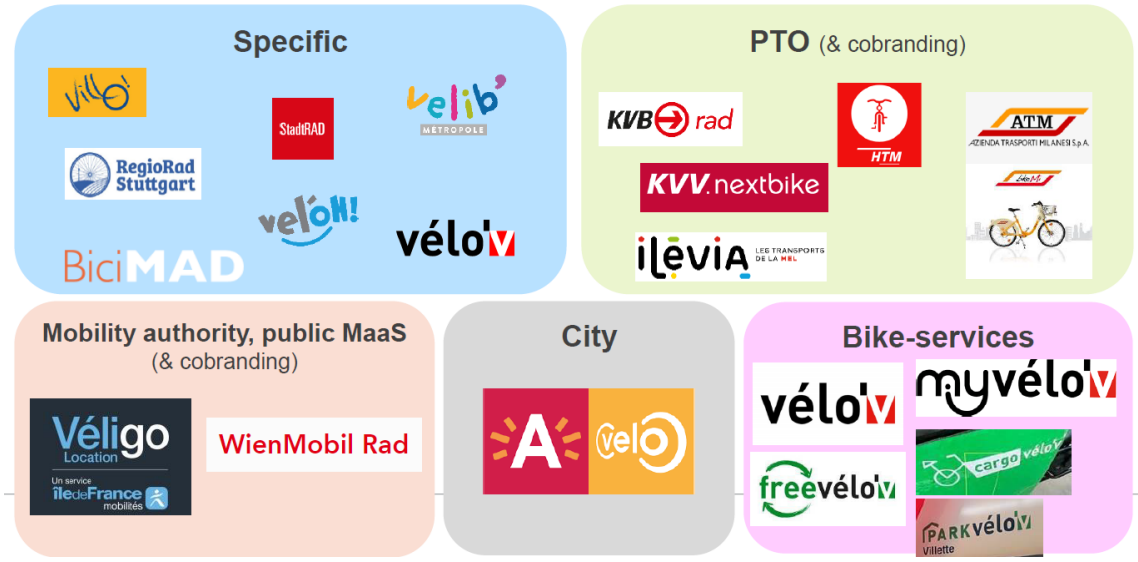
London

7.7.3 Brand diversity

The brand of the PB service can be:

- specific to the PB service (Brussels, Luxembourg, Paris).
- a range of bicycle services (Lyon).
- institutional in connection with the city (Antwerp).
- linked to the global mobility public services brand (Vienna).
- Derived from PT operators (Cologne, Dijon, Milan).

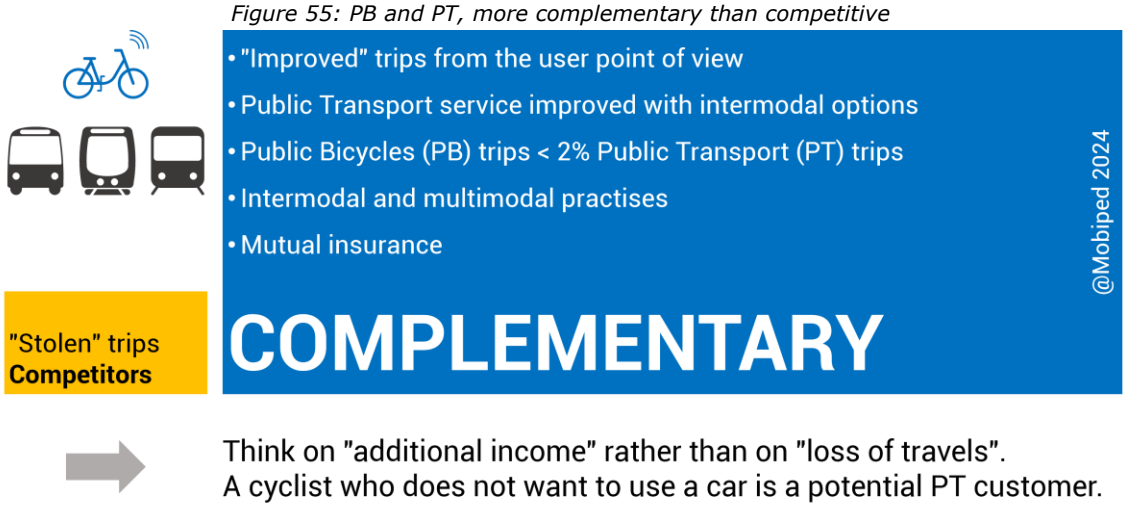
Figure 54: Brand positioning strategy for PB services (Author: M. Nicaise, STIB)



7.8 PB and PT are rather complementary than competitors

"Rather than being afraid of cycling, the PT operator should put its energy into attracting subscribers to multimodal practices. Cyclists are more likely to be PT passengers than motorists" (Budapest) *(Figure 55)*.

Figure 55: PB and PT, more complementary than competitive

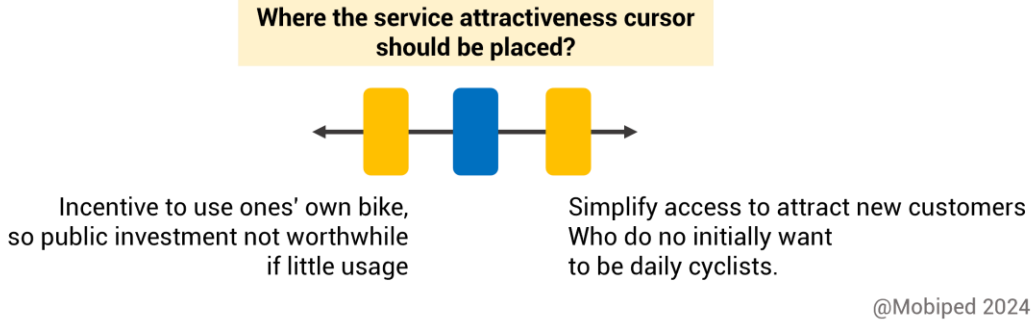


8 Challenges facing the bike share market

With Lyon's first large-scale PB service soon to celebrate its 20th anniversary, and more than 1,600 cities in the world with bike share services, the market is facing a number of challenges.

Maturity and stability of the sector	The industry is evolving rapidly, with players from a variety of backgrounds (advertising space, PT, IT, bike share specialists). Strategic changes and capital uncertainties, even among the historic players, raise questions about the sector's stability and maturity.
Return on investment	• A very high cost compared with the bicycle budget, but ultimately a very low bicycle budget compared with other modes. • Difficulties in defining the use value of a journey for each individual (one-off but extremely useful, regular because it is the only solution, regular but total opportunism) and the reality of intermodal and multimodal practices. • Little data is systematically collected to assess the services economic impacts.
Public vs. private vision	Silo approach to public and private bike share services, even though the service is virtually identical and only the governance model differs.
Complexity	A simple subject at first glance, but one of multidisciplinary complexity.
Policy	Decision makers are reluctant to pay, but each want a station in its municipality.
Alignment of interests	Difficulties in aligning the interests of users, the authority and the service provider. The marginal revenue from a rental is insufficient to cover the marginal cost of a rental, which has an impact on the service's economic equation.
Demand modelling	Prediction tools are appearing, but there is no robust modelling tool for designing a service.
Standardisation	No standard for furniture, bicycles and batteries.
Pricing	Pricing remains complex, with at least a right of access and a payment according to duration of use.
"Popularity"	"Popular" success is in terms of numbers and visibility in the public space. But the most vulnerable are under-represented.
Public service	Some cities (Brussels) and countries (France, Hungary) consider bike share to be a public service operated by the private sector. Other cities (Antwerp) and countries (Switzerland) consider bike share to be a private service supported (or not) by the public authorities.
Modal shift	Little commercial effort to target motorists.
Level of attractiveness	Difficulties in finding the balance between an attractive service to entice users with a simpler, more fluid service than the personal bike, and a service that is not too attractive to prevent cyclists from stopping using their personal bike at the taxpayer's expense *(Figure 56)*.

Figure 56: Striking a balance in the level of service offered



9 Appendices

9.1 Key features of rental services

Duration (type)	Very short	Short	Medium	Long
Rental period	Minutes	Hours	Days	Months
Name	Bike share	Daily rental Tourist rental	Weekly rental Tourist rental	LTR (Long-term rental bicycle)
Service to customer	Back-to-many	Back-to-one	Back-to-one	Back-to-one
Service access				
Location	Numerous locations in public spaces	Few times in public spaces, often in buildings	Few times in public spaces, often in buildings	One or more buildings Home delivery
Parking in public spaces	Dedicated racks/slots or virtual hubs	Bicycle racks	Bicycle racks	Bicycle racks
Time	24/7	24/7 or opening hours	Opening hours	Opening hours
Examples				
Local authority initiatives	Vélib', Vélo'v, Bicing, Villo !	Auxerre, New Aquitaine Mobility Region	Donkey Republic (Geneva, Lantis in Antwerp)	Véligo Location, Metrobike, Freevélo'v
Initiatives by private or semi-public organisations	Lime, Dott, Tier, Donkey	OV-Fiets (NS-Fiets), Blue Bike (ex SNCB), Smovengo in "Gare de Lyon"	Rental shops, Donkey	Swapfiets, Decathlon, Brompton
Main targets				
Children				✓
Students	✓			✓
Commuters	✓	✓		✓
Tourists	✓		✓	
Professional travel			✓	
Vulnerable groups				✓
Transport of goods				✓
Delivery (meals)				✓
Parents with children				✓
Company bikes				✓
Bike for employees				✓
Access to a bike				
Bike type	Standardised for intensive use and display in public areas, bike or cargo bike	Specific bike adapted to the environment + Accessories	Specific bike adapted to the environment + Accessories	Variety of bikes (City, mountain bike, children's, cargo bikes, etc.) + Accessories (luggage rack, baby carrier)
Bikes in good condition	Random	✓	✓	✓
Bikes for special use	x	✓	✓	✓

Duration (type)	Very short	Short	Medium	Long
Renter/lessee interface				
Joint inventory	x	✓	✓	✓
Service user interaction	Automated	Automated/Human	Human	Human
Liability during rental				
Express parking (theft)	✓	✓	✓	✓
Night parking (theft)	x	✓	✓	✓
Incentive to keep bikes in good condition	x	✓	✓	✓
Maintenance	x	x	x	✓ Partly
Return of bike to its place of origin	x	✓	✓	✓

9.2 Different types of damage to bike share

9.2.1 Causes

Service deterioration is the result of many factors: theft, vandalism, misuse, wear and tear, hacking (*Figure 57 et Figure 58).* Nextbike estimates that 4% of its fleet is stolen or damaged each year.

The absence of a joint inventory at the beginning and end of the rental period does not encourage careful and respectful behaviour and does not allow responsibility to be attributed for damage. Vandalism is not specific to Europe, as it has also occurred in Asia with free-floating bicycles.

Figure 57: The different causes of damage

Theft	• Entertaining occupation • Occasional use to get around without paying • Resale (materials): batteries, electronics, spare parts
Vandalism/Damage	• Bike dumping game (throwing them into the canal, placing them in unlikely places like trees) | TikTok challenge (Cologne) • Urban riots | Deliberate damage to a public symbol or a symbol of capitalism • Frustration of other users of the public space who do not use the service • Tagging or breaking screens
Improper use	Rubbish in the basket | Support for tags or unauthorised advertising campaigns (e.g. Vélo'v and Vélib') | Bike parking in the wrong place thanks to false geolocation | False prepaid card account (e.g. Nice).
Misuse	Frustration with poor service | Negligence (using a bike even if it is damaged) | Unintentional misuse: lack of understanding, lack of cycling infrastructure | Deliberate misuse: use of the emergency stop button to leave the bike anywhere in Marseille, the bike seen as a BMX for jumping pavements, two-person riding | Users are potentially inexperienced in urban cycling and prefer to switch from road to pavement, forcibly mounting pavements | Users are not 100% reliable to be considered as contributors to the service quality.
Excessive wear	Over-use during peak periods or by food deliverers | Wear and tear (poor prevention by the operator) | Ageing of materials due to climatic conditions (sun, cold, rain) | Operator's lack of interest | Questionable technical and maintenance choices (noise of crows from Vélib' brakes, noise from Vélo'v rear tyres).
Hacking	Computer viruses (e.g. Copenhagen) | Data theft | Disclosure of personal data.
Poor design	The manufacturer's belief that the system is tamper-proof despite all the tests carried out upstream, with possible resistance for several months or years before being surprised (Cologne, Marseille).

Figure 58: Some examples of the deterioration of bike share services

Cracking (Geneva)

Vandalism (Montpellier)

Rust (Montpellier)

Frame wear (Paris)

Faded paint (Barcelona)

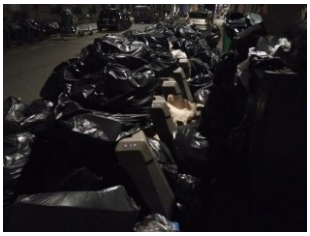
Baskets as bins (Paris)

Disappearance of signage at four parking slots (Stuttgart)

Disrupted water flows (Paris)

Warped rear wheel (Madrid)

Inconvenient parking (Paris)



Bin collectors' strike (Paris)

Tag on furniture

Loosening of the slot (Lyon)

Pavement deformation under the tyre (Paris)

Wear and tear of protection (Nice)

9.2.2 The consequences

This damage has many harmful consequences:

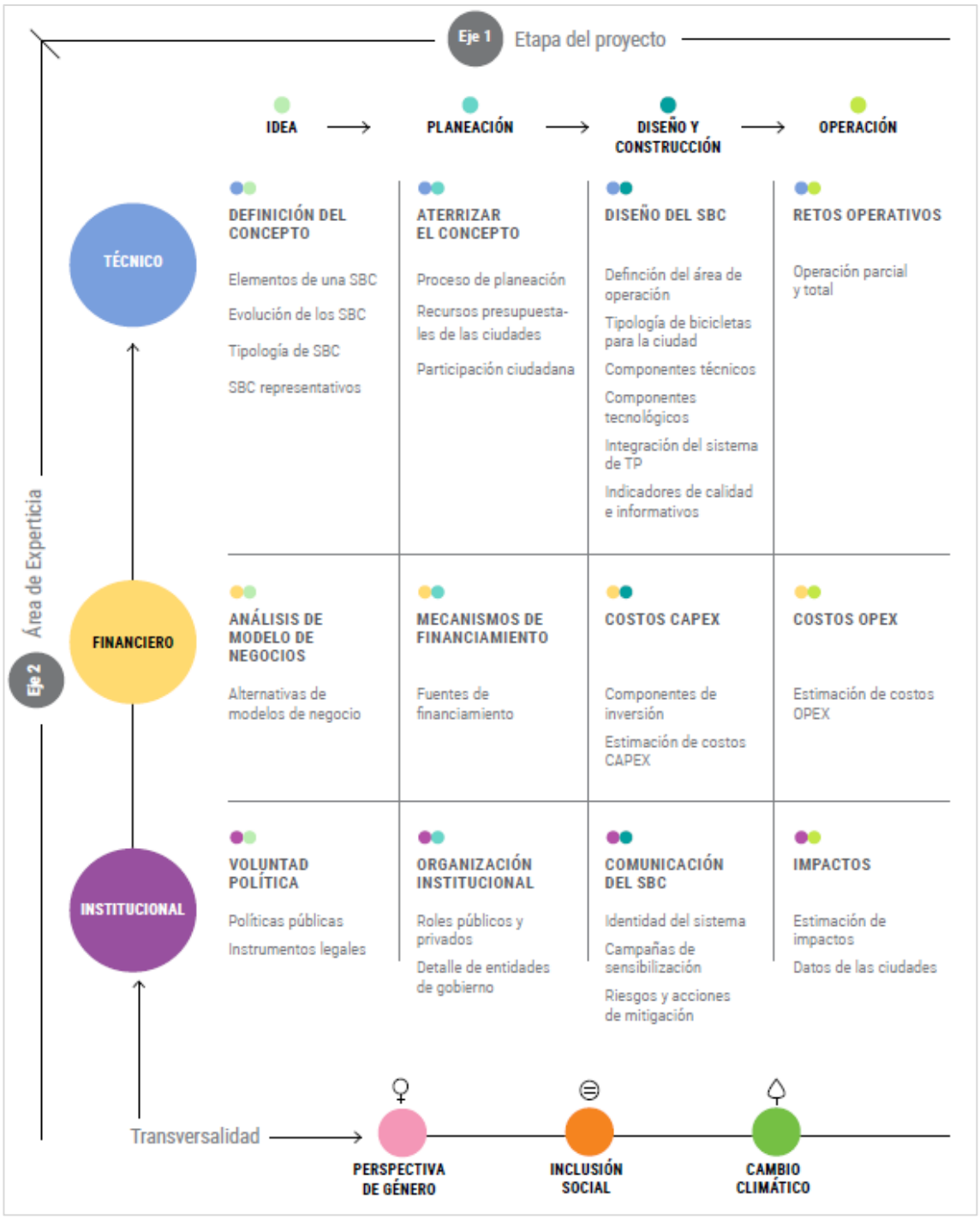
- deterioration of service quality and image.
- disruption of the operator's economic equilibrium, leading to service discontinuation (Lorient).
- water pollution from electronics.
- hidden costs of systematic complaints.
- removal of stations in neighbourhoods if too much vandalism.
- over-prevention disrupts the user experience by focusing on troublemakers rather than focusing on attracting users and increasing the sense of belonging.

9.2.3 Ways to reduce damage

It may seem unlikely to eradicate vandalism from a self-service device in the public space, but there are ways of reducing it.

Infrastructures	Develop a continuous network with as few micro-hazards as possible (pavements, jumps, fewer cobblestones, potholes) that make bicycles weaker.
Design of the bike - rack - stand system	Discourage/frustrate attempts with: • a streamlined bike. • special parts and protection. • a device that prevents leverage. • an alarm when there is a theft attempt. • a motor brake to prevent the possibility of using the stolen bike. • an eye tag sticker and stating that the bike is geolocated (several GPS chips in the bike?). • good station lighting. In the specifications: • higher strength requirements than those for private bicycles • possible R&D improvements as the contract evolves. • a distinctive, recognisable frame design. • beautiful things are less likely to be vandalised. • buy a bike in the tender to conduct beta tests with ex-convicts, in "Catch me if you can" redemption mode. • specific work on the connectors that cause faults. • durable materials and accessories to avoid warped wheels or flat tyres. • right to error included in the user experience design. • reduced possibilities for two people on a bike (flexible rear skirt or basket, possibility of renting several bikes with a single account, no foot support) or bikes designed to carry a passenger.
Community spirit	• Create a sense of community and brand loyalty among users, beneficiaries and their friends and family. • Organise consultations on the location of stations and artistic cocreation to involve residents of disadvantaged neighbourhoods, in partnership with social players.
Financial risk management	10% budget provision for vandalism, reinvested in the quality service if vandalism is lower (Antwerp).
Before the launch	Set up a simplified protocol with law enforcement agencies for filing complaints.
Operation	• Have robust spare parts and carry out preventive maintenance to avoid the broken glass phenomenon (close link between environmental conditions and social or anti-social behaviour). • Be able to adapt to heavy repair workloads, and switch to 24-hour operation during periods of very high usage. • Human presence to explain how the service works.
Communication	• Always positive communication: sense of belonging, diversity. • Update signage materials.
After the damage	• Be extremely reactive to avoid the broken glass phenomenon. • Interact with social networking platforms to avoid viral videos or challenges (Cologne). • Collect stolen bikes directly, with a team available 24 hours a day. • Avoid over-communicating to stifle the phenomenon. • Creation of a task force.

9.3 Planning diagram



9.4 Advantages and disadvantages of pedelecs parking and charging solutions

This work was carried out in the perspective of pedelecs bike share service to explore the advantages (+) and disadvantages (-) of different variants:

- A full dropzones service.
- A full charging stations service.
- A hybrid service combining dropzones and charging stations.

9.4.1 Technological solution

	Dropzones		Hybrid		Charging stations
PEDELECS CHARGING					
Method		Battery swapping		Grid via charging station + Swapping	Grid via charging station
If a lot of rentals	-	↗ swapping costs	+	Swapping in support	+ Constant charging
Battery charge cycle	+	Controlled in warehouse		←	- Random/variable parking time
Battery life	-	Over-used battery connectors		←	+ Less handling
Electricity failure	-	Dependent on power failure		→	- Dependent on power failure
Strike/absenteeism	-	Dependent on human resources			+ Charging will continue

9.4.2 A look at users and non-users

	Dropzones		Hybrid		Charging stations	
USER EXPERIENCE						
Walking time/distance before/after rental	+	Very dense network	+	→	-	Less dense network
Target audiences (in general)		Young, tech-savvy, male	+	→ ←		Older, higher education, male
Digital divide	-	Experience mainly via an app Impossible to return bike without app	~	→ ←	+	Access to a bicycle without systematically using Internet
No-commitment use	-	Impossible to pay without creating an account		←	+	In-station card payment
Return of the bike	-	Potential problem when returning the bike due to inaccurate GPS	-	→ ←	- +	Problem if bike not attached properly Return without action
If a station is full	+	Dense network and nearby dropzones	+	→	-	Frustration, uncertainty, detour
Understanding the offer	-	Evolution of rules over time from free-floating to dropzone, different in each city or country If several services, different prices and condition of use	+ -	Flexibility according to needs and habits Potentially confusing with distinct functions	+	Simple: pick-up and return only at the station, with a more reliable user experience. If efficient service, ↗ network effect, ↗ annual subscriptions
Bike availability	-	↗ risk of uncharged bike		←	+	↗ probability of having a charged bike
Access time	+	More chance of having a station nearby	+	Drastic reduction in pedestrian distances to/from a station.	-	Network dependent on the number of stations and associated costs
Obtain information	-	On the bike, or on the app		←	+	Possible on a stand or sign

	Dropzones		Hybrid		Charging stations
VISIBILITY IN PUBLIC SPACES					
Mass effect and visible urban landmark	-	Average (but direct visibility of bikes). Need for a symbolic totem/post. The colourful bicycle is in the spotlight.	→	←	+ Stable landmark with dock and slots furniture, even when no bike is present. The furniture "stifles" the bike's visibility.
Bike colour	+	Flashy, highly visible frame colour		←	- Urban architectural constraints
Parking space	-	Ground markings and/or racks	→	←	+ Slots
MANAGEMENT AND SHARING OF PUBLIC SPACE					
Speed control	+	Can be restricted by geolocation	→	←	+ Possible, if GPS integrated
Bicycle stability	-	Weak (wind, kicking, neglect), with risk of bicycles lying on the ground	→	←	+ Parked upright
Orderly bikes	-	Varied and anarchic directions Risk of parking outside dropzones and racks Unsatisfactory technology: GPS inaccurate, intrusive camera on bike, photo at end of journey restrictive, beacon very expensive	→	←	+ User obliged to park the bike properly to end rental period Positioned in station, in the same direction (except for overflow and temporary off-station parking)
Pedestrian/cyclist cohabitation	-	Risk of cluttered pedestrian walkways, problematic for people in wheelchairs, visually impaired or blind people, those with pushchairs or suitcases	→	←	- If positioned on the pavement, the cyclist believes they are entitled to ride on the pavement
Road safety	-	Danger if the bike protrudes onto the road	→	←	+ No parking risks
INCIVILITIES					
Theft	-	Higher exposure to theft to put in a truck.	- Increased theft risk with dropzone + Fewer removal attempts in station		More secure lock to furniture, especially if double lock (rear wheels and station attachment).
Vandalism	-	Higher if private service		←	+ Lower if public service

9.4.3 Financial aspects: investment, operation and revenue

	Dropzones		Hybrid		Charging stations
INVESTMENT (CAPEX)					
CAPEX costs	+ "Less high"		←	-	"Higher"
Stations	+ None, unless beacons are used to manage parking and compensate for GPS inaccuracies		CAPEX optimisation to meet needs		High, with IoT in the terminal
Bikes	- High stresses to withstand exposure to theft, the risk of shock in the event of a fall, and to protect IoT and embedded technologies (GPS, camera).	-	• Bike with both charging functions (swappable and in-station charging), • Lock system to the parking furniture • Robustness and IoT onboarding requirements	-	Integration of the lock into the bike frame or fork
Batteries	- Two batteries per bike: on the bike and charging Handling shortens service life		Duplicate batteries, but fewer of them	+	One battery perbike Longer service life
IoT placement	- On the bike		On the bike and in the slot stand	+	In the terminal and limited in the bike
Swapping vehicle	+ Numerous		Some	-	None
Collection vehicle	Identical		→ ←		Identical
Regulation vehicle	+ Few (because no SLA)		In between, less need for regulation	+	High (according to SLA)
User application	+ Shared with other cities, generally a proprietary brand		←	+	White labelling and adaptation to the needs of local authorities
Information system and software	+ Shared with other cities - Black box		←	+	Solution developed for other cities, + Access for public authorities, with specifications
Financing and cash requirements	+ "Low", with user revenues collected quickly, but insufficient over the long term		←	-	Very significant investment at the outset and payment dependent on public authorities

		Dropzones		Hybrid		Charging stations
OPERATION (OPEX)						
Operating costs	-	"Very high"	-	"High" with more complex operation	+	"Low"
Swapping	-	A lot of human resources, makes it possible to carry out a visual check of the bikes' condition	-	Depending on station/dropzone percentage and incentives to return bikes to charging station	+	None
Repair of stands and terminals	+	None	-	Lower ←	-	Repair and cleaning
Collection of bicycles for repair	-	Many locations	-	More complex (number of collection points, new profession), complicated and costly	+	Control the limited number of locations, thus regulating flows and workloads
Regulation	+	More alternatives with dropzones nearby for the customer	+ -	Challenge to return bikes to charging stations	-	More frequent full/empty stations, with additional effort on the part of the user
Badly parked bikes	-	Cost of removal or relocation	-	→ But lower		Almost none
Risk of theft	-	High	-	→ Lower	+	Lower
Penalties	+	None		←	-	Potentially high and provisioned
If use rate is high	--	Marginal cost of swapping increases with use, without considering cost of repairs and accelerated wear.		Possible reduction in regulation requirements due to availability of bikes in more locations	-	Marginal cost increases with repairs and accelerated wear, with the need for regulations
USER REVENUES						
Type of user	+	More "tickets"		→ ←	+	Long-term, recurring subscriptions
Territorial scope	-	Drop in revenue per bike as land coverage expands		→ ←	+	Drop in revenue per bike as land coverage expands
Network density	+	Expectation of higher revenues with more attractive service		→	-	Small distances between stations, making service less attractive
Profitability	-	Need for public funding due to insufficient revenues		→ ←	-	Need for public funding due to insufficient revenues

	Dropzones	Hybrid	Charging stations
HIDDEN COSTS FOR PUBLIC AUTHORITIES			
Selection of candidates	+ Short, involving few players	←	- Long, involving several players
Deployment supervision	- Monitoring of dropzone implementation + implementation costs	→ ←	- Participation in all meetings with the selected provider and stakeholders
Service supervision	+ Low	←	- Regular meetings, field audit, quality analysis, legal/accounting monitoring
Pound	- Removal of obtrusive bicycles	→	
Water services	- Collection from canals and waterpoints	→ ←	- Collection from canals and waterpoints
Police complaints	- Damage and theft of bicycles	→ ←	- Damage and theft of bicycles

9.4.4 Public space integration

	Dropzones	Hybrid	Charging stations
PARKING			
Mutualisation with shared e-scooters	- Possible without racks (↘ capacity) No parking racks to stabilise bikes and scooters	→ ←	- Possible depending on proprietary technology solutions
For 5*2 m² (10 m²)	+ 10-12 bikes, 10 if bike racks	Depending on public spaces availability	- 6 bicycles
Minimum length	+ 2.5 to 5 metres	Depending on public spaces availability	- 10-15 meters (except stacking)
Replace car space	+ Space-by-space negotiation	→	- Negotiation of several spaces
Durability	- Location without furniture, except racks	→ ←	+ Multi-year guarantee
Easement - Near public transit stop	+ Multiplication of small dropzones at each station/metro entrance/exit and near bus stops	→ ←	- Limited availability of continuous linear space nearby
Territorial coverage	+ Hyper-dense and hyper-extensive	→	- Density and limited coverage
Choice of locations	+ Potentially underserved neighbourhoods	Political arbitration on stations	- Numerous political and road trade-offs
Beyond the territory	+ Easy to deploy	→	- Complex to deploy
Physical or visual barrier	+ Possible to cross or bypass		- Not possible is the lock is connected at height

		Dropzones		Hybrid		Charging stations
IMPLEMENTATION						
Flexibility/agility	+	Flexibility to test locations Possible in several phases	+	Tactical urban planning possible before creating charging stations Dropzones can be discontinued if there is too much uncivilised behaviour, and the operation is too expensive.	-	Very low and costly flexibility to resize/relocate/expand in response to changing demand. No room for error. Platform or modular stations are a little more flexible.
Works duration	+	A few hours		→ ←	-	Several weeks (with connection)
Service delivery	+	A few months	+	Possible to start with dropzones and swapping to identify areas for intervention	-	Allow a minimum of one year after signing, after final legal recourse.
Civil engineering and (roads ground networks)	+	None or limited to one post		→ ←	-	Location constrained by roads and ground networks and the distance to the power grid Compliance with safety standards Analysis, excavation, risk of asbestos, +/- long trench Restoration to initial condition
Administrative procedures	+	Simplified approach		→ ←	-	Dependent on administrative layers (local government authorisations, building permits, RN management, power grid management, etc.).
Landscape integration	+	No constraints		←	-	Architectural constraints

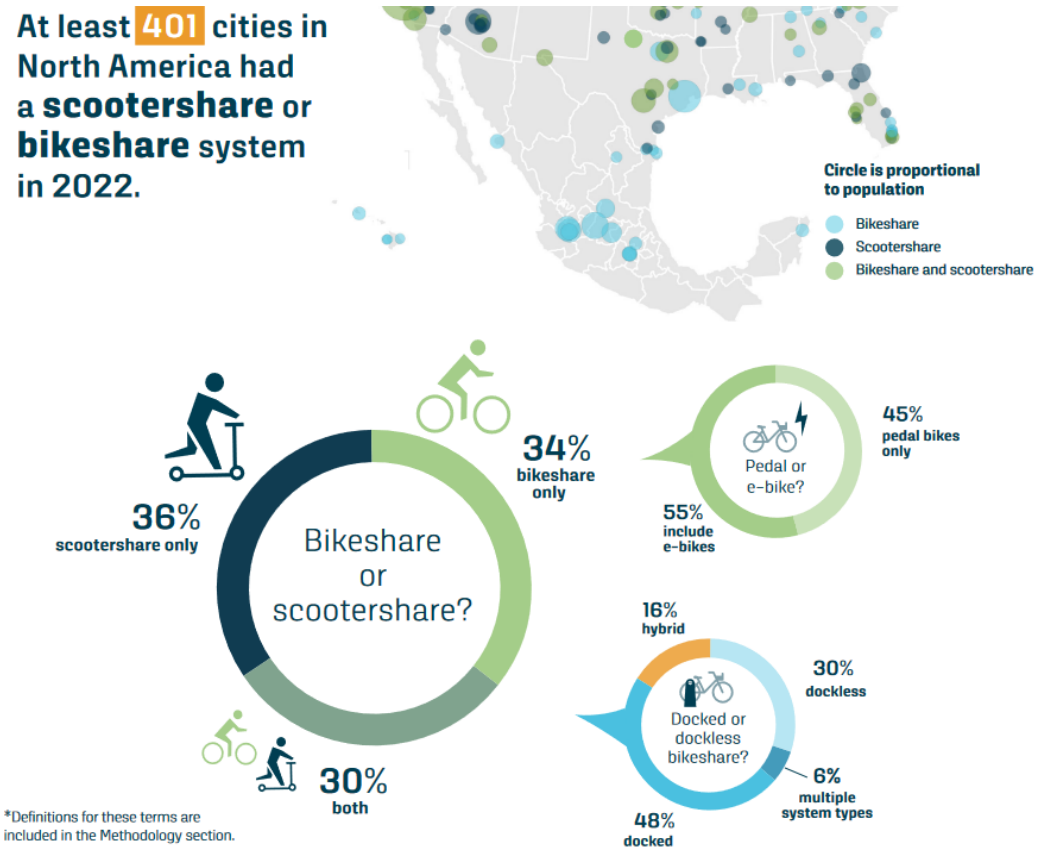
9.4.5 Impact

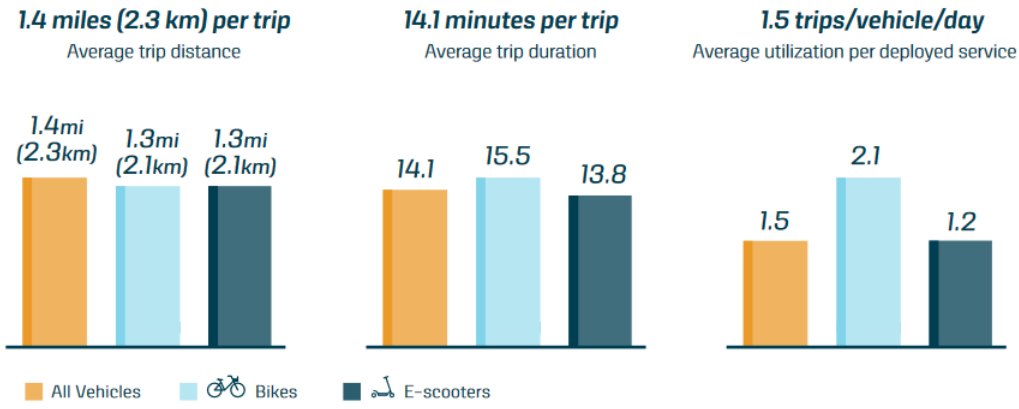
		Dropzones		Hybrid		Charging stations
ENVIRONMENTAL IMPACTS						
Manufacturing and recycling	-	Bikes, batteries		←	-	Bikes, batteries and street furniture
Importation and logistics	-	Bikes, batteries		←	-	Bikes, batteries and street furniture
Operation (depending on vehicles used)	-	Journeys for swapping		Reducing both	-	Journeys for regulation

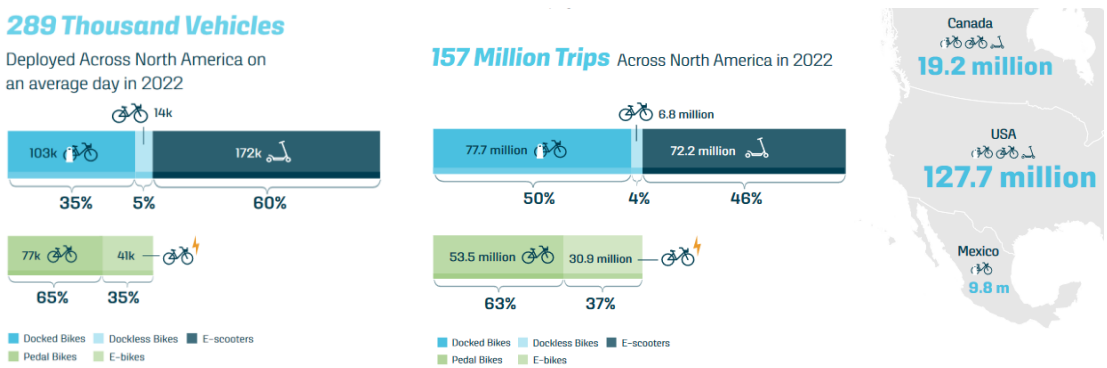
9.4.6 Governance, competition and market players

		Dropzones		Hybrid		Charging stations
NUMBER OF PLAYERS						
Local competitive bidding structure		Historically, free competition. Then local oligopolies regulated by the licensing system, or even a monopoly (Grenoble) or bans (Lyon).		Local monopoly for charging stations highly likely due to current lack of universal stations		Local monopoly due to the stations, which imposes a minimum local monopoly on the docking stations
Economies of scale	-	If oligopoly, double expenses and sub-optimisation of swapping and maintenance rounds		←	+	Yes, due to the local monopoly
Subscription	-	↘ probability of being a long-term subscriber		←	+	↗ network effect, probability of subscribing
Economic balance	-	Unstable (B2C model), stabilised if subsidised (B2C and B2G2C mix)		←	+	Stable (model B2G2C)
Discussions with public authorities	-	Around the table with competitors		←	+	Face to face, a single point of contact for public authorities
Innovation	+	Autonomous and fast		←	+	Within a constrained contractual framework
MARKET STAKEHOLDERS Detailed but probably non-exhaustive list						
Stakeholders		See section 5.3	-	Solutions are being deployed by B2C and B2G2C players, but suppliers and operators have little or no experience of a large-scale hybrid system. The market does not yet seem ripe for large-scale deployment.		See section 5.3

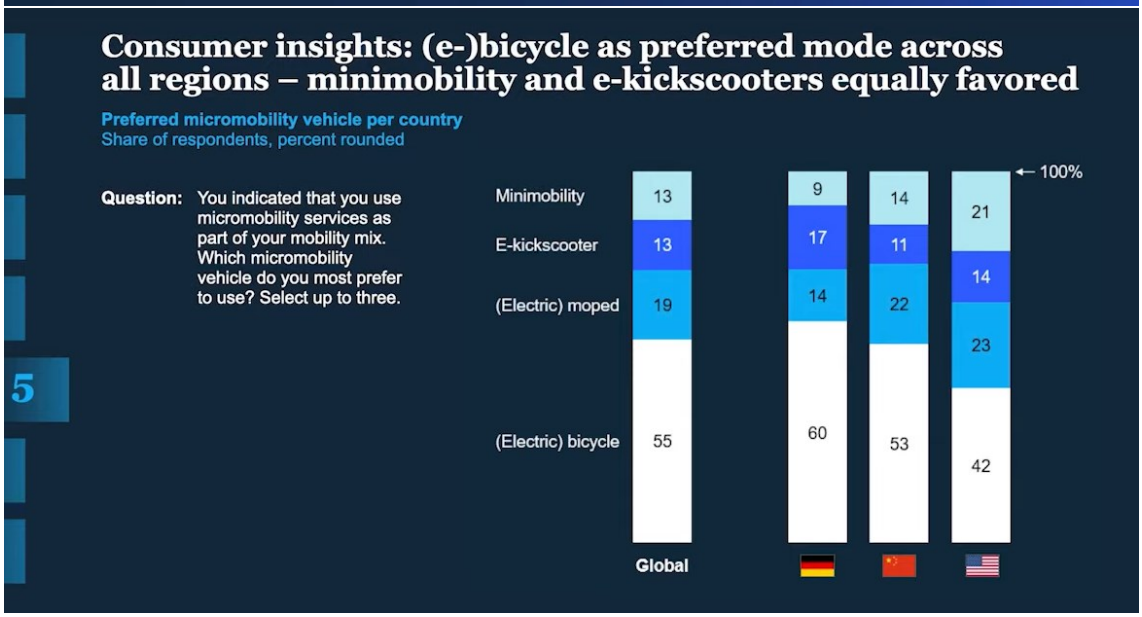
9.5 The North American market (*Source 31*)







9.6 Micromobility market trends (Source 19)



9.7 Bike share business skills

CONTRACT SUPERVISION

Contractual and legal monitoring
Field audits and mystery customers
Updating of indicators
Weekly meeting
Mirror software (Paris)
Data analysis and customer survey management
Assessments
Accounting: invoicing, penalties, bonuses

STATION LOCATIONS

Station pre-location study
Integration study for each station
Construction sites (permits, security, follow-up)
System settings
Signage

SUPPLY, LOGISTICS AND ASSEMBLY (CAPEX)

Stations
Bikes
Insurance
International logistics
Back-office IT solution
Front-office IT solution
Spare parts supply
After-sales service

SERVICE OPERATION (OPEX)

FINANCE
- Banking
- Revenue collection
- Revenue allocation

OPERATING COSTS
- Telecommunications
- Electricity
- IT maintenance
- Back office

HUMAN RESOURCES
- Hiring and management
- Key skills: electromechanics
- Wages
- Absenteeism management

COMMUNICATION
- Campaign design
- Dissemination
- Creation of a community spirit

USER RELATIONSHIP
- After-sales service and call centre
- Reception centre

BATTERY CHARGING
- Location
- Cabinet
- Security protocol

STORAGE
- Spare parts and consumables
- Inventory
- Replenishment (CAPEX)

BIKE AND STATIONS REPAIR
- On-street process
- Mobile workshop vehicle
- Warehouse process
- Quality control

BUILDING
- Warehouse
- Supplier reception
- Maintenance department

SWAPPING
- Battery swapping vehicle
- Charging structure and safety
- Battery repair and life cycle

REGULATION
- Regulation shuttle
- Operating software

EXTENSION
- New bikes
- New stations

INSURANCE
- Theft
- Vandalism/Damage
- Accident/Incident

IT
- Computer system
- IT security
- Banking transactions

9.8 Details of PB and PT integration issues

	PB - PT integration challenges	Feasibility	Comments
PEOPLE	Intermodal and multimodal users	✓	Already using one of the two modes
	Access by age	~	Different age categories
	Access by capacity	×	Blind, severely visually impaired and wheelchair users cannot ride bicycles
PRODUCTS	Use the same ticket for PT and PB	×	1. Need to identify the PB user and have a bank imprint (otherwise, risk of bike theft) 2. Need to harmonise usage times (30 min for PB, 60 min + transfer for PT)
	Use PT and bicycles with the same subscription	~	Request additional information for PB (deposit, post-payment authorisation, T&C)
	24-hour service	×	Budget and maintenance constraints for PT
PLACES	PB positioned near PT stops	~	Visibility and access time, but competition for public space between modes
	Ensure the cohabitation of pedestrians, cyclists and buses	~	Enforce the Brussels' STOP principle
	Guarantee commercial speed	~	Balance with the STOP principle?
	Improve territorial coverage	✓	PB station in the interstices of the PT network on radial routes
PRICE	Attractive combined pricing	✓	Voucher with customer number
	Special offer	✓	First trip for free
	Same PB - PT pricing, without distinction	~	To be defined, with overall price increase, but many PT products
PROMOTION	Single brand	✓	Harmonise brands
	Common or specific advertising	✓	A little advertising for the combination, a lot for each service
	Face-to-face sales	✓	Advertising for the combination, as for each service
	Partner and prescriber approach	✓	Need for the resources
	Create a sense of community	✓	

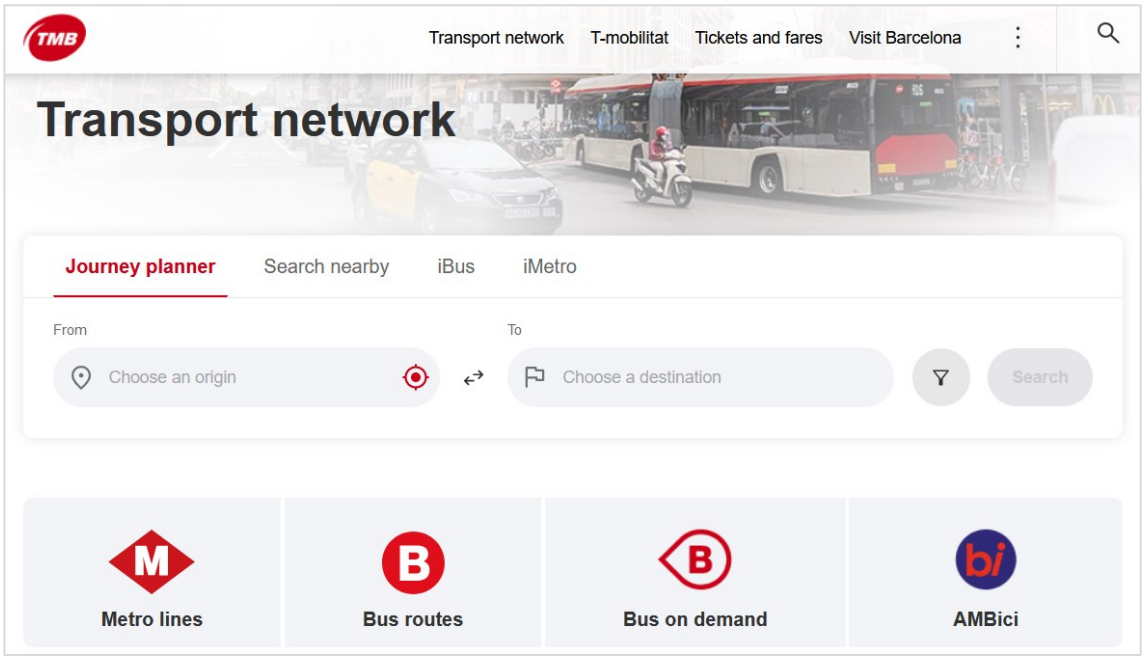
	PB - PT integration challenges	Feasibility	Comments
PROCESS			
Register	Incognito for a ticket	×	Possible for PT, not for PB
	Subscription information	~	Different information required
	Register only once	✓	One account for all modes
Obtain information	PB stops and stations	~	Limited space available on PB stations
	Website	✓	Avoid two clicks to reach the PB info
	App	✓	One common app
	With humans: agency, bus	~	Training customer-facing staff
	Real-time information	✓	GTFS and GBFS
	Route planner	✓	Displays intermodal routes.
	PT and PB network map	✓	Several map versions
	Line thermometer	✓	
	Directional signage	✓	PB indicated in metro stations
	Positioning signage	✓	Hub signage
Book	Website	×	Not possible for PT, booking rare
	Mobile app	×	Not possible for PT, possible for PB
Pay	In agency	✓	Interface adaptation
	PT vending machines and PB stations	✓	Interface adaptation
	To a third-party organisation	×	Buy a ticket on the Eurostar?
	Cash	×	Difficult for PB
	Deposit	×	Signature required, check amount available + direct debit authorisation
Access	Pre-payment - Bank imprint/transaction €0	~	Not necessary for PT
	Travel credit	~	
	Post-payment	×	PB (after journey), PT (end of day or end of month)
	Smartphone	✓	Bluetooth technology, NFC, QR code
	Season ticket	✓	Same RFID technology
	Bank card/open payment	×	Incompatible deposit amount
PROOF	Client testimonials	✓	To be found once implemented
	Actual practice data	~	Avoid the GDPR with a single common customer database and make assumptions due to lack of check out in PT
	Loyalty programme	✓	Common program, with authorisation in the same data base to track the intermodal journey

9.9 Compilation of price lists

9.9.1 Public Bicycles

Barcelona - Ambici

https://www.ambici.cat/en/



Barcelona - Bicing

https://www.bicing.barcelona/es/tarifas

	Tarifa Plana		Tarifa por uso		Abono metropolitano (Bicing + AMBici) Tarifa Plana		Abono metropolitano (Bicing + AMBici) Tarifa por uso	
	50 €/año		35 €/año		65 €/año		53 €/año	
	BICICLETA MECÁNICA	BICICLETA ELÉCTRICA	BICICLETA MECÁNICA	BICICLETA ELÉCTRICA	BICICLETA MECÁNICA	BICICLETA ELÉCTRICA	BICICLETA MECÁNICA	BICICLETA ELÉCTRICA
Primeros 30 minutos	Gratis	0,35 €	0,35 €	0,55 €	Gratis	0,35 €	0,35 €	0,55 €
30 min - 2 horas * (Fracción de 30')	+0,70 €	+0,90 €	+0,70 €	+0,90 €	+0,70 €	+0,90 €	+0,70 €	+0,90 €
A partir de 2 horas	+5€/hora	+5€/hora	+5€/hora	+5€/hora	+5€/hora	+5€/hora	+5€/hora	+5€/hora

Chicago - Divvy Bikes

https://divvybikes.com/

	Single Ride	Day Pass	Divvy	Lyft Pink
	$1 + $0.17/min	$16.50/day	$130.90/year	$199/year
	Get the app →	Get a day pass →	Join →	Join →
Classic bike prices	$1 unlock + $0.17/min	3 hours free, then $0.17/min	45 min free, then $0.17/min	45 min free, then $0.17/min
Scooter prices	$1 unlock + $0.42/min	Free unlocks + $0.42/min	Free unlocks + $0.27/min	Free unlocks + $0.27/min
Ebike prices	$1 unlock + $0.42/min	Free unlocks + $0.42/min	Free unlocks + $0.17/min	Free unlocks + $0.17/min
Bike Angels			●	●
Rideshare benefits				●

Madrid - Bicimad

https://www.bicimad.com/en/bicimad

Tarifa del contrato básico

Primera fracción de hasta 30 minutos: 0,50 €.

Segunda fracción de hasta 30 minutos: 0,50 €.

Siguientes fracciones de hasta 30 minutos: 3 €.

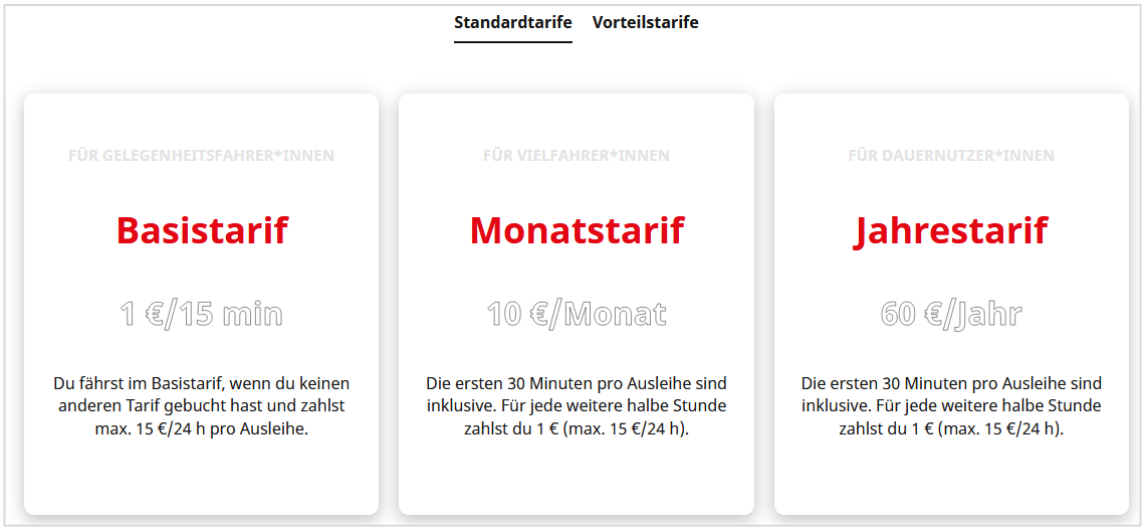
Tarifa plana 30 días

Cuota de 10 € mensuales:

- Viajes gratis ilimitados de hasta 30 minutos.
- Segunda fracción de hasta 30 minutos: 0,50 €.
- Siguientes fracciones de hasta 30 minutos: 3 €.

Cologne - KVB

https://nextbike-live.pluspol-networks.de



Dijon - Divia Vélodi

https://www.divia.fr/en/bicycle/diviavelodi/see-rates

London - Santander Cycles

https://tfl.gov.uk/modes/cycling/santander-cycles/what-you-pay?intcmp=2315

Pay as you ride - £1.65 for up to 30 minutes

- £1.65 for each additional 30 minutes

Monthly membership - £20 a month

- Unlimited rides up to 60 minutes for 30 days
- Rides longer than 60 minutes pay £1.65 for each additional 60 minutes

Annual membership - £120 a year

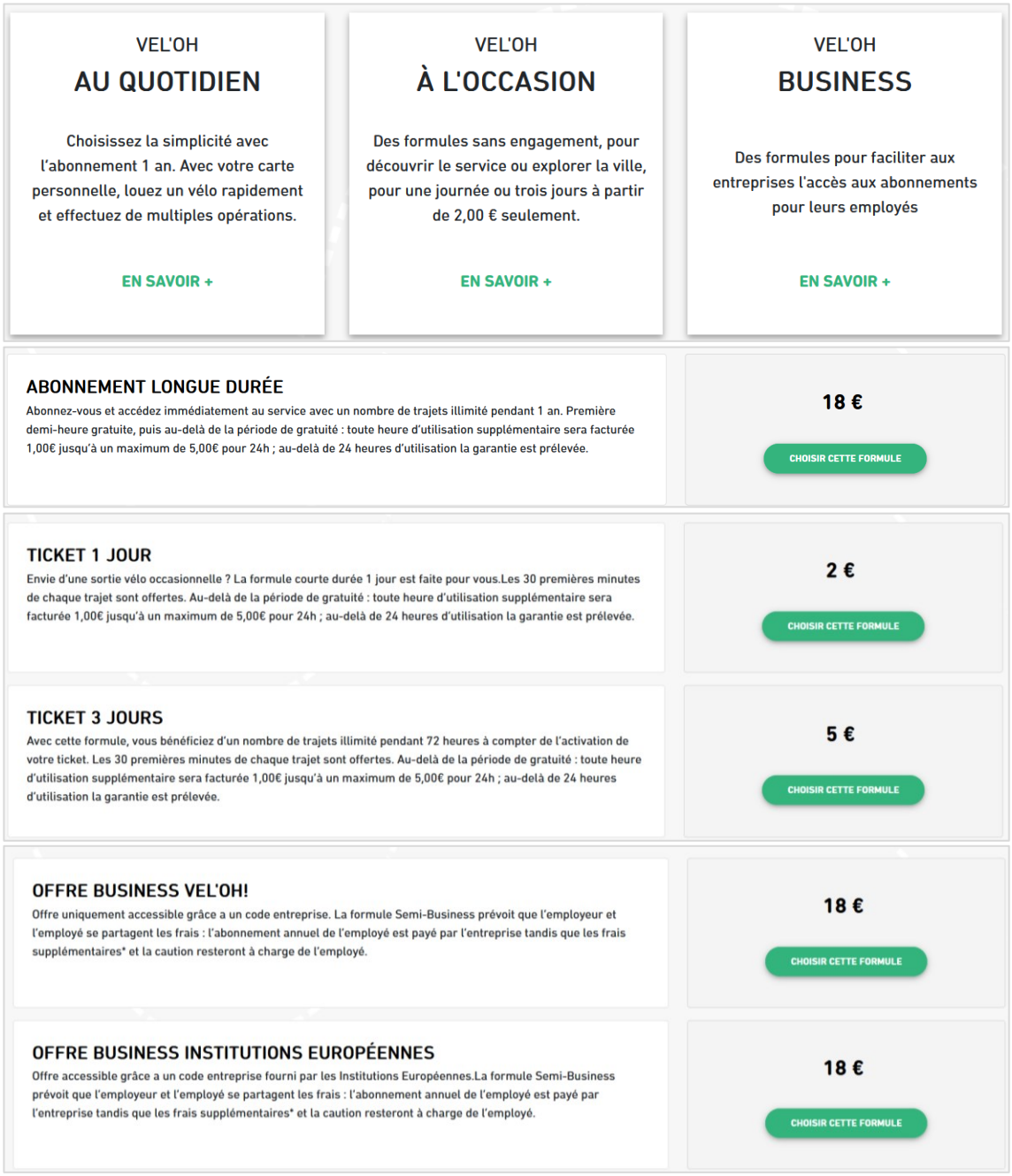
- Unlimited rides up to 60 minutes for 365 days
- Rides longer than 60 minutes pay £1.65 for each additional 60 minutes

E-bikes (users must be registered)

- £3.30 for single rides up to 30 minutes - £3.30 for each additional period up to 30 minutes
- Monthly: add a surcharge of £1 (on top of the £20 monthly membership fee) for rides up to 60 minutes - £3.30 for each additional period up to 60 minutes
- Annual: add a surcharge of £1 (on top of the £120 annual membership fee) for rides up to 60 minutes - £3.30 for each additional period up to 60 minutes
- Hire only available through the app or a membership key

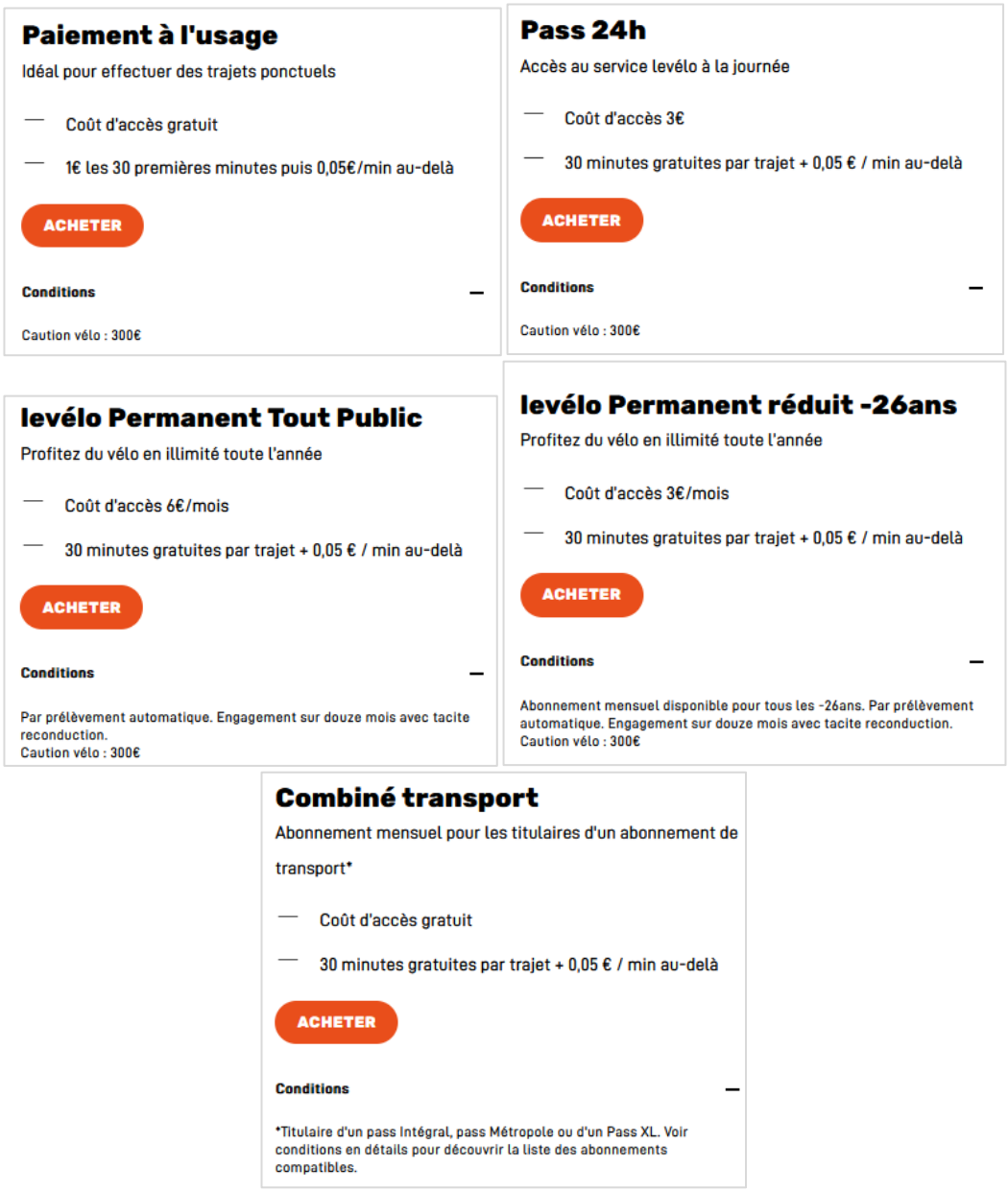
Luxembourg - Vel'oh

https://myveloh.lu/en/offers/groups



Marseille - Levélo

https://levelo.ampmetropole.fr/fr/about



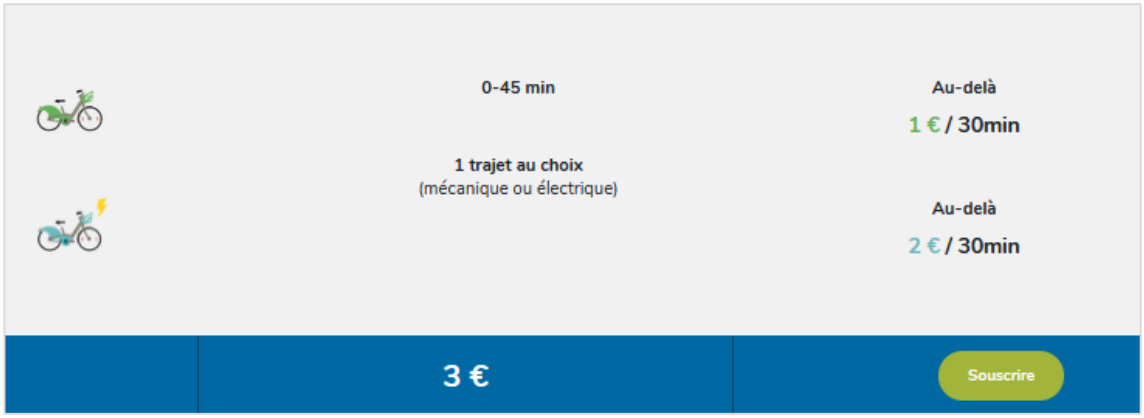
New York - Citybike

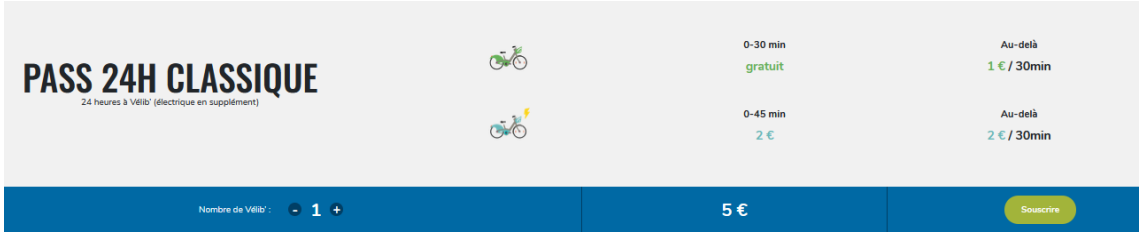
https://citibikenyc.com/pricing

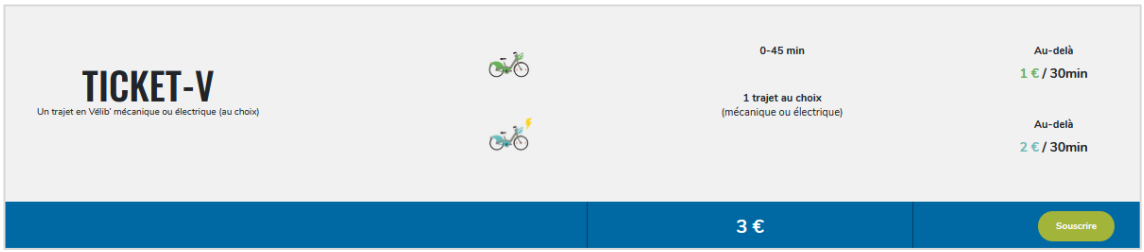
	Course unique	Laissez-passer d'un jour	Citi Bike	Lyft Pink
	4,49 $ pour 30 minutes	19 $/jour	205 $/année	199 $/an
	Téléchargez l'appli →	Obtenez un laissez-passe... →	Joignez-vous à nous →	Joignez-vous à nous →
Vélo déverrouillé	4,49 $	gratuit	gratuit	gratuit
Prix des vélos électriques	0,26 $/min	0,26 $/min	0,17 $/min	0,17 $/min
Temps de course 30 min	30 min		45 min	45 min
Bike Angels			●	●

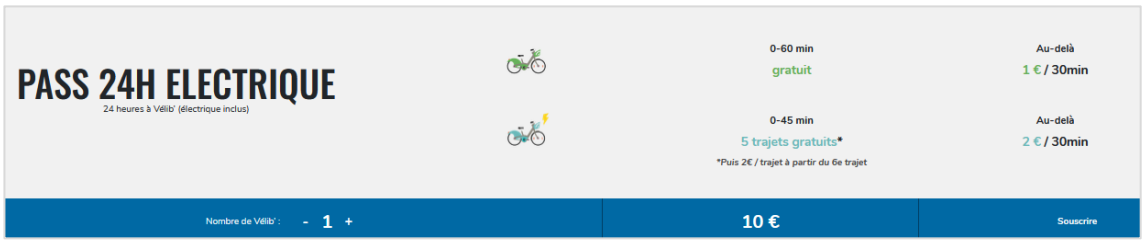
Paris - Vélib' Métropole

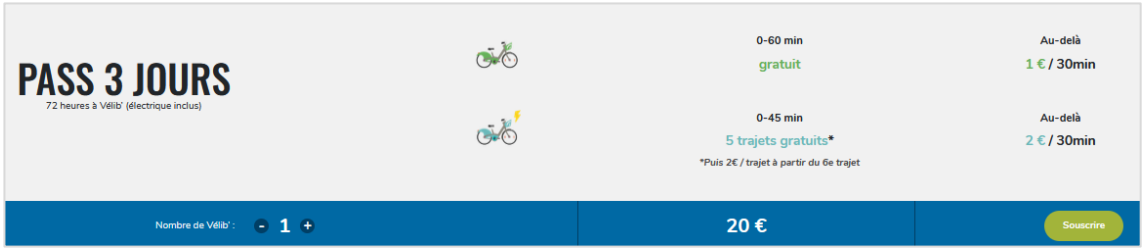
https://www.velib-metropole.fr/en

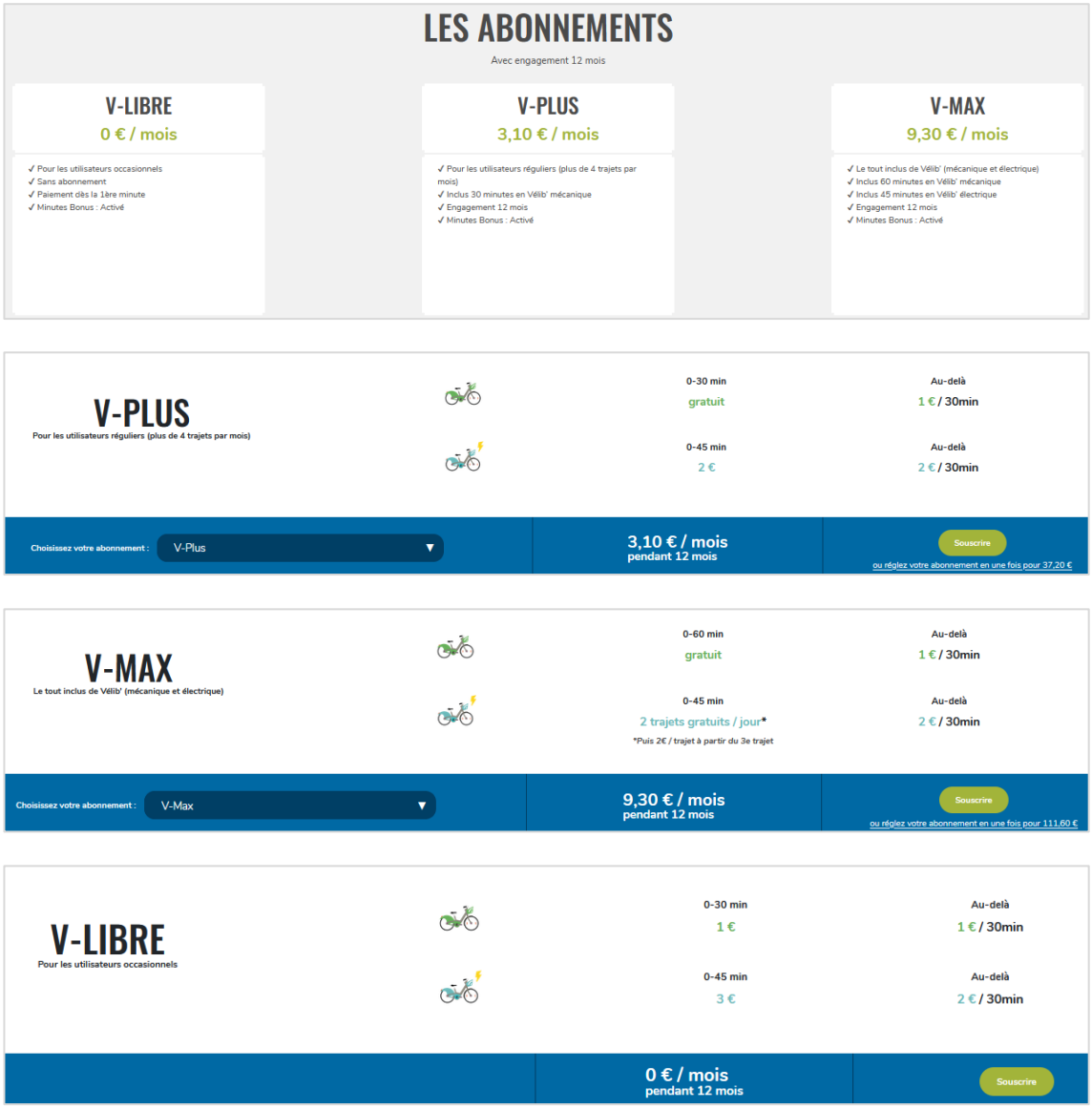

0-45 min
1 trajet au choix
(mécanique ou électrique)
Au-delà
1 € / 30min
Au-delà
2 € / 30min
3 €
Souscrire


PASS 24H CLASSIQUE
24 heures à Vélib' (électrique en supplément)
0-30 min
gratuit
Au-delà
1 € / 30min
0-45 min
2 €
Au-delà
2 € / 30min
Nombre de Vélib' : - 1 +
5 €
Souscrire


TICKET-V
Un trajet en Vélib' mécanique ou électrique (au choix)
0-45 min
1 trajet au choix
(mécanique ou électrique)
Au-delà
1 € / 30min
Au-delà
2 € / 30min
3 €
Souscrire

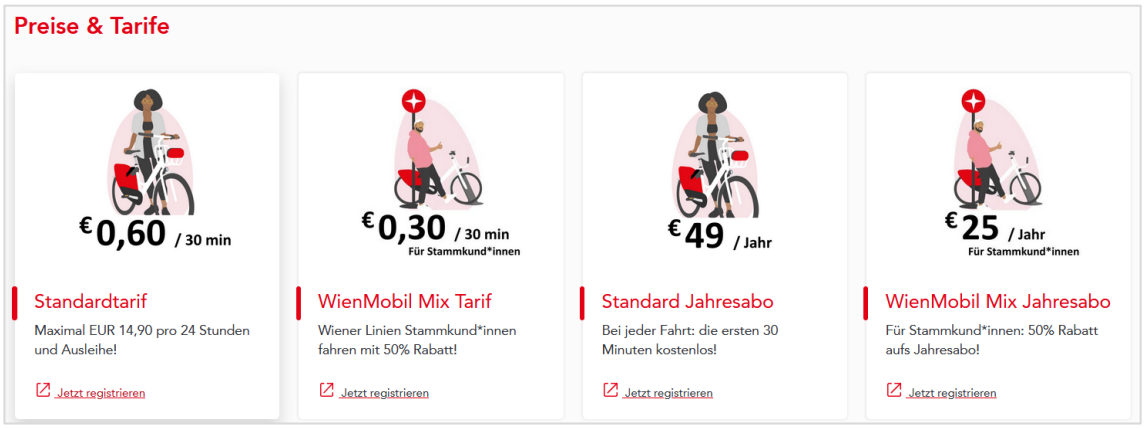

PASS 24H ELECTRIQUE
24 heures à Vélib' (électrique inclus)
0-60 min
gratuit
Au-delà
1 € / 30min
0-45 min
5 trajets gratuits*
*Puis 2€ / trajet à partir du 6e trajet
Au-delà
2 € / 30min
Nombre de Vélib' : - 1 +
10 €
Souscrire


PASS 3 JOURS
72 heures à Vélib' (électrique inclus)
0-60 min
gratuit
Au-delà
1 € / 30min
0-45 min
5 trajets gratuits*
*Puis 2€ / trajet à partir du 6e trajet
Au-delà
2 € / 30min
Nombre de Vélib' : - 1 +
20 €
Souscrire



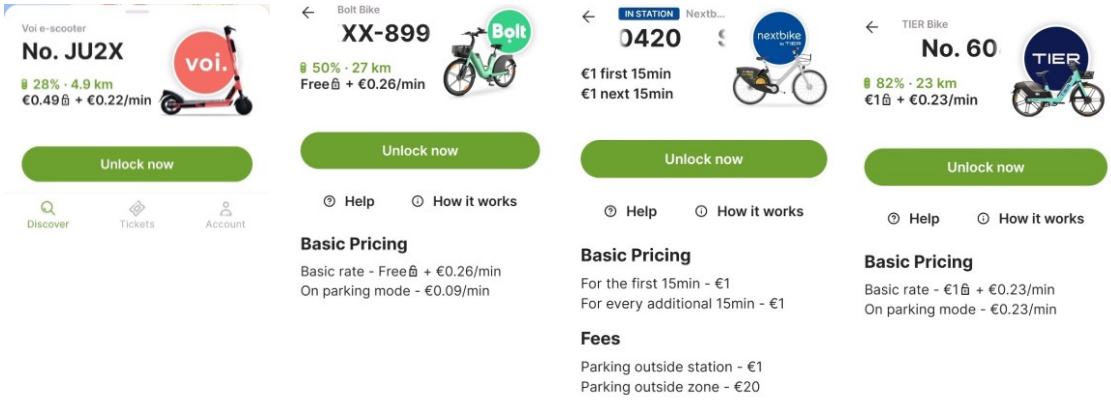
Vienna - Wien Mobil Rad

https://www.wienerlinien.at/web/wl-en

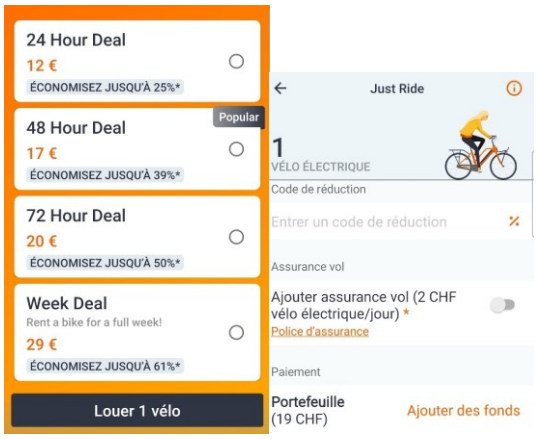


9.9.2 Private Shared Bicycles

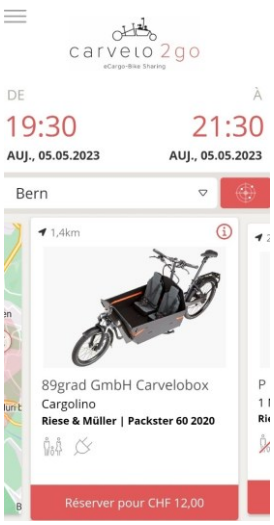
Various prices on the MaaS Jelbi app (Berlin)



Donkey Republic

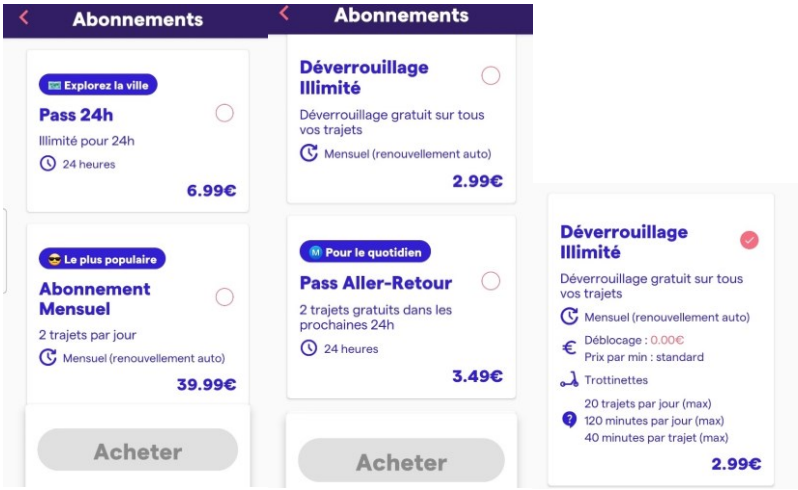


Carvélo2go

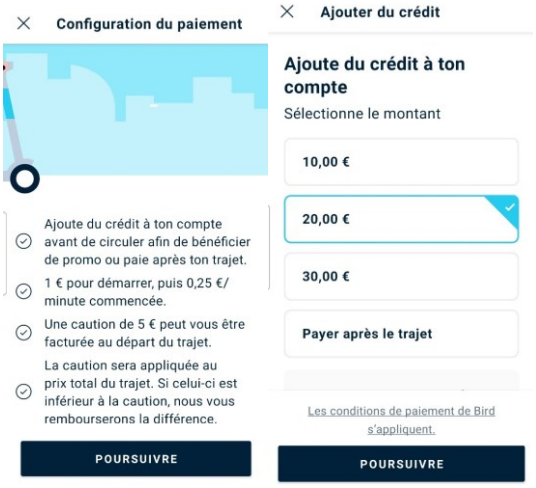


Dott

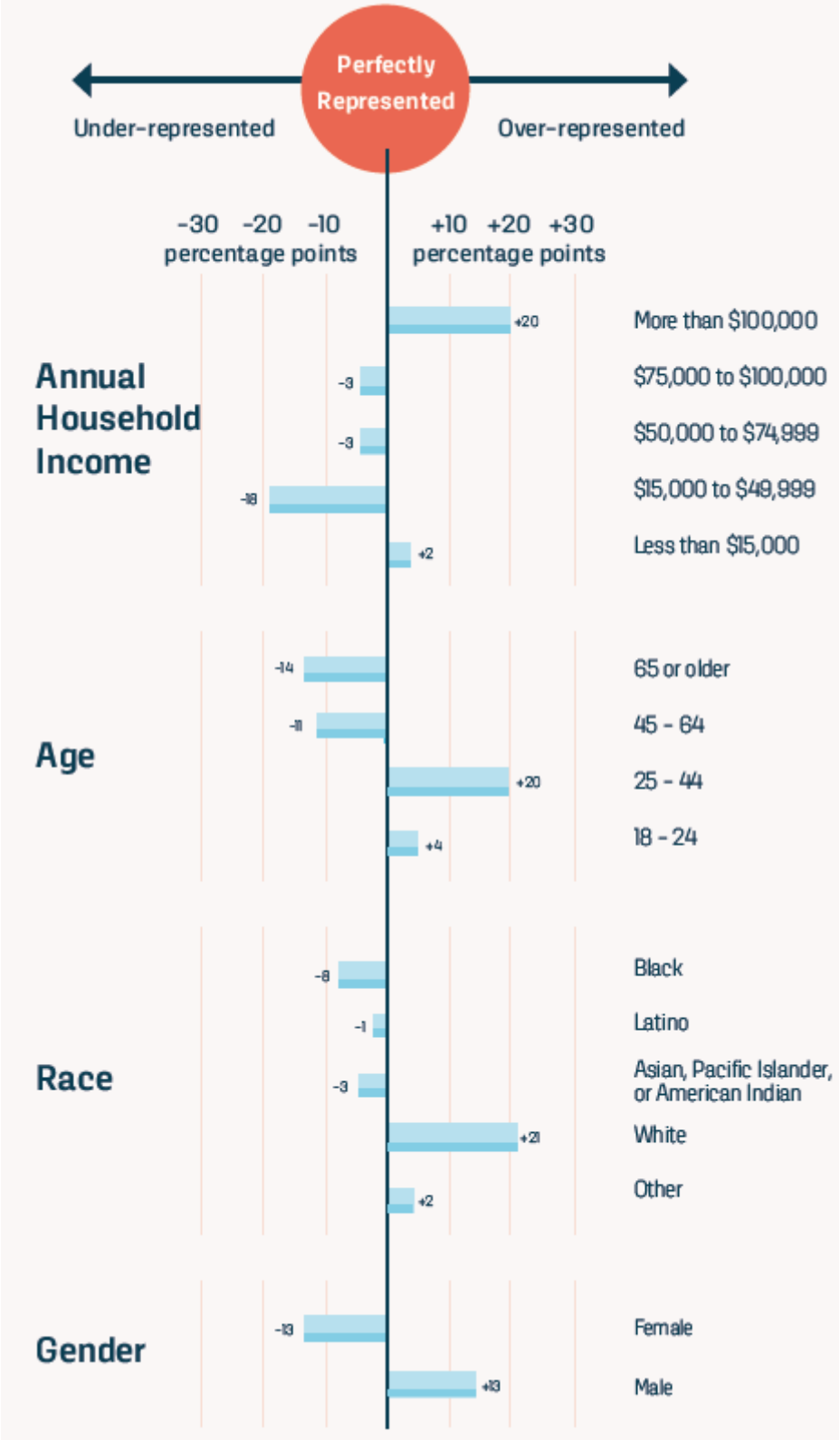
Pony



Tier



9.10 Under-representation of certain groups in North America (Source 36)



10 Table of figures

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Financing

NextGenerationEU is a temporary recovery instrument of over €800 billion to help repair the immediate economic and social damage caused by the coronavirus pandemic. Post-COVID-19 Europe will be greener, more digital, more resilient, and better adapted to current and future challenges.

The Recovery and Resilience Facility, the centrepiece of NextGenerationEU, is endowed with €723.8 billion in the form of loans and grants to support reforms and investments undertaken by EU countries. The aim is to mitigate the economic and social consequences of the COVID-19 pandemic and to make European economies and societies more sustainable, more resilient, and better prepared for the challenges and opportunities posed by the ecological and digital transitions.

The "Preparatory study for the public bicycles service of the Brussels-Capital Region in 2026: Benchmark and Recommendations" is part of these priorities established by the Brussels Government and at European level, and particularly concerns the Mobility axis and the Acceleration of MaaS deployment component. More specifically, it aims to prepare the future public bicycle service in the Brussels-Capital Region. In financial terms, "Preparatory study for the public bicycles service of the Brussels-Capital Region in 2026: Benchmark and Recommendations" will receive €197,816.75 including tax.

B Public Bicycles (PB) & Long-Term Rental (LTR) International Benchmark

April 2024

Benoît Beroud - MOBIPED

Bruno Van Zeebroeck - TML

Emanuela Peduzzi - TML

Commissioner

BRUSSELS-CAPITAL REGION

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Mobiped

Authors	Benoît Beroud (MOBIPED) Bruno Van Zeebroeck (TML) Emanuela Peduzzi (TML)
Reviewers	Christophe De Voghel (BRUSSELS MOBILITY) Mathieu Nicaise (STIB)
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Sponsor
Brussels-Capital Region | Brussels Mobility Regional Public Service
Organising Authority for Mobility
Place Saint-Lazare 2 | 1035 Brussels
https://mobilite-mobiliteit.brussels/en
Christophe De Voghel: cdevoghel@sprb.brussels

Partner
STIB-MIVB - Brussels public transport company
(Société des Transports Intercommunaux de Bruxelles –
Maatschappij voor het Intercommunaal Vervoer te Brussel)
Rue Royale 76 | 1000 Brussels | www.stib-mivb.be
Mathieu Nicaise: mathieu.nicaise@stib.brussels

Mobility research office
TRANSPORT & MOBILITY LEUVEN
Diestsesteenweg 71, 3010 Leuven | www.tmleuven.be/en
Bruno Van Zeebroeck: bruno.vanzeebroeck@tmleuven.be

Public bicycles expert
MOBIPED - Mobility of Bipeds
10 bis rue Jangot, 69007 Lyon | www.mobiped.com/en
Benoît Beroud: benoit.beroud@mobiped.com

Contents

Glossary

Cycling

BS	Bike Share (service or system)
e-PB	Public e-Bicycles (Public pedelecs)
e-SB	Shared e-Bicycles (Shared pedelecs)
GBFS	General Bikeshare Feed Specification
LTR	Long-Term (cycle) Rental
PB	Public (funded) Bicycle
SB	Shared Bicycles

Stakeholders

BCR	Brussels-Capital Region
STIB	Brussels Inter-Municipal Transport Company

Other vocabulary

ET	Excluding tax
MaaS	Mobility-as-a-Service
PSD	Public Service Delegation
PT	Public Transport

1 From bike share to public bicycles

The study's steering committee wanted to select, study and visit a number of Public Bicycles (PB) services. The consultants used a funnel approach to select the cities:

- overview of the global bike share market with services with over 1,000 bikes.
- panorama of 20 Public Bicycles (PB) services (from public initiatives) in Europe.
- qualitative benchmarking of selected services.

1.1 Bike share market global overview

According to the *Meddin Bike-sharing World Map*, by the end of 2022 there were around 2,000 public and private bike share services worldwide, representing 9 million bicycles (including 200,000 pedelecs ones) in 1,600 cities in 90 countries on five continents *(Source 13)*.

Of these, 482 bike share services, in 374 cities, had a fleet of over 1,000 bicycles *(Figure 1 and Figure 2)*. A ranking of the top 50 cities is available in *Appendix 6.1*.

Figure 1: Distribution by continent of bike share services with over 1,000 shared bicycles

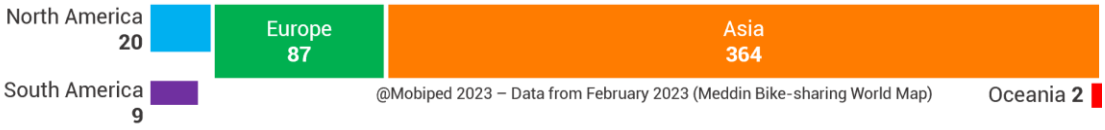
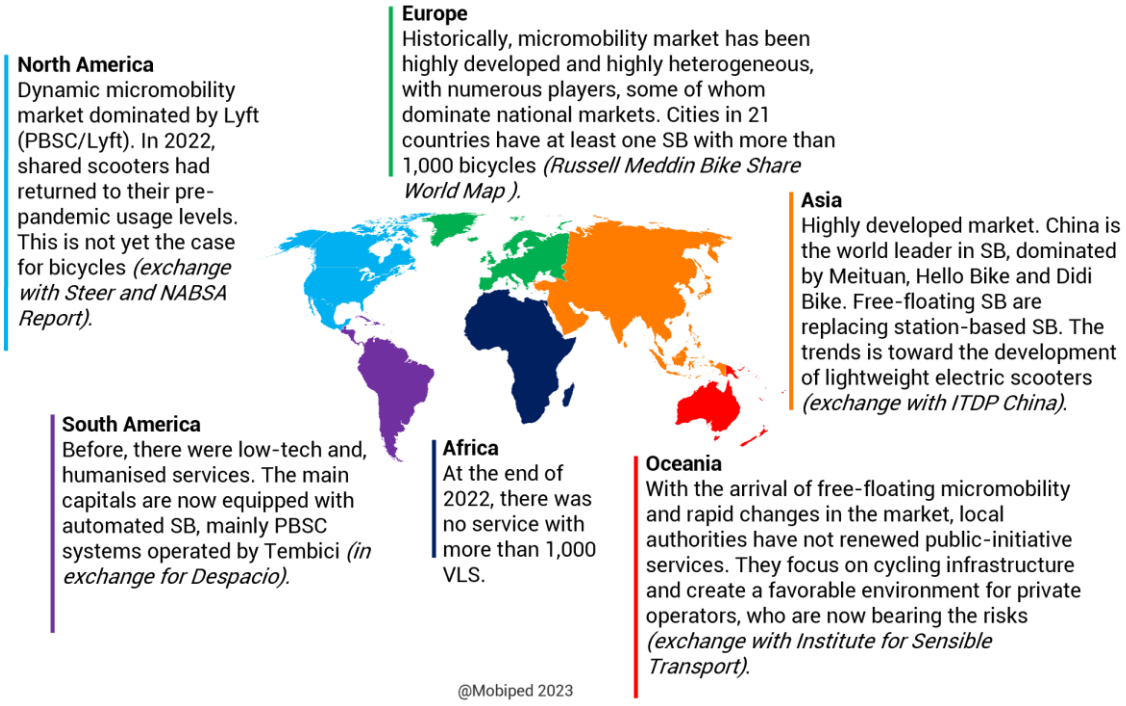


Figure 2: Overview of continental markets for cities with over 1,000 shared bicycles



1.2 Panorama of 20 European cities with Public Bicycles services

1.2.1 Data collection

Of the 87 European Shared Bicycles services with more than 1,000 bicycles, 20 Public Bicycles Scheme in 12 countries resulting from local public authority initiatives were selected as potential sources of inspiration for Brussels *(Figure 3)*. The main differentiating features of these services are listed in *Appendix 6.2*.

For each city, data was collected concerning:

- the service: name, number and types of stations and bicycles.
- the contract: players, duration, content.
- usage: annual rentals in 2022 or partly in 2023 for latest launched service.
- territorial context: population, climate, topography.
- mobility context: modal shares, private micromobility services *(Appendix 6.3)*.

Throughout the study, inspirational data gleaned from other European cities and around the world was compiled by country *(Appendix 6.4)*.

Figure 3: Map of PB services analysed in 20 European cities

1.2.2 Comparison charts

Figure 4: Fleets of pedal and pedelecs Public Bicycles Services in 20 European cities

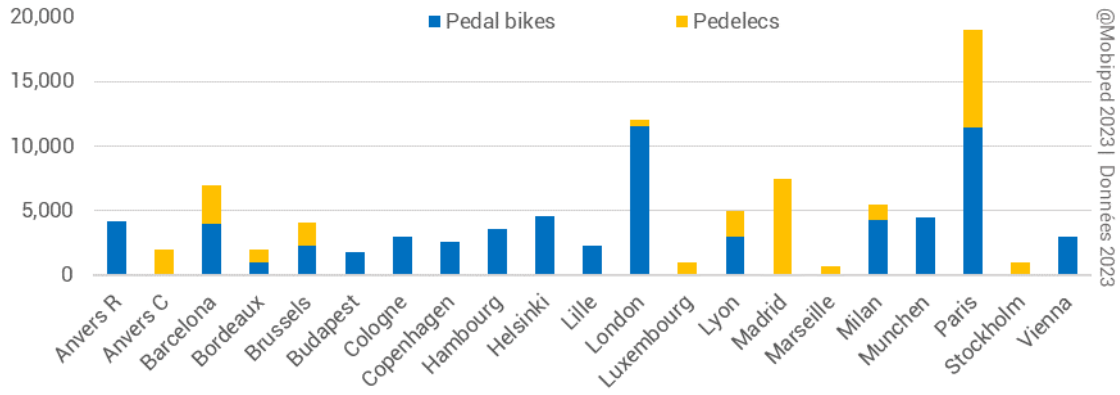


Figure 5: Annual rentals/available bikes/365 days

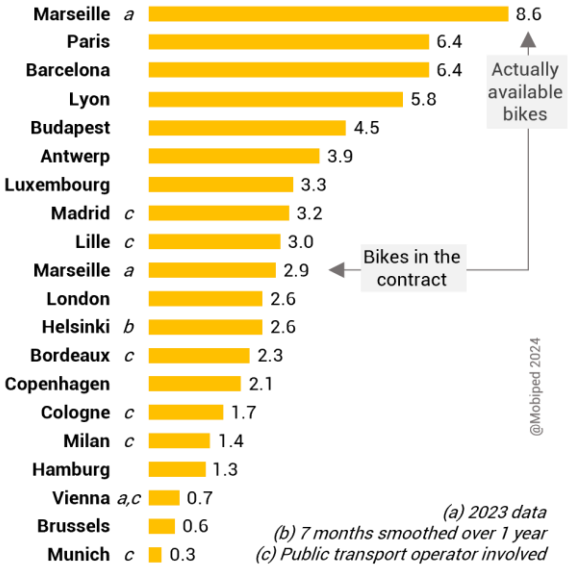


Figure 6: 2022 annual ranking of the cities with the most journeys by bike and per capita (Source 4)

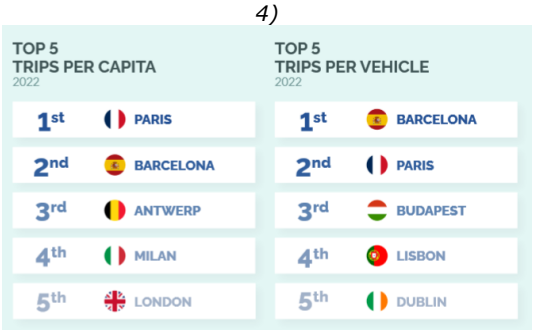
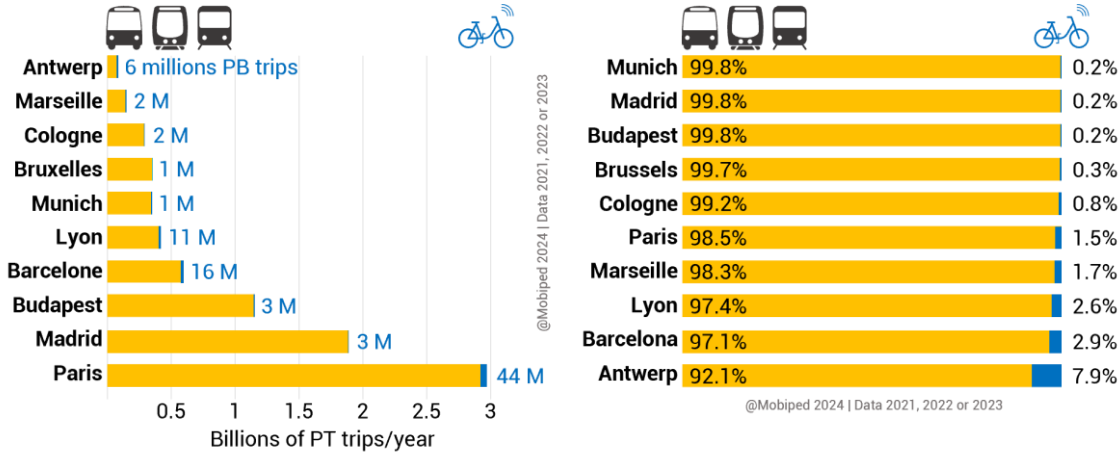


Figure 7: Trips comparison between Public Bicycles services and urban public transport networks



1.3 Detailed benchmark of 9 services in 4 European countries

To select the services to be analysed in depth, the study's steering committee weighed up the advantages and disadvantages according to:

- data collected on services.
- diversity of suppliers and operators.
- inspiration for Brussels (transition, e-PB, topography).
- study logistical considerations: schedule, existing contacts, budget, travel.
- opportunities to learn from other cities through additional exchanges and associated visits.

Nine services were studied instead of the five PB services initially planned:

- 7 PB: Antwerp City (C), Antwerp Region (R), Brussels, Budapest, Madrid, Marseille and Paris.
- 2 LTR (Long Term Bicycle Rental): Fietsambassade in Ghent and Véligo Location from Ile-de-France Mobilités (*Figure 8*).

Each service was the subject of a 15 to 20-page factsheet of varying depth (*Sources 14, 15, 16, 17, 18, 19, 20, 21*). The highlights are summarised on one page (*Appendix 6.5*). These cities are both inspiring for Brussels *(Figure 9)*, and at the same time show significant disparities from one another *(Figure 10)*. A workshop was organised in Brussels to gather public bicycles officers *(Appendix 6.15)*.

Data preamble

The data provided in the paragraphs of this report is deliberately rounded to give trends and orders of magnitude. The resulting analyses and comparisons must be made with stepback, as data may come from different years, sources, formats, calculation methods, and may vary or differ in accuracy, even when it concerns the same service.

Figure 8: Map of PB and LTR services studied as part of this benchmark

Figure 9: Benefits of each service in the Brussels context

City	Country	Service	PB	LTR	Contributions to the study	Visit
Antwerp City (C)	Belgium	Bicycle	✓		Belgian context. High-performing PB.	21/09/2023
Antwerp Region (R)	Belgium	Donkey Republic	✓		Belgian context. New regional service.	20/09/2023
Brussels	Belgium	Villo !	✓		Analysis topic.	
Budapest	Hungary	MOL Bubi	✓		Good performance. Multimodal governance.	14/06/2023
Ghent	Belgium	Fiets Ambassade	✓	✓	Belgian context. LTR and other bicycle services. Subsidised private SB.	12/06/2023 (informal)
Madrid	Spain	Bicimad	✓		Hilly territory. 100% electric launched in 2023. Operated by the bus company.	29/08/2023
Marseille	France	Levélo	✓	✓	Hilly territory. 100% electric launched in 2022 with a new technological solution.	28/06/2023
Paris	France	Vélib' Métropole	✓		Very high-performance PB, transitional experience of charging stations.	27/06/2023
Paris (Region)	France	Véligo Location		✓	Largest LTR service in the world | Supported by the mobility authority historically PT oriented.	27/06/2023

Figure 10: Diversity of services studied

Bicycle culture	From 1% bicycle modal share (Marseille) to 34% (Ghent).
Topography	Flat with hills (Paris) or undulating with hills (Marseille).
Services	6 urban PB, 1 intercity PB and 2 LTR services.
Size	From 700 bikes on-street (Marseille) to 17,000 (Paris).
Bikes	100% pedal bikes (Antwerp, Budapest) | 100% pedelecs (Madrid, Marseille) Mixed with integrated (Paris) or removable (Brussels) battery.
Performance	Rentals/bike/day from 0.67 (Brussels) to 8 (Marseille).
Contract	Same supplier-operator (Antwerp, Brussels) | Binomial supplier-operator (Marseille, Paris, Madrid, Budapest) | In-house public management (Madrid) | Revenue for the operator (Antwerp).
Service providers	Bonopark, Clear Channel, Donkey Republic, Fifteen, Inurba, JC Decaux, Nextbike, PBSC, Serveo.
Temporality	Services launched in 2009 (Brussels) or February 2023 (Madrid).
Cover	Urban discontinuities (Antwerp Region) and urban continuities (others).

2 Public Bicycles Services Benchmark

2.1 Context

Figure 11: Main contextual data for the territories analysed

	Brussels Villo !	Antwerp C Velo	Antwerp R Donkey R.	Budapest MOL Bubi 2	Madrid Bicimad 1	Marseille Levélo 2	Paris Vélib' 2
Reference year	*2022*	*2022*	*2023*	*2022*	*2022*	*2023*	*2022*
Context							
Population of conurbation or urban area	1,222,637	510,000	1,135,000	1,774,000	6,780,000	1,903,173	5,200,000
Population of the main city	188,737	510,000	510,000	1,774,000	3,300,000	870,321	2,100,000
Administrative area	163 *Region*	204 *City, port*	1 207 *Région*	525 *City*	606 *City*	241 *City*	402 *Greater Paris*
Density (inhabitants/km²)	7,505	2,500	940	3,379	5,446	3,611	12,935
Topography	Flat, Hilly	Flat	Flat	Flat, Hilly	Flat, Hilly	Hilly	Flat, Hilly
Mobility							
Bicycle (modal share)	9.3%	32.0%	28.0%	2.0%	0.6%	1.0%	2.3%
Public Transport (Millions of journeys/year)	338	71	n.c.	1,135	1,861	121	2,920

2.1.1 The territory

Population: the city of Marseille is the most similar to the Brussels Region. The city of Antwerp is clearly smaller. The other cities or territories are clearly larger. However, the area of PB coverage is often different from that of the administrative boundaries (*see 2.1.1*).

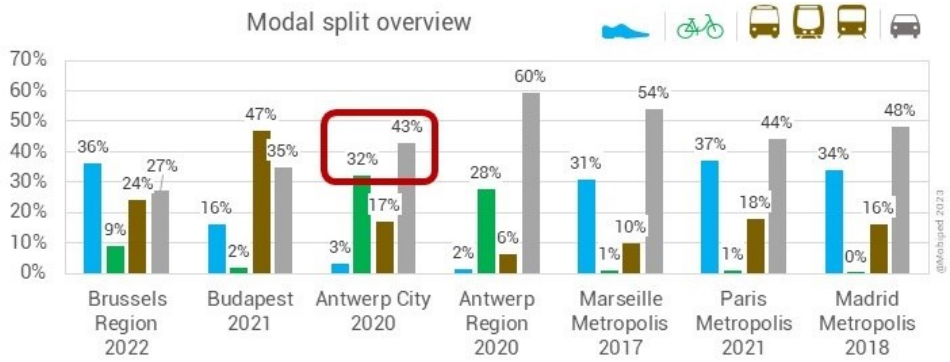
Topography: with the exception of Antwerp, the territories are undulating or hilly.

Density: population density partly determines the potential for PB use. The density is very high in the Greater Paris, at almost 13,000 inhabitants/km². Brussels and Marseille are next with +7,500 inhabitants/km². The Antwerp Region has the lowest density. The density of Antwerp City is artificially low because it includes the port of Antwerp. Budapest also has a relatively low density due to its very large administrative boundaries.

2.1.2 Modal shares

The modal shares below are the result of heterogeneous territories and methods (e.g. intra-regional travel in Brussels and home-to-work travel in Antwerp). While precise comparisons are pointless, orders of magnitude awaken the critical senses. It should be noted that the modal share of bicycles was 0.6% in the city of Madrid and 4.3% for commuting in Greater Paris in 2020.

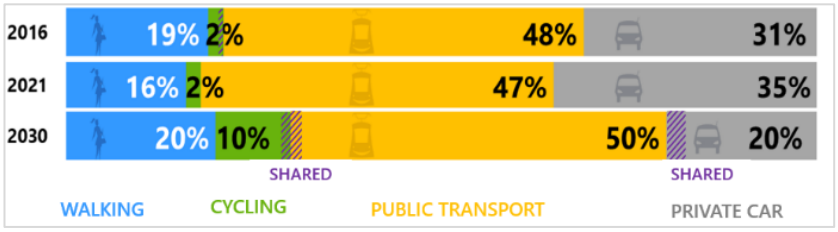
Figure 12: Modal shares of different modes in the 7 regions



Percentage of shared mobility in modal share

Budapest now includes shared mobility in its modal share projections.

Figure 13: Budapest modal share projections include shared mobility (BKK, 2022)



No correlation between high bicycle modal share = low car modal share

A frequent objective of mobility policies is to increase the modal share of cycling in order to reduce that of cars. But there seems to be no correlation:

- in Antwerp, cycling accounts for 32% of commuting journeys and driving 43%, with walking representing a much smaller share than in other areas.
- in Budapest, cycling accounts for 2% of journeys, and cars 35%. The modal shares of walking and public transport are high.
- in Brussels, the increase in the modal share of bicycles goes hand in hand with a decrease in that of cars between 2010 *(Beldam)* and 2022 *(OVG 6)*. Of the cities surveyed, Brussels has the lowest car modal share, as well as the smallest surface area.

Surveys show that, in the absence of bike share, the vast majority of journeys would have been made on foot or by public transport (*Source 2 and 9*). Beyond bike share, modal shifts are generally taking place between walking, public transport and cycling, and less so with cars. To reduce the modal share of the car, it is essential to reduce the attractiveness of car use (*Source 12*). Parking is a key factor in the car modal choice, especially in city centres where alternatives are becoming more credible. For commuting, the measures with the greatest impact on car use involve the car itself *(Figure 14)*.

Figure 14: Impact of measures on modal choice for commuting in Belgium (Source 27)

Mesure	Impact
Gratuité des transports en commun	+8 % T.C.
Abri couvert pour vélos	+34 % vélo
Parking sécurisé pour vélos	+16 % vélo
Campagne de sensibilisation au vélo	+23 % vélo
Emplacements de parking réservés aux covoitureurs	+120 % covoiturage
Base de données interne sur le covoiturage	+56 % covoiturage
Indemnité kilométrique pour véhicule privé	+6 % voiture
Voitures de société	+13 % voiture
Carte carburant	+15 % voiture
Plan de déplacements d'entreprise	-11 % voiture
Parking payant pour les travailleurs	-4 % voiture
Organisation d'une action de sensibilisation sur la mobilité	-5 % voiture
Coordinateur de mobilité	-5 % voiture

2.1.3 Cycling policy budget per capita

The Brussels-Capital Region invests €13/inhabitant/year, Marseille €17 and the City of Paris intramuros €20/inhabitant/year, not including Vélib' Métropole and Véligo Location.

2.2 The service offer

The analysis of the PB service offer covers the system itself (stations, terminals, bicycles), territorial coverage and pricing *(Figure 15 and complete table in Appendix 6.6)*.

Figure 15: Key figures for the PB service offer

	Brussels Villo !	Antwerp C Velo	Antwerp R Donkey R.	Budapest MOL Bubi 2	Madrid Bicimad 1	Marseille Levélo 2	Paris Vélib' 2
Reference year	*2022*	*2022*	*2023*	*2022*	*2022*	*2023*	*2022*
Public Bicycles System						*06.2023*	
Stations	345	303	430	178	264	155	1,443
With parking hook	*345*	*303*	*0*	*0*	*264*	*155*	*1,443*
Géofences	*0*	*0*	*430*	*178*	*0*	*0*	*0*
Stations in theory	345	303	430	190	264	200	1,450
Parking slots (nb)	8,435	9,600	0	0	6,336	3,100	45,476
Bikes in the contract	5,000	4,200	2,150	2,060	3,000	2,000	20,000
Bikes availables	4,103	4,200	2,150	2,060	2,964	700	17,019
Pedal bikes	*2,303*	*4,200*	*300*	*2,060*	*0*	*0*	*10,258*
Pedelecs	*1,800*	*0*	*1,850*	*0*	*2,964*	*700*	*6,761*
Territorial coverage							
Residents concerned	1,222,637	480,000	1,135,000	909,301	1,500,000	870,321	5,200,000
Perimeter area (km²)	132	80	1,368	61	51	84	442
Area 150m radius (km²)	24	19	19	13	n.c.	13	89
Average distance between to nearest stations (m)	387	289	710	313	n.c.	350	277
Pricing					*Pedelecs*	*Pedelecs*	*Pedelecs*
Monthly subscription	€3.0	n.c.	n.c;	€2.7	n.c.	€6.0	€9.3
Yearly subscription	€36	€58	€600	€23	€25	€72	€112

Ratios focusing on supply enable to position Brussels in relation to other urban PB, and to distinguish the intercity PB from the Antwerp Region *(Figure 16)*, with corresponding graphs *(Appendix 6.7)*.

Figure 16: Key service offer performance ratios

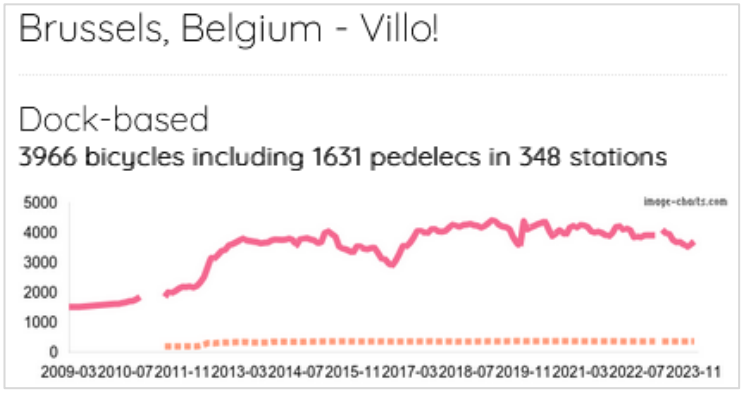
Offer performance ratio	Urban PB	Brussels	Antwerp R	Annexes
Bikes/Station (theoretical)	10 - 14	14	4	6.7.1
Parking slots/bike	2 – 2.7	2	not known	6.7.2
Parking slots/station	20 - 32	24	4	6.7.3
Contractual bikes nb/km² (System area)	24 - 59	38	2	6.7.4
Contractual bikes nb/km² (Administrative area)	4 - 50	31	2	6.7.5
Inhabitants/Contractual bikes nb	114 - 500	245	528	6.7.6
Stations/km² (System area)	2.4 – 5.2	2.7	0.3	6.7.7

2.2.1 Bikes

Number of bikes: In theory, there are around 2,000 bikes in Budapest and Marseille, 5,000 in Brussels and Antwerp, 3,000 in Madrid (7,500 for Bicimad 2) and 20,000 in Paris. However, fewer bikes are available on the ground, as part of the fleet is undergoing maintenance, or the service has still not been delivered one or several years after launch (Marseille, Paris).

While the number of bikes available for rental changes daily *(Figure 17)*, it represented an average of 82% of theoretical *Villo !* in 2022.

Figure 17: Number of publics bicycles available for rental from 2009 to 2023 (Source 30)



Accessories: each service has its own inspiring features *(Figure 18)*.

Figure 18: Several inspiring features (photos: B. Beroud | Overflow: SAVM)

Real-time information (PBSC - Madrid)

Name and phone holder (Donkey - Ghent)

Removable battery (JC Decaux - Villo !)

Connected padlock (Nextbike - Budapest)

Not to seat wheel guard (PBSC - Madrid)

Handle under saddle (Donkey - Antwerp R)

Overflow (Smoove - Paris)

Private naming (Nextbike - Budapest)

Advertising space (JC Decaux - Villo !)

De-electrified station (Budapest)

Stacking charging (Fifteen - Marseille)

Repair racks (Fifteen - Marseille)

Bicycle type *(Figure 19)*: Antwerp City (Vélo) and Budapest only have pedal bikes. Madrid and Marseille are 100% pedelecs. Paris and Antwerp Region have a mix of pedal bikes and pedelecs. In Paris, the frame is identical but colour-coded to distinguish them. In Brussels, some of the bicycles can be electrified, which require a removable battery to launch the assistance. This system encountered technical problems and did not find a wide audience. The service generations show the evolution of the bicycles *(Figure 19)*.

Figure 19: Share of pedal and pedelecs bicycles in each service

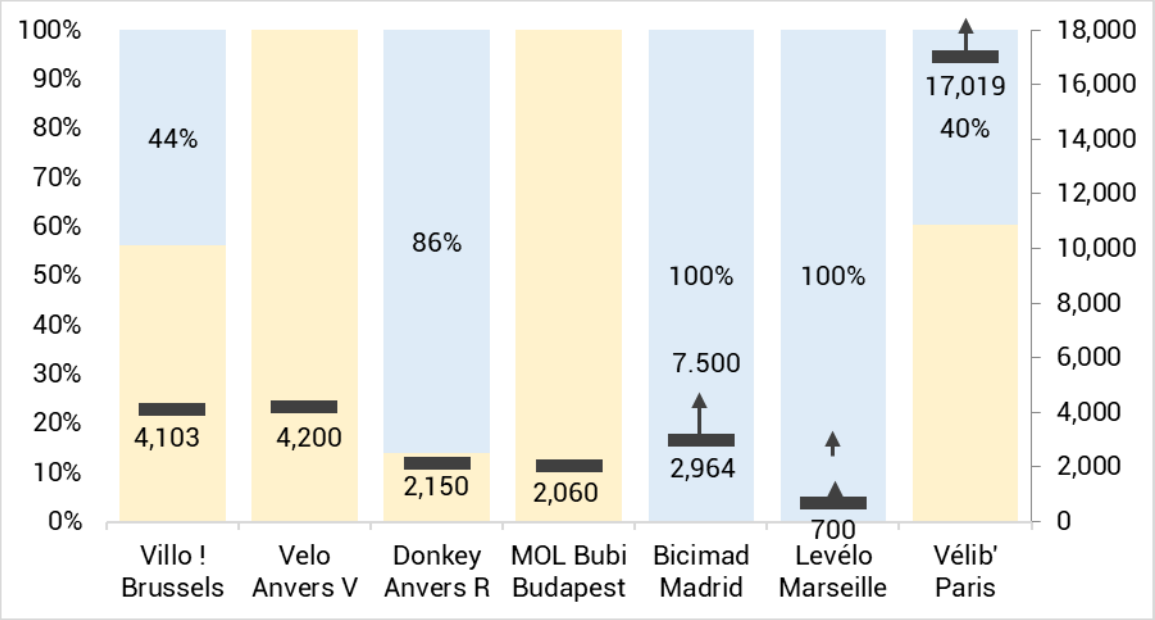
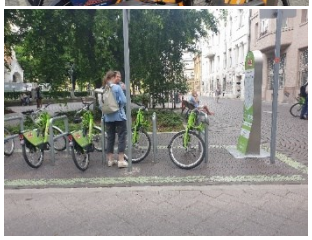
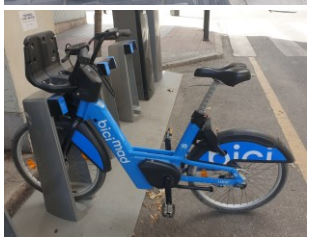
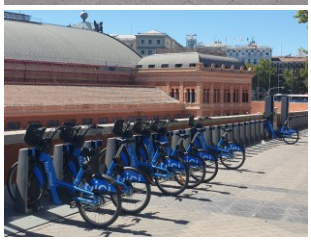
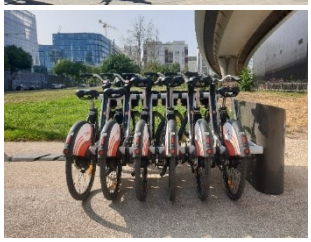


Figure 20: Photos of public bikes generations and current stations

System	Version 1	Version 2	Parking
Villo ! Brussels		Response in 2026	
Velo Antwerp City		Response in 2027	
Donkey Republic Antwerp Region		Not applicable	
MOL Bubi Budapest			
Bicimad Madrid			
Levélo Marseille			
Vélib' Paris			

Photos: MOL Bubi 1 - BKK | Bicimad 1 - madridesnoticia.es |
Donkey Republic station - M. Nicaise | Others - B. Beroud

2.2.2 Stations

There are around 1,450 stations in Paris and a few hundred in other services. Bicimad 2 in Madrid will have over 600 stations. The figures are shown on the maps on the following page.

2.2.2.1 Type of station

Heavy non-charging station: Brussels (JC Decaux) has individual in ground parking slots, with an identification terminal, a map and often advertising space. Antwerp City (Clear Channel) has smaller on-street stations, but they are not walk-through.

Heavy charging station: Paris (Smoove) has individual in-ground parking slots. In Madrid (PBSC), slots are now integrated into platforms with less civil engineering, facilitating rapid installation at a rate of eight stations/day. The stations are equipped with an identification terminal. Heavy-duty stations reduce the risk of bike theft.

Light charging station: Marseille (Fifteen) is based on a stacking system that reduces the need for civil engineering. The bikes are linked by magnets (frame and rear wheel) through which the power passes. However, incorrect handling by a user prevents proper connectivity and bother charging. This is particularly detrimental as the user has no choice but to take the bike at the end of the line. The possibility of snatching the bike is accepted, as a stolen bike quickly becomes unusable. Budapest (Nextbike), with the installation of a connected padlock on the back of the bike and the use of smartphones, has made the old heavy-duty stations obsolete. The equipment has been retained without the electronics and remains a dedicated parking.

Ground markings: Antwerp Region (Donkey Republic) has no stands, as the service relies on smartphones, connected padlocks and battery swapping. Spaces are marked out on the ground and immaterialised in geolocated zones via GPS. Initially, 12% of bikes were parked outside drop zones. Awareness campaigns and fines have led to a 5% reduction.

2.2.2.2 Station locations

Paris, Marseille and Madrid indicated that they have located and sized stations based on territorial analyses of potential travel zones. Stations in mixed-use areas balance themselves out, with people coming and going all day. In districts without an activity mix, or remote areas, commuter flows unbalance the distribution of bicycles, probably requiring a logistical rebalancing of bicycles from one station to another.

2.2.2.3 Pedestrian access to stations

The low density of stations in Brussels is also reflected in the fact that the average distance between two neighbouring stations is 387 metres, significantly higher than in other services *(Figure below)*. This distance is 191 m in Mexico City *(Source 6)* and less than 280 m in Barcelona. While the results are impacted by the presence of a few non-central stations (Marseille and Paris), the density of stations and the distance between them have an impact on walking times from the departure point/to the final destination, as well as the distances to be covered in the event of empty/full stations. The Antwerp regional service has an average distance of 710 metres. The density of stations over the surface area of the system (light green on the map next page) is 3.8 stations/km² in Antwerp, 3.3 in Paris and 2.6 in Brussels.

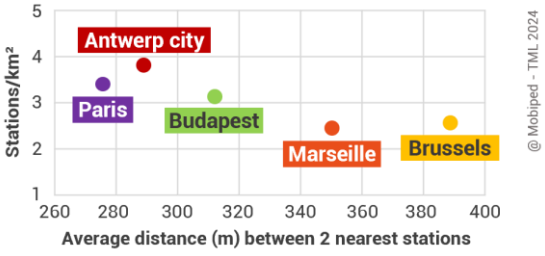


Figure 21: Analysis of "station density" and "average distance between two nearest stations" for urban PB systems

2.2.2.4 *Coverage and spatial accessibility of station networks*

Two surface areas are used to estimate the coverage of PB stations networks:

- **system area** (convex hull) within a perimeter drawn around the furthest stations (light green), including areas without stations in the case of isolated stations. The surface area of the Brussels service is 10 times smaller than that of the Antwerp Region, three times smaller than that of Paris, but twice as big as that of Antwerp, Marseille and Budapest.
- **station surface area**, within a radius of 150 m (white) or 300 m (blue) around each station. Madrid and Paris cover more territory than Brussels. But Brussels is the only service not to have a 150 m station density in the city centre (light-blue spots overlapping with a dark-blue circle), clearly reducing its attractiveness. The data is shown in *Figure 15*. The low density of stations in Brussels was already visible in 2013 *(Appendix 6.8) and 2016 (Source 2).*

A

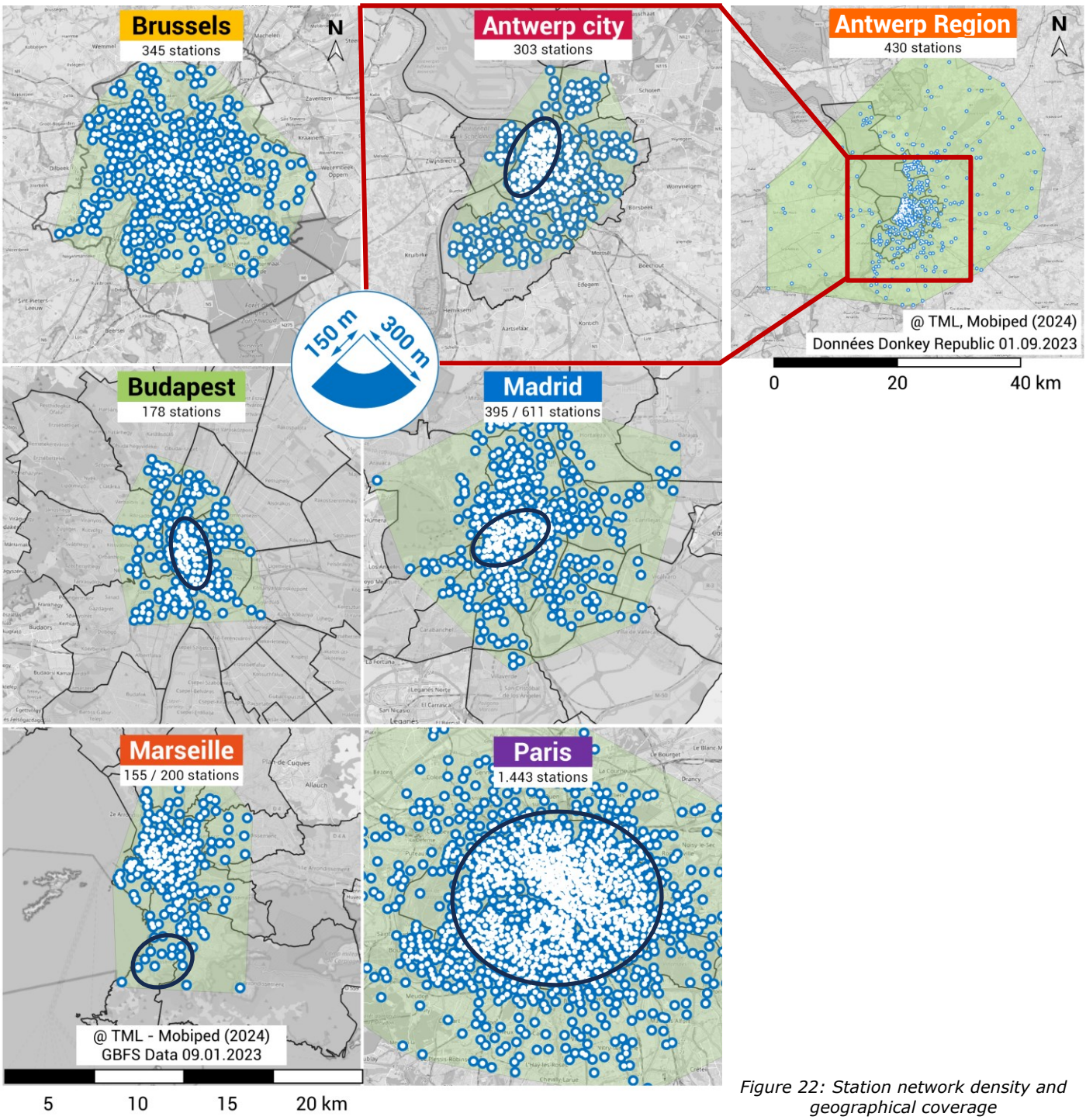
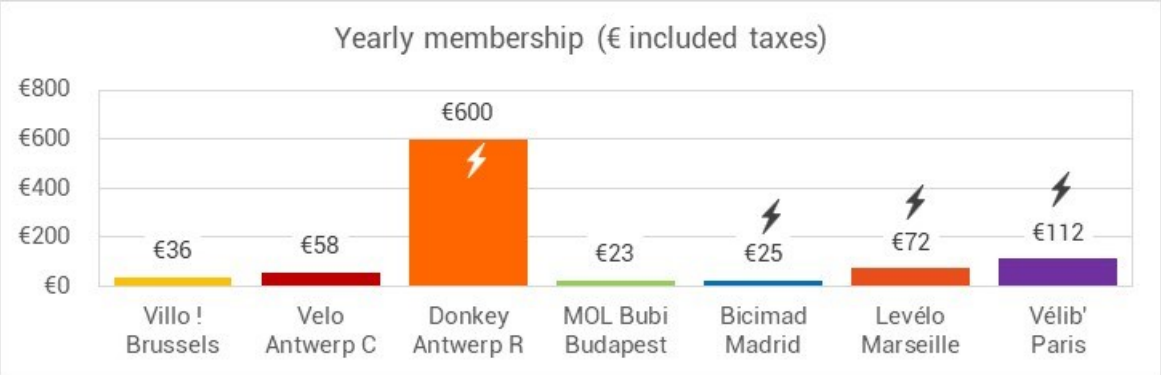


Figure 22: Station network density and geographical coverage

2.2.3 Price accessibility

2.2.3.1 Subscription

Annual subscriptions are generally very affordable. Brussels' pedal annual subscription (€36, €42 since March 2023) is in the lower bracket with Budapest (€23) compared to Antwerp's PB (€58). The annual pedelecs subscription is €25/year in Madrid, €72/year in Marseille and €112/year in Paris. Public transport subscribers enjoy discounts in Marseille (free) and Madrid (€15/year). To prevent misuse by meal delivery services in Paris, a €1 charge is levied from the third rental within 24 hours.

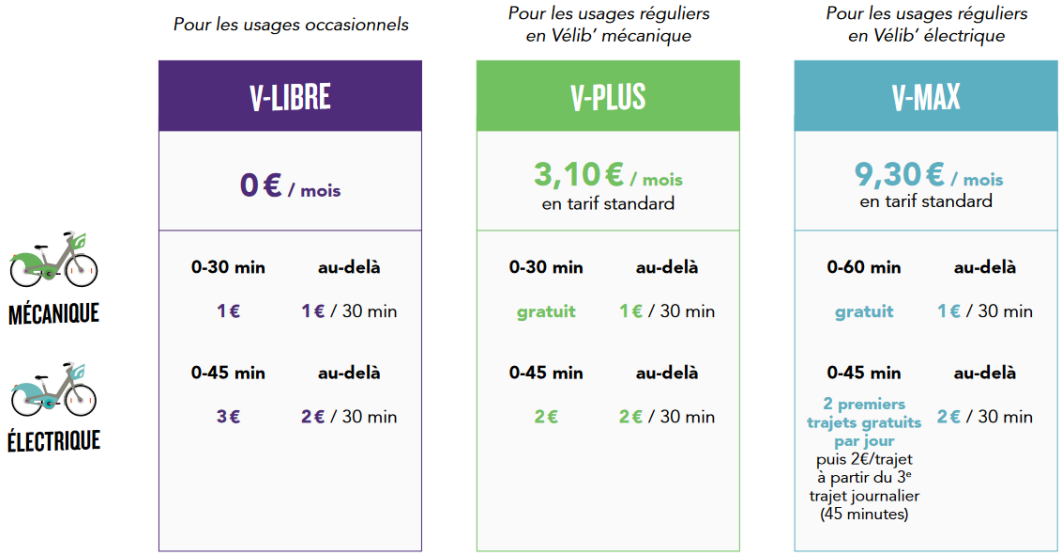


2.2.3.2 Usage and specificity

Use is free of charge for the first half-hour on all urban services, then charged by the minute or by time slots, with increasingly high deterrent prices. Donkey Republic offers Pay-as-you-Go pricing, from a few minutes to a few months, with a decreasing hourly rate and packages based on the number of journeys. The user pays €600, equivalent for 400 journeys of 30 minutes. This is more or less equivalent to a round trip every working day of the year.

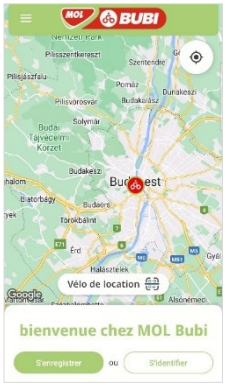
Figure 23: Donkey Republic Pay-as-you-Go price range (2023)

Figure 24: Vélib' price range (2023)

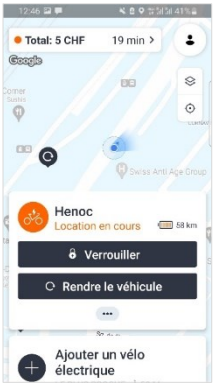


2.2.4 Ticketing support: apps predominate

Most systems offer the option of paying by debit card at the terminal (Antwerp, Paris, Brussels) or using a public transport card (Brussels, Budapest, Marseille, Paris, Madrid). Smartphone apps are becoming the main interface for unlocking/locking the bike and obtaining information on the journeys made.



Nextbike app white label (Budapest)



Unlocking/locking from app + battery life in km (Donkey Republic - Geneva)

End-of-journey validation, assessment and GPS tracking (Fifteen – Marseille)

2.2.5 Communication - The example of Budapest

Budapest, which considers it easier to communicate on a service than on an infrastructure, has a very effective communication strategy aimed at all audiences from 8 to 80 years of age. It contributes to a sense of belonging and pride, thus limiting vandalism. BKK clearly communicates to motorists, helped by having an oil company name the service; this has the merit of targeting motorists at petrol stations *(photos below BKK)*.

Motorists are also cyclists

Advertising at petrol stations

Planning document

2.2.6 Bicycle distribution thanks to regulation shuttles

Around 250 bikes are moved every day for regulation purposes in Budapest, 800-900 in Brussels, 970 in Paris and 1,166 in Antwerp, where half the workforce is dedicated to regulation. In Marseille, regulation is carried out by two teams in the morning (6am-2pm), two in the afternoon (2-10pm) and two at night (10pm-6am). Regulations depend on a number of parameters (shuttle capacity, regulation times and duration, number of warehouses, warehouses distances, functionality of movements between regulations between two stations versus return-to-depot functionality, internal organisation). The following ratios should be considered as orders of magnitude *(Appendix 6.9)*:

- Stations/shuttle: around 30 in Antwerp, Paris and Marseille, 60 in Brussels and 90 in Budapest.
- System area covered per shuttle: one shuttle covers an average of 31 km² in Budapest, 22 in Brussels, 17 in Marseille, 10 in Paris and 8 in Antwerp.

After one year of operation, Marseille noticed that stations previously empty with pedal bikes now tend to overflow with pedelecs bikes. However, the service still lacks the hindsight to know the extent to which this impacts regulation needs and inherent costs.

Orders of magnitude for human resources and regulation/repair volumes are given in *Appendix 6.10*.

2.3 Trips

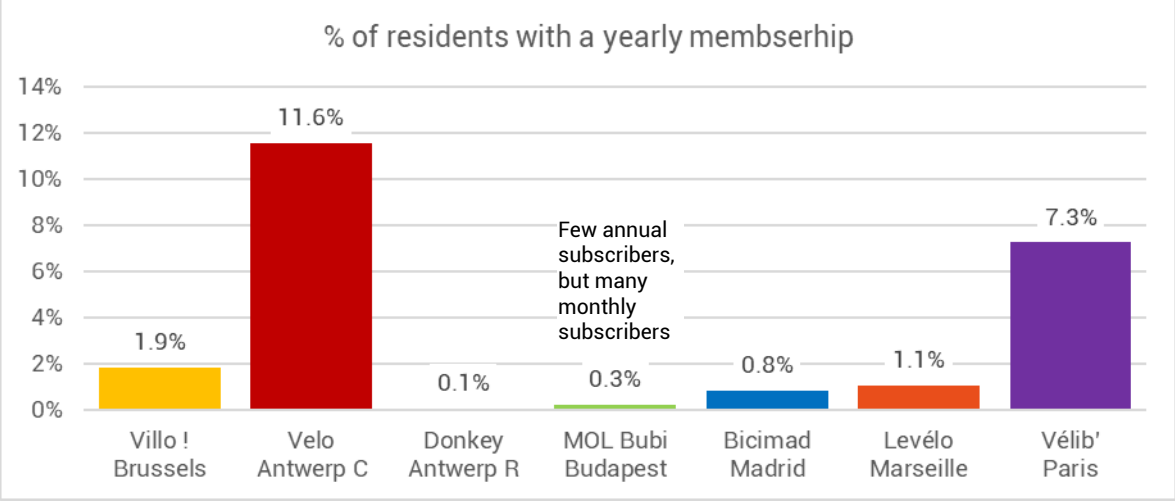
The trips analysis focuses on rental data, users *(Figure 25)* and modal choice.

Figure 25: Key demand and usage data

	Brussels Villo !	Antwerp C Velo	Antwerp R Donkey R.	Budapest MOL Bubi 2	Madrid Bicimad 1	Marseille Levélo 2	Paris Vélib' 2
Reference year	*2022*	*2022*	*2023*	*2022*	*2022*	*2023*	*2022*
PB Demand							
Annual rentals	997,826	6,028,472	364,000	2,791,509	3,412,000	2,197,135	44,202,115
Members (nb)							
Membres >1 month	*18,861*	*59,000*	*n.c.*	*4,447*	*56,746*	*20,000*	*378,000*
Users< 1 month	*45,272*	*90,965*	*n.c.*	*351,102*	*0*	*37,000*	*708,886*
Main users	Higher education (74%) Male	Higher education (75%) Male	Leisures trip Foreigners	Higher education (72%)	Higher education Male	n.c.	Male (58%)
Average length / trip (km)	1.9	2.3	8.6	2.0	2.6	3.2	Pedal : 2.8 Pedelecs : 3.8

2.3.1 Subscribers and users

Annual subscribers: there are around 380,000 long-term subscribers in Paris, 60,000 in Antwerp, 56,000 in Madrid (a number that exploded with the new Bicimad 2, with free travel during the transition and election phase), 20,000 in Brussels and 5,000 in Budapest. As Budapest has a lot of monthly subscribers and few annual ones, comparisons are not relevant. In relation to the number of inhabitants served by the service, 11.6% of Antwerp residents have an annual season ticket, 7.3% in Paris, 1.5% in Brussels, 1% in Marseille and Madrid. In relation to the number of theoretical bikes, there are 19 annual subscribers/bike in Paris and Madrid, 14 in Antwerp, 10 in Marseille and 4 in Brussels. In Brussels, 10% of *Villo !* subscribers live outside the Brussels Region.



Short-term users: in Marseille, more rentals (60%) are made with short-term tickets than with season tickets. As this is a new service, it may be a way of testing it without commitment. In Brussels, short-term rentals account for 10% of all rentals.

Profiles: as observed elsewhere *(Source 6 and 23)*, there is an over-representation of men and high-school graduates. The Antwerp regional system attracts large numbers of foreign tourists (20%). In Paris, social tariffs account for 30% of subscribers, and 4 out of 5 want to renew their subscription.

2.3.2 Number of rentals

Annual rentals: in 2022, Paris generated more than 44 million (M) annual rentals, with only rentals lasting more than 3 minutes counted. Next came Antwerp City with 6 M rentals, Madrid 1 with 3.4 M for 3,000 bikes (+7 M for Bicimad 2 in 2023), Budapest 2.8 M, Marseille 2.2 M, Brussels 1 M and 0.4 M for Antwerp Region (*Appendix 6.11.1).*

Annual rentals per inhabitant: the number of inhabitants served by the PB service is difficult to identify due to the partial coverage of the service in relation to administrative boundaries. The total population of the city was used, or only the districts served, if known. On average, a resident uses a public bicycles 0.8*/year in Brussels, 3*/year in Budapest, Madrid and Marseille, 9*/year in Paris and 13*/year in Antwerp (*Appendix 6.11.2).*

Turnover rate (trips/bike/day): the turnover rate is the main indicator of an PB service's performance. However, the announced results rarely specify the calculation method, which can lead to widely varying interpretations (*Figure 26*). It is prudent to use the number of annual rentals to smooth out any seasonal variations, and to distinguish between the number of bicycles on the ground available for renting and the number of theoretical/contractual bicycles (*Figure 27*). Concerning the number of bicycles available for renting, the turnover rate was close to 9 in Marseille in 2023, 6 in Paris, between 3 and 4 in Antwerp, Budapest and Madrid, and 0.55 in Brussels in 2022 *(Figure 28).* It seems that Madrid, with its new service, achieves very high turnover rates. The expansion of services generally results in lower turnover (Antwerp, Brussels). Paris boasts a high population density and a large number of stations. Antwerp Region has a lower turnover rate in 2023 than the other territories, due to a larger area, lower station density and a higher price range.

Figure 26: Diversity of parameters which could be used to calculate turnover rates

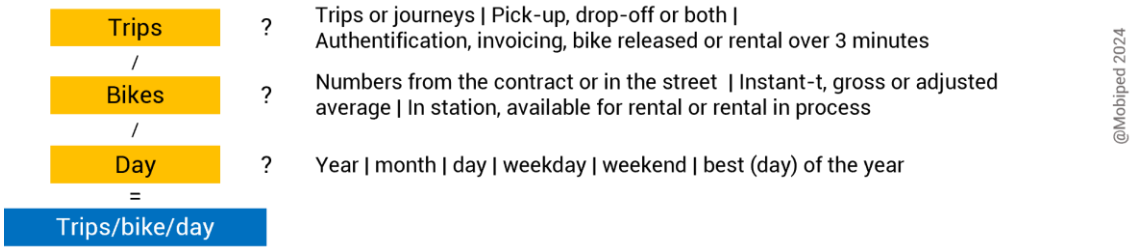


Figure 27: Rentals/bike/day (contract bikes and theoretical bikes)

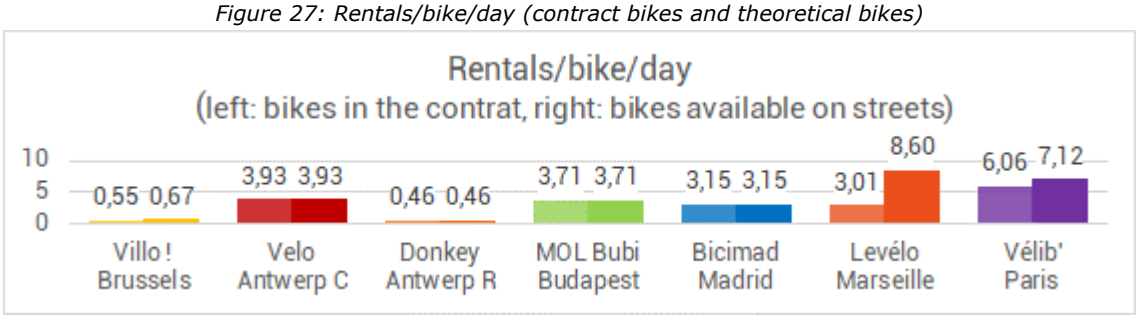
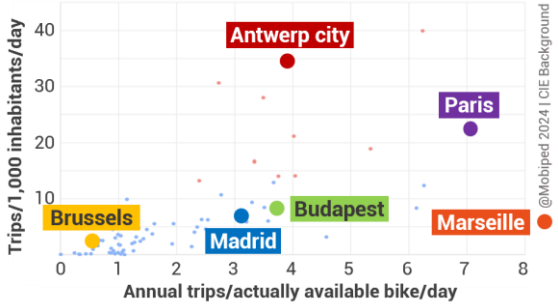
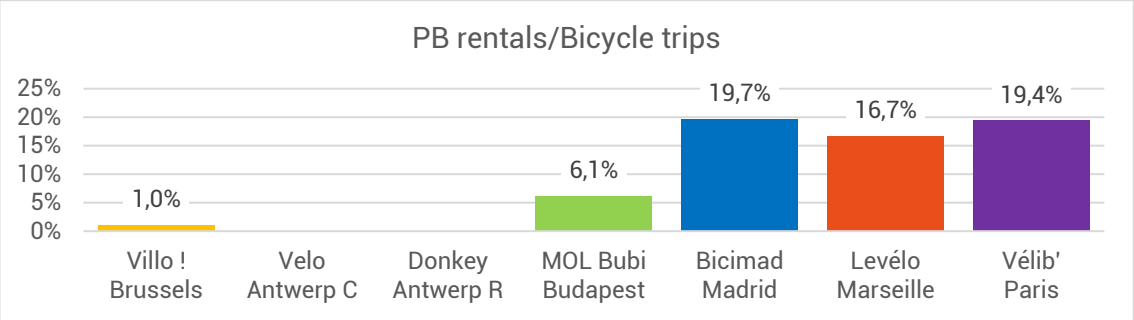


Figure 28: Rentals/1,000 inhabitants vs. rentals/bikes on the ground/day (background: CIE with all bike sharing data combined [3])



2.3.3 PB contribution to bicycle trips

Number of trips: PB accounts for 20% of all bicycle trips in Paris and Madrid, 17% in Marseille, 6% in Budapest and 1% in Brussels. As the number of bicycle trips in Antwerp is unknown, the ratio could not be calculated.



Counting/Observation: the manual counts carried out by Pro Velo in Brussels indicate that 2% of the bicycles counted are *Villo !* bikes. In Paris, Vélib' accounted for 25% of bicycles in 2022, compared with 45% in 2014. In Madrid and Marseille, the Brussels delegation saw very few personal bikes (apart from those used to deliver meals), and almost all the bikes they did see were Bicimad ones.

2.3.4 Mobility practices

Distances, times and speeds: the distance covered between two stations with a pedal bike is 2 km in Antwerp, 2.8 km in Paris with a pedal bike, 3 km in Marseille with pedelecs and 3.8 km in Paris with pedelecs. In Antwerp Region, Donkey bikes cover an average of 8.3 km (25% cover more than 10 km), probably more for occasional and leisure journeys. 90% of rentals are Pay-as-you-Ride. In Paris, pedelecs are over-used compared with pedal bikes.

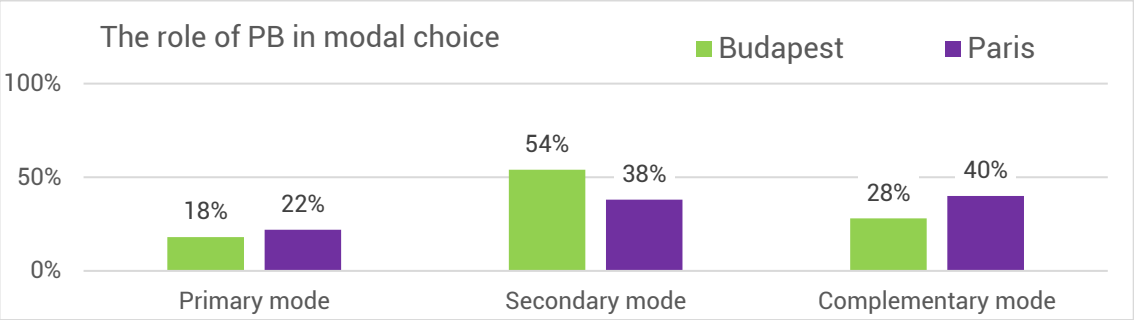
Figure 29: Overuse of pedelecs to pedal Vélib'

	Pedal bikes	Pedelecs
% of fleet	60%	40%
Turnover rate	5.5	9.6
Average distance (km)	2.8	3.8
Average time (min)	14.7	17
Average speed (km/h)	11.2	13.4

Number of rentals	20,514,140	23,687,975	44,202,115
Distance cycled	57,439,592	90,014,305	147,453,897

Travel practices

In Paris and Budapest, PB is the main mode (choice number 1 for all journeys) for 20% of users. For 80% of respondents, PB is part of a multimodal package.



2.4 Governance

Figure 30: Governance elements of the PB systems studied

	Brussels Villo !	Antwerp C Velo	Antwerp R Donkey R.	Budapest MOL Bubi 2	Madrid Bicimad 1	Marseille Levélo 2	Paris Vélib' 2
Governance							
Contracting authority	Région de Bruxelles-Capitale	Ville d'Anvers	Lantis pour la Région des Transports d'Anvers	BKK (Agence de mobilité)	Ville de Madrid	Métropole Aix-Marseille-Provence	Syndicat Mixte Autolib' Vélib' Métropole
System provider	JC Decaux	Clear Channel	Donkey Republic	Nextbike	Bonopark & Booster-bikes (Bicimad 2 : PBSC)	Fifteen	Fifteen (ex-Smoove)
Service operator	JC Decaux	Clear Channel	Donkey Republic	Csepel	Bonopark -> EMT	Inurba	Smovengo

2.4.1 PB objectives not evaluated

Each city authority has its own objectives, often linked to the promotion of more sustainable mobility *(Appendix 6.13)*. These objectives may be generic (promoting multimodality, offering an alternative to the car, facilitating new forms of mobility) or targeted (encouraging modal transfer in Brussels, reducing car use in Budapest, attracting new users in Paris and Marseille).

But none of these objectives seem to have been qualified using the SMART (Specific, Measurable, Achievable, Realistic and Time-bound) method. As a result, the assessment of goal attainment cannot be quantified, verified, questioned or validated.

2.4.2 Stakeholders

Public Authority/Contracting organisation: apart from the Lantis agency for the Antwerp Transport Region, the ordering institution for the other territories is the metropolitan public authorities.

Supplier: all the systems studied are solutions from private companies: Bonopark, Clear Channel, Donkey Republic, Fifteen/Smoove, JC Decaux, PBSC, Nextbike.

Operator: only Bicimad in Madrid is an in-house public management. The others are operated by private service providers: Clear Channel, Csepel, Donkey Republic, Inurba, JC Decaux, Serveo, Smovengo. Clear Channel and JC Decaux have historically been both suppliers and operators. Donkey Republic, too, but the technical solution is limited to connected bikes and does not include proprietary dock-based stations.

2.4.3 Governance model and contract duration

Governance model: Antwerp, Paris and Brussels launched a tender combining the provision and operation of the service. Budapest 1 and Madrid 2 acquired part of the system using European funds. Budapest 2 launched an invitation to tender for the operation. The City of Madrid entrusted the operation to its bus transport authority.

Contract duration: contracts generally last more than ten years, sometimes with extensions initially planned or linked to an amendment such as a territorial extension (Brussels, Antwerp Region). However, Budapest has a shorter contract whose duration corresponds to the depreciation period of the bicycles, which is five years. Bicimad 2 in Madrid has a three-year contract with PBSC-Serveo for the supply and installation of the equipment. This licence can be extended for a total of 12 years.

2.4.4 Market supervision

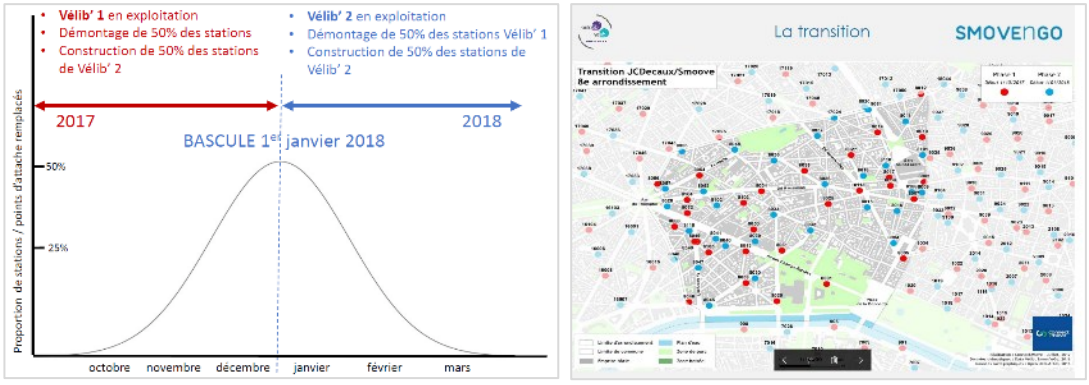
Contract monitoring: Paris has a highly structured monitoring system with follow-up meetings (weekly for operations and bimonthly for service quality), field audits agreed by both parties (10% of stations/month, +20,000 bicycles/year), a user committee, indicators for 164 contractual obligations and, above all, a replica of the operator's IT system (operations management, maintenance, outsourced user relations centre, back-office) that enables it to carry out its own analyses and take a critical look at the data supplied by the operator. Budapest regrets the absence of MBS data for its own analyses.

Human resources: in Brussels, Antwerp City, Antwerp Region and Marseille, there is around one FTE equivalent within the public authorities to monitor the operational side of PB, but the main PB contact person is often in charge of other bicycle topics. In Budapest, there are six FTEs (two in the planning and four in the field). In Paris, SAVM is a structure dedicated to PB with around 20 FTEs, including one director, one study coordinator, one operations coordinator, four field agents, one data analyst, one statistician/cartographer, two in communications, etc.

2.4.5 Transition between two contracts

The transition between two services represents a real challenge, in which the role of the local electricity grid operator is key. Budapest closed the service for several months. Madrid interconnected the old and new systems to ensure continuity of service and offered the service for free, initially for five months, extended to 11 months. Marseille is still awaiting full contractual deployment, several months after the initial delivery date. Paris has gradually brought the two systems together, but the transition has been tricky at the organisational, political and industrial levels for a number of reasons *(Appendix 6.5.7)*.

Figure 31: Transition program in Paris in 2017 and 2018 (SAVM)



2.4.6 Financial data (Investment + Operations)

Key financial data are shown in the table below.

Figure 32: Key financial data for PB services

	Brussels Villo !	Antwerp C Velo	Antwerp R Donkey R.	Budapest MOL Bubi 2	Madrid Bicimad 1	Marseille Levélo 2	Paris Vélib' 2
Price paid by the local authority (€ public excl. VAT)							
€/year	€0.0 M	€4.4 M	€1.6 M	€2.2 M	€11.5 M	€3.9 M	€51.4 M
€/bike/year	0 €	€1,048	€724	€1,046	€3,821	€1,950	€2,571
Revenue (assumed Excl. VAT)							
€/year	€0.63 M	€4.00 M	n.c.	€1.19 M	€3.00 M	€1.00 M	€25.35 M
Beneficiaries	Operator	Operator	Operator except 10 %	Authority	Operator	Authority	SAVM : 70-85% Smovengo : 15-30%
Coverage rate	n.c.	48%	66%	55%	39%	26%	49%
Remaining cost (€ exc. VAT/bike/year)							
€/year	n.c.	€4.40 M	€1.56 M	€0.96 M	€8.46 M	€2.90 M	€26.06 M
€/bike/year	n.c.	€1,048	€724	€468	€2,821	€1,450	€1,303
Ratio (€ public excl. VAT)							
€/trip	n.c.	€0.73	€4.28	€0.35	€2.48	€1.32	€0.59
€/km travelled	n.c.	€0.32	€0.50	€0.17	€0.95	€0.41	€0.18

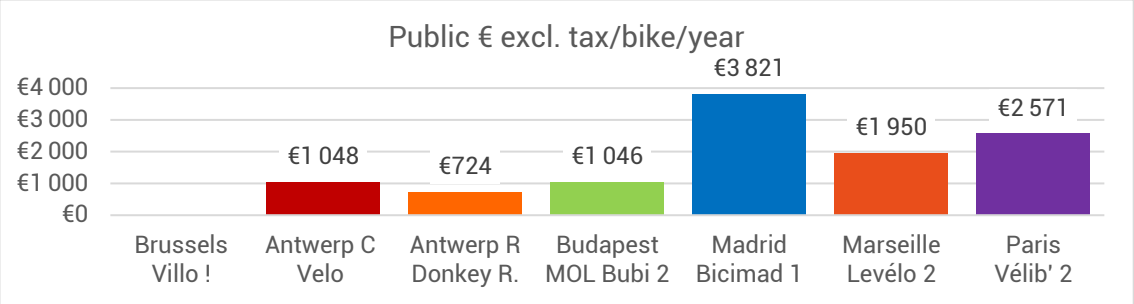
The following analyses should be analysed with caution, given the diversity of financial data:

- Values in currency (Budapest) in the year of contractualisation or amendments.
- Figures obtained excluding tax, with tax or unspecified.
- VAT rate specific to each country and distinct for user revenues (6% in Antwerp).
- Different VAT accounting treatment for public authorities.
- Differences between the contractual amount and the amount actually paid with indexation. In Paris: +24% between 2017 and 2023, with an expected increase of €9 million in 2023.
- Contract changes affecting investment amortisation periods (contract extension in Brussels or reduction in Madrid) or annual operating costs with an increase in the number of bicycles (Brussels, Budapest, Antwerp City and Region, Paris).
- Contractual term sometimes longer than the actual operating period.
- Absence of data due to lack of transparency in the advertising market (Brussels).
- User revenues retained by the operator (Antwerp City, Antwerp Region).
- Different contractual models, including in-house investment (Madrid, Budapest 1) or operating (operations in Madrid, communication and customer service in Budapest).
- Differing calculation methods versus generic ratios, estimates or accurate data.
- Fleet diversity, mix of pedal and pedelecs bikes (Antwerp Donkey and Paris), and fleet volume (theoretical in the contract or "real" on the ground).
- Amount spread over the term of the contract or provided for one year including penalties and bonuses.
- Imprecision between price paid, cost of service for the operator, remaining costs for the authority and perceived value of the service (*Figure 33*).

Figure 33: Method of calculating public authorities "remaining costs"

Price paid by the local authority
− **User revenue** (if received by the local authority)
− Other income
= **Remainder to be paid** by the local authority

2.4.6.1 *Price paid by the public authorities*



E-PB with charging station: the cost in Marseille, Paris and Madrid ranges from €2,000 to €4,000. Madrid's figure is higher because it includes the purchase of the Bonopark solution with a reduced amortisation period, and operating costs for EMT. In Bicimad 2, 80% of Madrid's PB system was paid for by a European subsidy.

Figure 34: Various values of € excl. tax/bike/year for the Paris Vélib'

€/bike/year	Comments
1,992	Contractual amount 2017
2,571	Amount paid in 2022 by SAVM
2,956	The estimated cost to the service operator is €887 million over 15 years. The difficulties of the transition, the illusion that overflow (the possibility of parking your bike close to a full station) would avoid operating costs, and the overuse of pedelecs have caused the operator's anticipated costs to explode: +70% in operating costs, +15% in investments.

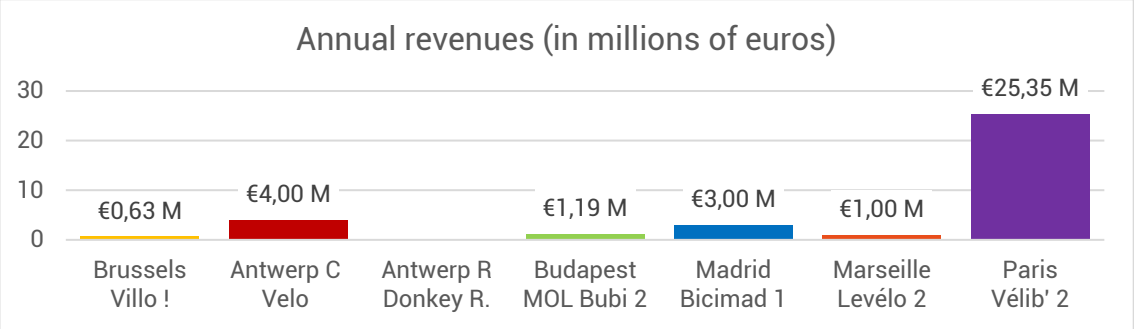
E-PB without charging station: Donkey's station-free system logically has a lower price, but the territorial extent of the service generates high-cost logistical and swapping constraints.

Pedal PB: the systems in Antwerp and Budapest cost close to €1,000/bike/year. Budapest has a very low cost, potentially explained by the absence of a station, continuity with the previous service, local bike production and the cost of living in Hungary.

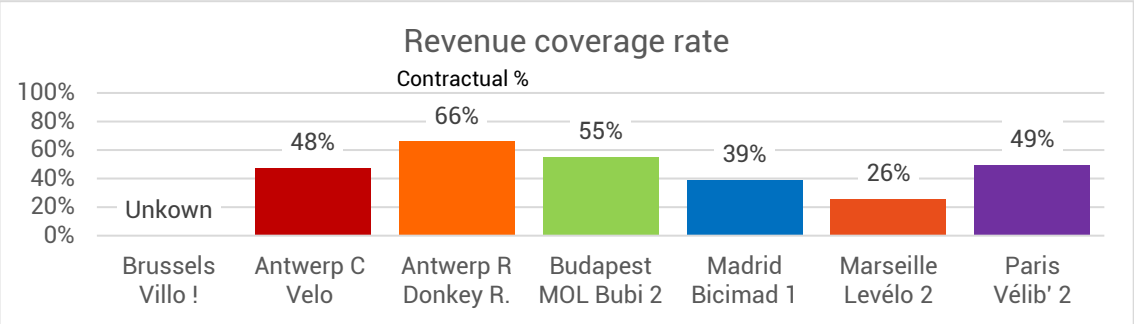
2.4.6.2 *Revenues*

Collection: Revenues are collected by the operator. It either keeps it (Brussels, Antwerp City, Antwerp Region, Madrid) or gives it to the ordering institution (Budapest, Marseille, Paris). Paris provides the operator with a profit-sharing scheme ranging from 15% to 30% depending on the amount of revenue received. For operators, profit-sharing becomes particularly necessary with high turnover rates (e.g. 5) to cover operating costs, which increase disproportionately. Marseille operates without profit-sharing. JC Decaux's revenue collection in Brussels as part of the advertising space contract does not seem sufficient to develop usage.

Amounts: in some territories, revenue is generated by annual subscriptions (Antwerp City, Brussels, Paris). Paris (€25 M and Antwerp (€4 M) generates more revenue with higher usage and prices than Brussels, where prices and subscriber numbers are lower. Despite a very affordable annual subscription, Madrid generated €3M in revenues in 2022. In other territories, revenues are mainly generated by short-term users (Antwerp Region, Marseille). In Marseille, revenue was €1 M for the first year of operation in 2023, with the hope of reaching an average of €1.7 M/year over the life of the contract. Most rentals are by public transport subscribers, for whom the bike subscription is free.



Coverage: the average revenue coverage rate is between 26 and 66%. In Madrid, user revenues covered an average of 26% of costs over the life of Bicimad 1. In 2022 alone, they represented 39% of EMT's revenue. In the Antwerp Region, Lantis contributes 33% of total expenses, suggesting a cost coverage of 66% through user revenues. Donkey pays a portion of the revenues to Lantis if they exceed 10% of the investment.



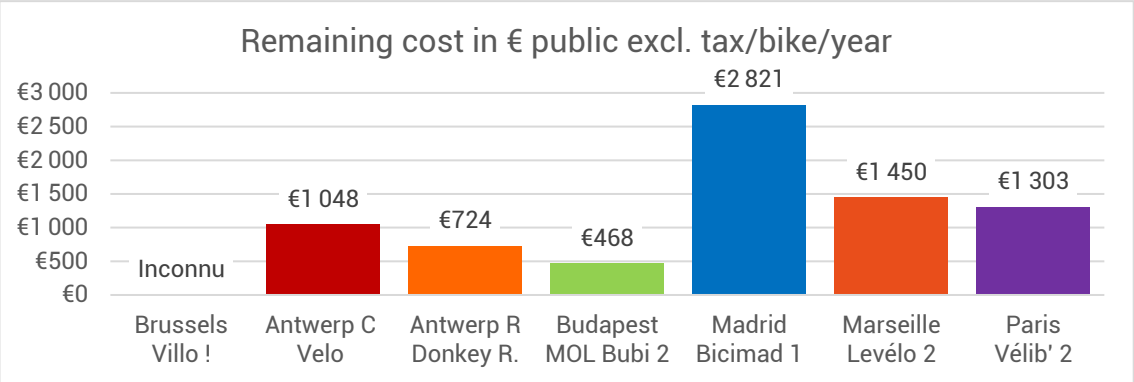
2.4.6.3 *Variable remaining payment from public euros excl. tax/bike/year*

The remainder to be paid by the authority involves deducting the amount paid from the revenues recovered by the public authorities. If the operator keeps them, the remaining cost is equivalent to the contract price.

E-PB without stations: the remaining cost for the Antwerp Region is €724/bike/year.

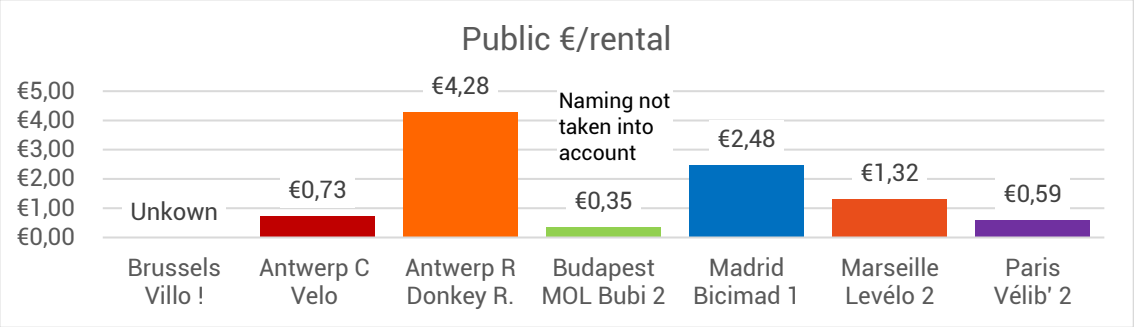
E-PB with charging stations: Madrid's remaining payment is very high, probably due to the price of the old technology and a very affordable subscription. In 2022, Paris had a remaining outlay of €1,303/bike. With €1 M in the first year, the remaining cost is €1,450 ex-VAT/bike/year. With annual revenues of €1.7 M, this would mean €1,100/bike/year for Marseille.

Pedals bikes: Antwerp City's remaining outlay remains high but in line with regulatory efforts and usage performance. Budapest has the lowest remaining cost, thanks to a lower initial price. This amount does not include naming rights, which further reduces the bill for BKK.

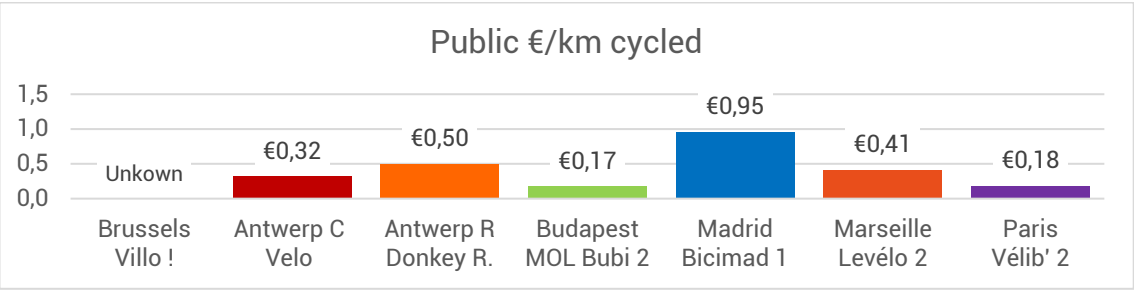


2.4.6.4 *Public € excl. tax ratios (investment + operation)*

Apart from the cost in Madrid, which is a special case given the difficulties encountered with the initial technology, the public cost (investment + operation) per rental ranges from €0.35 in Budapest to €1.32 in Marseille. Donkey's regional system is the most expensive per rental.



The public cost (investment + operation) per km travelled ranges from €0.17 in Budapest to €0.34 for the Antwerp Region. It is €0.95 for Madrid 1.



2.4.7 Comparison with STIB costs in 2022

	STIB *(Appendix 6.11)*	PB analysed
User revenue coverage/(CAPEX + OPEX)	18 %	26 ↔ 66 %
€ public/journey	€2.58	€0.35 ↔ 2.48
€ public/km	€0.38	€0.17 ↔ 0.95

2.4.8 Focus on subsidised bike share in Ghent

The city of Ghent has been offering rental services via Fietsambassade for many years, but did not want to invest in a PB service. However, the city grants an annual subsidy of €150,000, i.e. €100/bike or €125/pedelecs for three licences awarded to Donkey Republic, Dott & Baqme and Bolt. These companies must serve five districts in addition to the city centre and are free to choose their fare structure. The turnover rate varies between 0.3 and 2 rentals/bike/day, depending on the type of bike. And expenditure per trip in 2023 was between €0.17 and €0.93 per trip, excluding VAT. The above comparison with public PB needs to be weighed against the smaller fleets.

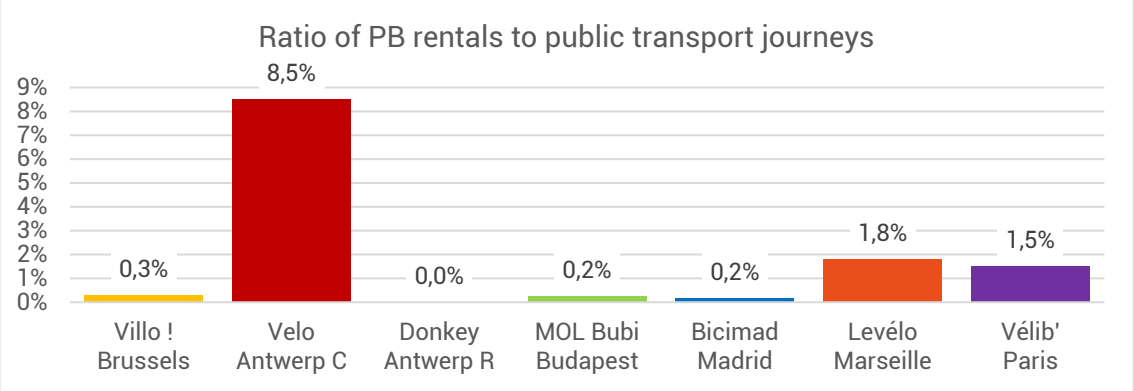
Figure 35: Data and ratios for private SB in Ghent (FietsAmbassade data 2023 | Calculation: Mobiped)

	Donkey Republic	Dott	Baqme	Bolt
Bikes	550	600	20	400
Type	Pedal bikes	Pedelecs	Pedelecs	Pedelecs
Rentals in 2023	188,445	439,234	2,700	23.440 (12.06 -> 31.12)
Rentals/bike/day	0.94	2.01	0.37	0.29
Unit subsidy	100	125	125	125
Subsidy/bike	55,000	75,000	2,500	50,000
€ public/trip	0.29	0.17	0.93	nc.

2.5 Interaction with public transport (PT)

2.5.1 Journey volumes

PB rentals generally account for less than 2% of journeys made on the urban public transport network. Antwerp appears to be an exception.



2.5.2 Governance

- **Initiative**: the PB initiative comes from mobility authorities (Paris, Budapest, Brussels, Marseille), cities (City of Antwerp and Madrid) or a special agency (Lantis for the Antwerp Region). Madrid's bus operator was involved, probably to save the failing system.
- **Operation**: only Madrid has entrusted PB operations to EMT, the municipal mobility services company (bus, pound, car parks), which does not operate the metro.
- **Financing**: financing is separate from public transport funding. Communication and customer relations resources are shared within the Budapest Mobility Agency.
- **Warehouses**: each warehouse is independent of the public transport warehouse. Although located on a bus operating site, the Madrid site will soon move to become independent.
- **Revenue collection**: user revenues are collected by the PB operator and often passed on to the organising authority. Collection via the public transport operator only takes place in Madrid.

2.5.3 Marketing mix

- ***People*/Clients**: PB customers are cyclists with monomodal, intermodal and multimodal practices. However, the PT and PB customer databases are still separate. Marseille will soon hold all the customer data for metropolitan mobility services via a mobility account.
- ***Products*/Services**: none of the services studied offers the same conditions of use between PB and PT. In its communication, Budapest considers PB to be an integral part of the public transport fleet.
- ***Spaces*/Distribution**: all the services say they have positioned PB stations close to public transport stops, without specifying the type of stop, the distance or the percentage.
- ***Pricing*/Tariffs**: PT subscribers receive a €10 discount on their Madrid subscription and free access to Marseille via a voucher. The other services do not have integrated pricing.
- ***Promotion*/Sales:** In Budapest, BKK communicates about both PT and PB. Strangely, the PB graphic chart is totally different from that of public transport, due to the naming system. In Madrid, bicycles have the same blue colour as buses.
- ***Processes*/Routes (including MaaS)**:
    - Route planner: the multimodal Budapest Go app proposes an intermodal itinerary including PB, but refers to the dedicated app to access it. Marseille has a bike itinerary search engine in the PB app.

    - After-sales services: BKK (Budapest) manages the front office with qualified agents.
    - Ticketing: PB subscription available on PT passes (e.g. Paris, Marseille)
    - In-person sales: the Metropolitan shop in Marseille sells PT and PB subscriptions. In Budapest, it was possible to take out a subscription at the counter of the PT network. This was appreciated but the procedure was too long. MOL Bubi 2.0 has gone 100% digital.
    - Online sales: short-term Vélib' offers (per journey, per day, over three days) are available on the MaaS IdFM and/or Bonjour (RATP) apps.
- ***Proof:*** in 2017, 47% of *Villo !* users in Brussels used it intermodally. More than 25% of Antwerp City users are intermodal with the bus, tram or train. In Budapest, 80% of PB users use public transport as their main mode of transport.

3 Key findings regarding PB

3.1 Key messages

3.1.1 Service offer

Station density	Walking access time to station is crucial.
	First, densify the centre. Then, consider gradually extending the network while maintaining a high density.
Pedelecs	A game-changer.
Operation	Commuting generates imbalances that need to be regulated.
	Need for an operator focused solely on PB.
	Presence of structural vandalism for an object in the public space.
	Beyond certain usage levels, the marginal cost of a new rental is not sufficiently covered by marginal revenues.
MaaS	Digital apps are an integral part of the user experience.
	No complete integration between PT and PB.
	Ownership of the customer database is essential.
Transition	This is always a tricky time.

3.1.2 Usage and journeys

Figures	Be careful when calculating ratios, especially trips/bike/day.
Users	PB is not that inclusive for a service financed with public money.
	Between 1% and 10% of the population has an annual subscription.
Cycling	Few users would have made their journey by bike.
	Lack of evidence that PB leads to a significant increase in the number of daily bike journeys.
	PB is a success in cities with an emerging cycling culture, but it can also be a success in a city with a high level of cycling.
	PB rentals account for a maximum of 20% of bicycle journeys.
Multimodality	80% of PB users have multimodal behaviour.
	PB users have intermodal practises.

3.1.3 Governance

Contracts	Possibility of obtaining EU funding and separating investment and operation.
	Consider one year between the end of legal proceedings and inauguration.
	A complex project that requires a strong partnership, but not blind trust.
	Implementing the contract is not easy, with the risk of stifling the operator.
	PB-Advertising space contracts are no longer the norm.
Public investment (Investment + Operation)	The price for the authority is between €1,000 and €4,000 excl. tax /year/bike. It varies between the initial price and the payments.
	User revenue coverage between 26 and 66%.

	Remaining cost to the public authorities of between €450 and €2,800 excl. tax /year/bike.
	€0.35 to €2.48 excl. tax/rental. €0.17 to €0.95 excl. tax/km.
	No financial data for Brussels, due to a lack of transparency in the advertising market.
	PB with a direct subsidy subject to conditions, as in Ghent, a new approach.
Public policies	Much more than just a bicycle project, with a strong political resonance.
	No SMART method applied to objectives, with doubts about the achievement of key goals.

3.1.4 Public transport

Volume	PB and PT are more complementary than competitive.
Network	At first, PB operates as its own network, thanks to its high density in the city centre. The connection with PT is an added value.
Internal culture	Limited impact on the cycling culture within the PT operator.
Governance	Involving PT operators in governance and/or operations is not a key success factor.

3.1.5 PB and LTR

Complementarity	PB and LTR are complementary, meet different needs and have different operating volumes.
PB	PB has a quantitative impact on the number of citizens who cycle at least once a year.
LTR	LTR has a qualitative impact on the number of journeys made by bicycle by a citizen and is more inclusive.
	LTR is more of a "learn to fish/ride a bike" approach than a "give a fish/bike" approach.
	LTR is better integrated into the bicycle services supply.
	LTR seems less expensive in terms of public euros/km.

3.2 A mobility impact to be moderated

3.2.1 Ambiguous contribution to bicycle access

On the one hand, the number of PB users who would have travelled by bike rather than by PB is 20% in Brussels (*Source 29*). But if the aim is to provide access to a bike for those who do not have one or cannot afford one, this has to be weighed against the fact that:

- in 2020, 84% of PB users in France owned a bicycle *(Source 9)*.
- in 2017, 59% of *Villo !* users owned a bicycle, compared with 47% of non-users (Brussels, *Source 29)*. In 2023, 3/4 of shared bike users had a private bike in the household *(Source 26)*. However, it was not specified whether this bike is suitable for urban journeys and available by all members of the household.
- only 2% of users consider the possibility of buying their own bike (Budapest).
- four out of five users want to continue taking out a Vélib' subscription (Paris).
- 57% of Brussels households without a bicycle have space to park a bike, so lack of space at home is not the only reason for not cycling *(Source 26)*. But 43% do not have any space available in their homes, so they probably cannot consider buying a bike.

3.2.2 Underprivileged populations under-represented among users

Getting socially disadvantaged people on bikes thanks to PB sounds inappropriate as they remain under-represented among PB users. In contrast, those with higher education qualifications are strongly over-represented *(Sources 22, 25)*. PB is not the best option for people who have never cycled in their lives.

3.2.3 PB generates very little direct impact on modal shift from cars

On the one hand, promoting an alternative mode is insufficient to reduce the modal share of the car (*See 2.1.2*). On the other hand, most PB users replace a journey by public transport, bicycle or on foot. Between 5% and 10% of users would have made a journey by car. Assuming that each user makes the same number of journeys, the number of car journeys avoided is derisory in relation to the volume of cars in the conurbation. The car km avoided on a metropolitan scale represent less than 0.1% of car km (Brussels, Lyon [1]). On the other hand, PB seems to have an indirect impact on the relationship between car use and ownership *(Figure 36)*.

Figure 36: Indirect impacts of PB and LTR on car use [6]

	PB	LTR
Drop in car use	26 %	49 %
No need to buy a car	18 %	20 %
Parting with a car	7 %	6 %

3.2.4 The PB user, multimodal and intermodal travellers

- In Antwerp, PB journeys involve a number of intermodal practices. PB are used in addition to the metro (29%), tram (33%), car (20%), train (37%) or bus (24%).
- In Budapest, MOL Bubi users have multimodal practices. Their regular mode of travel is public transit (80%), PB (72%), personal bicycle (33%), car (31%) or train (17%).
- In Paris, 22% use Vélib' as their main mode, 38% as a secondary mode and 40% as a complementary or back-up mode.

3.3 Usefulness still poorly understood

3.3.1 Poorly evaluated objectives

The initial PB objectives *(Appendix 6.13)* do not appear to have been subject to a SMART (Specific, Measurable, Achievable, Realistic, Time-bound) approach, or to evaluation. The analyses focus on the service itself, but little on the expected and counterbalanced impacts. This gives the impression that there is no desire to objectivise the return on public investment or to direct resources towards these objectives, raising questions about the real usefulness of PB. For example, the *Villo !* objective of generating a modal shift (from cars) towards soft modes seems inappropriate. On the one hand, a high bicycle modal share is often at the expense of the pedestrian modal share and does not guarantee a reduction in the car modal share. Car parking management is far more effective than PB in reducing car modal share, but more unpopular. On the other hand, bicycle trips that replace car journeys represent a tiny proportion of total car traffic. And the resources deployed did not seem focused on finding motorist customers.

3.3.2 Is PB only useful in cities with a low modal share?

Cities with very high modal shares (Ghent, Amsterdam, Copenhagen) had no Public Bicycles, but are starting to have private Shared Bicycles. One of the great advantages of PB seems to be that it supports the development of a cycling culture. In Paris, PB accounted for 40% of bicycle counts in 2014. By 2022, PB rentals accounted for 20% of bicycle journeys in Paris, as in Madrid and Marseille where bicycle modal shares are below 5%. In this way, PB is helping to reverse the slogan "Build infrastructure and cyclists will come" (supply creates demand) to "Generate cyclists who will pressure for safe cycling infrastructure" (demand stimulates supply). PB makes cyclists visible, as observed in Madrid and Marseille, and gives credibility to the cycling option.

Antwerp, on the other hand, is an oddity, with one of Europe's best-performing PB services considering a 32% modal share for bicycles and a low modal share for public transport (17% in the City and 6% in the Region). But the people of Antwerp often use Velo instead of their own bicycles (85% of Antwerp residents have a bicycle), which raises the question of the relevance of investing in such a service, depending on the modal share.

3.4 Notions of costs per public euro invested

The intervention of the public authorities generally makes it possible to offer an attractive pricing structure that facilitates access to the service and increases usage. A high annual subscription (€600/year for Donkey Republic in Antwerp Region) has the opposite effect to a more affordable service (€58/year for Velo Antwerp City).

Some ratios for the services studied:

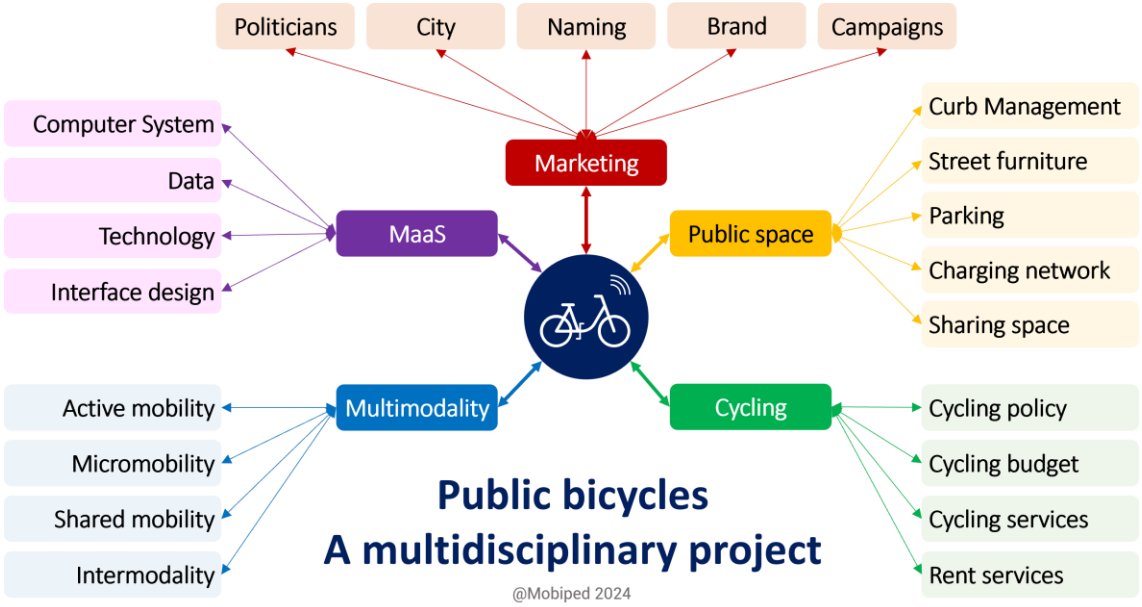
- **€ excl. tax/rental**: between €0.35 and €2.48 for urban PB and €2.95 for regional PB.
- **€/km travelled**: between €0.17 and €0.95 for urban PB and €0.34 for regional PB.
- **coverage rate**: revenues represent between 26% and 55% of PB costs in urban areas, and 66% in the contract for the regional system.

3.5 Public Bicycle, much more than just a bike rental service

Although rarely recognised and promoted, PB allow a bicycle component to be included in a number of themes:

- **marketing**: political agenda (Madrid), city branding (Paris, Antwerp Velo), tool for regular communication about cycling (Budapest).
- **public spaces**: parking (Antwerp), curb management (forthcoming), street furniture and integration of landscape with historic monuments (Paris, Brussels), electric charging from public spaces (Paris, Madrid).
- **MaaS**: search engine visibility (Brussels, Budapest), Big Data, DataViz and Data Analyse (Paris) and artificial intelligence (Antwerp).
- **multimodality**: consolidation of diversified multimodal and intermodal offers via shared mobility and micromobility to gain credibility in the face of car-only mobility.
- **cycling**: substantial budget to give bicycles credibility, complementary PB and LTR rental services (Marseille), promotion of personal bicycles (Paris).

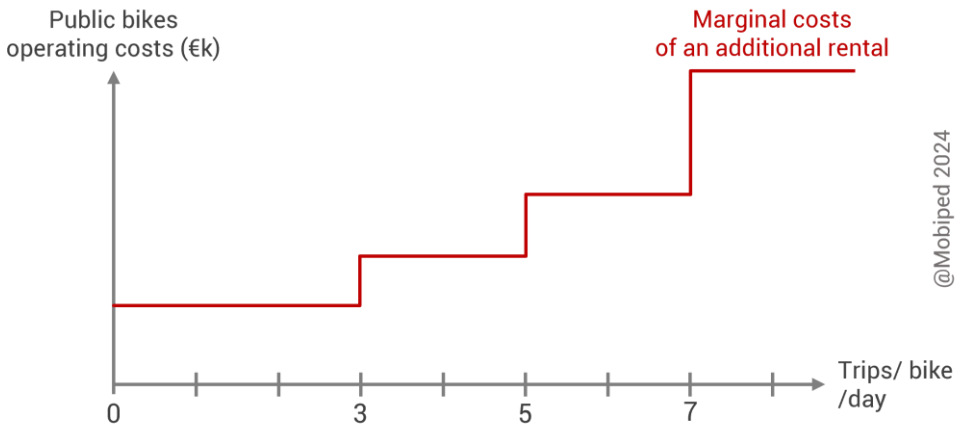
Figure 37: Public Bicycles, a multidisciplinary project to integrate cycling into a number of public policies



3.6 Success can upset the economic equilibrium of the contract

The more rentals there are, the higher the marginal cost of an additional rental *(Figure 38)*. Success can stifle the service and worsen its economic equation.

Figure 38: Simplified view of the marginal cost of an additional rental



3.7 The ideal PB does not exist, but there are inspiring practices

3.7.1 Governance

Design	Possibility of separating investment (purchase of bicycles) and operating contracts.
Financing	Possibility of applying for European funding, notably for system acquisition (Budapest for MOL Bubi 1, and Madrid Bicimad 2).
Planning	Plan well in advance, and allow enough time for a smooth installation.
Competition	Competitive dialogue encourages suppliers to improve the quality of their offers. As in any call for tenders, there is a risk that operators promise things that cannot be delivered. It is advisable to challenge systems and bikes to check their reliability during the tendering process.
Stakeholders	One of the major challenges of PB is to bring together divers needs of users, authorities and operators. Customers want a guarantee of service. A priori, the authority wants to maximise the number of bicycle trips made via the service, for a minimum of public money. The operator wants sufficient financial incentives to cover the increased marginal cost of an additional rental and generate profit. The authority and the operator form a team as far as possible, but trust cannot be blind.
Operation	It is more efficient to have a team dedicated 100% to PB (Antwerp) with a local base. Overflow does not solve the structural effects of commuter flows. In districts without a mix of activities, there is still a need for regulation to rebalance the availability of bicycles and available parking slots.
Market monitoring	Paris has a high-quality monitoring system with follow-up meetings (weekly for operations and bimonthly on service quality), field audits agreed by both parties (10% stations/month, +20,000 bicycles/year), a user committee, indicators for 164 contractual obligations and, above all, a replica of the operator's IT system (operations management, maintenance, outsourced user relations centre, back-office). Thus, the authority carries out its own analyses and take a critical look at the data supplied by the operator.
Service level clause	If the quality indicators are too strict, they will be impossible for the operator to achieve. The operator will include the penalties in its price proposal. If they are too high, this can lead to blackmail or actual bankruptcy. Velo Antwerp has a number of objectives whose non-achievement is not subject to sanction.
Profit-sharing	No system is a guarantee of success in itself. The systems studied use different ways of involving (or not) the operator in the result. Profit-sharing is particularly important when the turnover rate is higher than five, to cover the marginal cost of an additional rental.

3.7.2 Marketing mix

People	Ownership of the customer database is crucial. Ideally, a single database is managed by the organising authority, like the future Compte Mobilité (Marseille) or IdFM Connect (Paris). The service must prevent the use of the PB as a production tool for meal delivery drivers, as the bikes are not designed for this purpose.
Products	Pedelecs in hilly areas (Luxembourg, Marseille) has revitalised services that previously had low rental volumes. They are clearly popular and overused in mixed fleets (Paris). While they help attract new audiences and cover longer distances, they also cause a number of operational challenges *(Appendix 6.14)*.
Places	An PB becomes attractive if the cumulative pedestrian access time is low from departure to station, and then from station to destination. Thus, station density is a key factor in increasing the number of rentals. Expansion is gradual, starting from the centre and resisting political pressure to install stations on the outskirts without any continuity of network density.

Pricing	There is a willingness to pay for pedelecs. Revenues cover between 26% and 66% of cumulative costs (investment and operating). Solidarity pricing and pricing combined with public transport are very common.
Promotion	The LTR Véligo Location communication budget represents over 20% of the operating budget. Budapest promotion is inspiring.
Process (MaaS)	With the app now at the heart of the customer experience for the majority of users, an ergonomic, information design and ease of use are essential. A smartphone holder and a route planner integrated into the app are very welcome. Accessing from the MaaS app is gradually developing (e.g. via Navigo for Vélib'). Data is provided in GBFS and MDS formats.
Proof	User surveys do not seem to be carried out systematically, even though they are potentially crucial to evaluating the achievement of objectives.

3.8 All transitions are complex

With the exception of Antwerp, the cities have experienced an initial transition between two services. When there is a change of technological solution and operator, the transition is a real challenge. Each city has had its share of difficulties. The pitfalls of transitions, particularly that of Paris, are a source of much learning. In general terms, this involves:

- negotiating an exit clause with the current operator.
- allowing a minimum of eight months, ideally 12 months, between contract signature (after appeal) and launch, to facilitate smooth ordering, delivery, assembly and installation.
- asking the operator for proof of their promises and a risk management strategy with an associated action plan.
- involving urban planning departments and the electricity grid operator at a very early stage, especially for the installation of charging stations, as their intervention will have a significant impact on the planning and potential delays of the transition between services.

3.9 Subsidised private SB: an inspiring compromise

Long reluctant about Shared Bicycles, Ghent recently developed an inspiring approach that allows its residents to rent pedelecs.

The city of Ghent gives capped subsidies to a limited number of private SB operators, under a number of conditions, such as covering certain districts or events. Despite the conditions imposed, managing public space with SB remains a challenge for the city of Ghent.

Instead of putting €1,000/bike/year into a SB service, the city contributes €100 or €125/bike/year, enabling it to continue investing in the parking facilities that benefit all cyclists, in the development of mobility management actions and in complementary bicycle services via the FietsAmbassade.

3.10 Key success factors

- a dense network of stations
- quality bicycles adapted to the territory
- an easier user experience
- a simple and attractive pricing
- a strong identity linked to the territory
- an involved service provider
- dedicated and long-term public funding

3.11 Involving PT operators in PB governance is not a key success factor

The idea of an operator managing all forms of mobility is very appealing on paper. While the first signs of acculturation to cycling are there, the reality is more surprising.

3.11.1 Benchmark feedback

- BKK, Budapest's multimodality agency, oversees an PB operated by a private operator specialised in PB. But the naming and graphics are different from those of PT.
- The operation of PT and PB are two distinct activities, even within the Madrid where EMT is going to completely separate its PB and bus warehouses.
- PB rental volumes remain marginal compared with PT journeys volumes: 0.2% in Brussels, Budapest and Madrid, around 1.5% in Paris and Marseille and 8% in Antwerp.
- The integration of cycling in the field of an in-house public management at EMT in Madrid or transit authority does not guarantee that cycling will be considered first in its other projects. For example, bicycles are banned from bus lanes in Madrid (4.1.4).

3.11.2 But PB are still an opportunity for PT

Rather than focusing on the PT journeys "stolen" by bicycles, BKK advocates putting energy into attracting new customers who will increase overall revenues. A cyclist is more likely to use public transport than a car driver. Micromobility improves access to public transport, which remains the backbone of multimodality.

In an analysis of travel surveys carried out in several French cities, 55% of PB users had a public transport subscription, compared with 23% of private cyclists (*Source 24*). The only data obtained from the mobility patterns of PB users, in Paris and Budapest, shows multimodal practice patterns (*see 2.3.4*).

For the public transport operator's involvement in PB to be a success, the mobility authority must ensure that PT operator:

- make its own of the specific features of the bicycle and cycling.
- treats all modes equally.
- separates PT and PB negotiations.
- is involved in supervision without blindly trusting the PB operator, despite the low influence of PB compared to public transport.
- respects the distribution of roles defined via a RACI (Responsible, Accountable, Consulted, Informed) matrix.

4 Long-Term cycles Rental (LTR)

4.1 Véligo Location (Paris), the world's largest LTR

4.1.1 Presentation of the service

The service: Véligo Location is a long-term cycle rental service for a maximum of six or nine months, with the option of renting accessories and taking out insurance. The pedelecs subscription costs €40/month and €20/month for the solidarity rate. Once booked online, the bike is delivered to the home or collected from one of the 277 delivery points in 171 towns and villages.

Launch: launched in September 2019 with 10,000 e-LTR, the fleet has gradually grown to 5,000 e-LTR+ 5,000 e-LTR and 1,000 e-cargo-bikes. The success of Véligo Location is based on an attractive offer and a high communication budget. The service has benefited from a dynamic cycling context and the positive effects of the PT strikes at the end of 2019 and post Covid lockdown. With over 20,000 e-LTR, Véligo Location is the largest long-term rental service in the world, following on from the French long-term rental market which emerged in the late 90s.

4.1.2 Governance

Clear objective: "Invite people to try out a pedelecs before they buy their own", and then highlight bike purchases subsidies, equivalent to 50% of the purchase price but capped at €500 incl. VAT.

Governance: Ile-de-France Mobilités (IdFM), the mobility authority for the Ile-de-France region, has awarded the public service contract to Fluow, a consortium of four companies. By 2022, its operations required the equivalent of 196 people to:

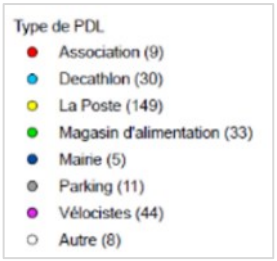
- supply, service and maintain the bicycles
- provide and maintain the management systems
- manage bike storage and retrieval logistics
- insure the bikes
- maintain customer relations
- collect revenues
- communicate

Price: IdFM financed the investment with the purchase of the bikes. Bicycles are returnable goods, requiring outgoing and incoming inventory between contracts. IdFM finances a fixed contribution to operations, calculated on operating expenses and commercial revenues:

- Véligo 1: €111 M over six years (€18.5 M/year), i.e. approximately €1,000/bike/year
- Véligo 2: up to €300 M over eight years (€37.5 M/year), including the acquisition of facilities for cycling houses and the doubling of the fleet.

Relationship with private players: in relation to private long-term rental services, an upstream legal study gave the green light because Véligo Location is a regional offer (not centred on Paris) and limited in time. Furthermore, private players are highlighted at the end of the rental period. Two networks of local partners support the company's local presence with the:

- distribution network (which benefits from traffic generation).
- network of 35 bike shops for repairs.



Communication: 20% of the operating budget is dedicated to communication.

4.1.3 Mobility practices

- 47% are women.
- Average 15.4 minutes per journey.
- 61% of subscribers use a Véligo Location every day, 31% several times a week.
- 46% of users did not cycle before.
- 40% of Véligo Location customers bought a bike in the month after the rental period.

4.1.4 Integration with public transport

Although Véligo Location stems from IdFM, it has no connection with public transport: specific public service delegation, own database, dedicated warehouse, no contribution to MaaS, independent operation, distribution outside the public transport network, no combined pricing and dedicated communication to avoid comparing the two modes.

4.1.5 Bicycle culture within a public transport organisation

IdFM has historically been PT-oriented. In the 2000s, cycling started to be considered through bicycle parking. In 2022, bicycles represented 0.5% of IdFM's total budget, and LTR 0.18%.

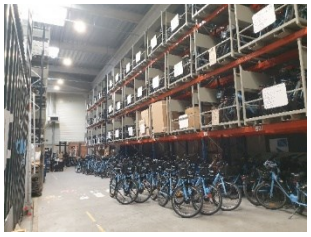
Véligo Location is the result of a cautious political order for IdFM to offer its own bike rental service. Its success was surprising and had a positive impact on the image of cycling for decision-makers, with IdFM receiving a lot of media coverage. There is a consensus on cycling, with no opposition from the Board of Directors, and even a desire to go further. While an internal cultural adaptation to cycling has begun, the PT reflex remains firmly anchored.

4.1.6 Véligo Location 2: 2025 - 2032

- **Fleet**: doubling (target of 40,000 bikes) and diversification of the fleet with folding bikes, pedal bikes, adapted bikes, professional cargo bikes with flatbed, box or trailer.
- **Cycling policy**: Véligo Location 2 customers will have free access to IdFM's bicycle parking facilities, and will be able to test bike models eligible for the purchase subsidies. The synergy between all the bicycle services will be strengthened by the creation of a regional network of 20 to 40 bicycle houses with specific criteria (surface area, proximity to stations). A wide range of services will be offered: front desk, information, advice, promotion, bike testing before rental, subscription assistance, promotion, bike distribution and minor repairs. A circular economy approach will be implemented for the reconditioning, resale, donation and recycling of current and future fleets.
- **Contract**: the contract will be for eight years, in line with the amortisation period for investments in bikes and bike houses. It will be commissioned one year after signature.
- **Customer database**: connection possible with the future IdFM Connect unique identifier.

3 Véligo Location bikes parked in a street

Battery not insured, to be removed



Warehouse

4.2 In Belgium, the example of the Ghent LTR

4.2.1 Cycling context

- **Bike ownership**: 90% of families in Ghent own a bike, and 84.5% of Ghent residents access to a bike (Buurtmonitor Stad Gent, 2020).
- **Private Rental services**: The FietsAmbassade has a cycling services strategy as described below. There are plenty of private services, as private SB, private shared cargo bikes, private LTR (Swapfiets), back-to-one SB with return to the point of departure at the station (Blue-bike), a platform for sharing cargo bikes between neighbours ("Dégage" in the Rabot district) and cargo bikes (Cambio).
- **Ambitious parking policy**: giant parking areas at train stations, the goal of a bike park less than 100 metres from each house entrance (useful in the historic centre), exploration of new parking concepts (flexible parking, peak-hour parking), private parking offer at €65/month for the user.

4.2.2 FietsAmbassade services

Figure 39: Range of bicycles (Photo: FietsAmbassade)

FietsAmbassade has five branches and offers several bicycle services: parking, repair, rental, training (20 training courses in 2023, 30 expected in 2024), offers for businesses, refurbishment and sales of second-hand bikes (1,000 bikes sold for between €100 and €400). The demand for training + purchase of bicycle for the underprivileged at reduced prices is greater than the supply.

4.2.3 FietsAmbassade's bike rental service

Two distinct services are offered:

- unsubsidised rental of a wide range of bicycles: five shops for daily, weekly and monthly rental for individuals and groups at market prices to avoid unfair competition with private operators (same applies to repair services).
- subsidised LTR for students, who can rent a bike for €70/year. This has been available since 2002, and more than 7,500 students took advantage of this service in 2023.

	Bikes	Rentals	Cumulative rental days
Private rentals (without subsidies)	676	9,918	68,518
For students (with subsidy)	8,284	7,628	
Gearless bike	7,767		
Bike with gears	480		
Pedelec Classic	15		
Pedelec Comfort	22		

Rental point

Padlock key for rented bike

FietsAmbassade, Donkey and Dott

LTRs in Wallonia: public LTR are available in Liège (+/- 800 bikes), Gembloux and Ottignies. Prices vary according to the subsidy. A few years ago, Pro Velo offered two-month e-LTR tests for motorists, resulting in a 70% modal shift *(Source 2)*.

5 PB and LTR are complementary

PB and LTR are two complementary bicycle rental services. On a tight public budget, choosing between the two services can be an issue. But both services are fully relevant as part of an overall approach to mobility and the development of cycling practices.

5.1 Public Bicycles, a mass-market service for multimodal use

PB provides simple, fast access to bicycles from public spaces, like a no-commitment, one-off mobility "insurance policy" *(Figure 41)*. PB has a quantitative impact on the number of citizens who cycle at least once a year. PB users tend to be multimodal, without necessarily adopting a cycling lifestyle. In 2022, for 20,000 bicycles in each service, there were 378,000 Vélib' subscribers and 22,000 LTR subscribers *(Figure 43)*.

5.2 LTR, a quality service for regular cyclists

5.2.1 Training rather than giving

LTR has a qualitative impact on the skilfulness and frequency of urban cycling by users. It enables targeted groups to try out a type of bike and the life of a cyclist, before becoming a cyclist with their own personal bike. LTR is an invitation to enjoy a cycling lifestyle by planting seeds with an approach of "learning to fish" rather than "giving fish". Véligo Location beneficiaries are renewed every year and the oldest one remain cyclists without receiving recurrent public funding from the local authority to access a bicycle.

5.2.2 LTR, a fairer and more diverse cycling experience than PB

Certain user categories are under-represented with PB. In terms of the proportion of subscribers within the service, LTR is fairer and more socially diverse.

- **Gender**: with LTR, the gender balance among subscribers is more balanced (47% women for Véligo Location for pedelecs, 54% for cargo bikes and 53% in the ADEME study in 2021 *(Source 10)* than with PB (42% women with a long-term subscription and 25% for short-term users at Vélib').
- **Education**: the overrepresentation of higher education among PB users is less prevalent among LTR users.
- **Disadvantaged groups**: the percentage of subscribers benefiting from a solidarity price is higher at Véligo Location (10%) than at Vélib' (5%). Often overlooked in mobility policies, underprivileged groups have never, or very rarely, cycled, in Brussels too. A coherent LTR + training/coaching + bike purchase strategy is the best way to meet the needs of these groups, as demonstrated by Vélo Solidaire in Brussels. Ghent is also planning a similar offer. Demand systematically outstrips supply. The cost of such a service is likely to be limited since it uses second-hand bikes instead of new shared bikes. The savings on equipment help finance the training and coaching of new cyclists.
- **Students/young people**: they represent 15% of Vélib' and Véligo Location subscribers.
- **Bike ownership and use**: over 75% of PB subscribers own a bike. 46% of Véligo Location subscribers did not ride a bike before. One year after the end of the rental period, 40% of users had bought a bike (thanks in particular to purchase subsidies), 30% were considering or awaiting financing, and 36% had found another solution for using a bike. In this way, LTR is more effective in driving long-term change in cycling practices.

Figure 40: The of behavioural change applied to bike share and LTR

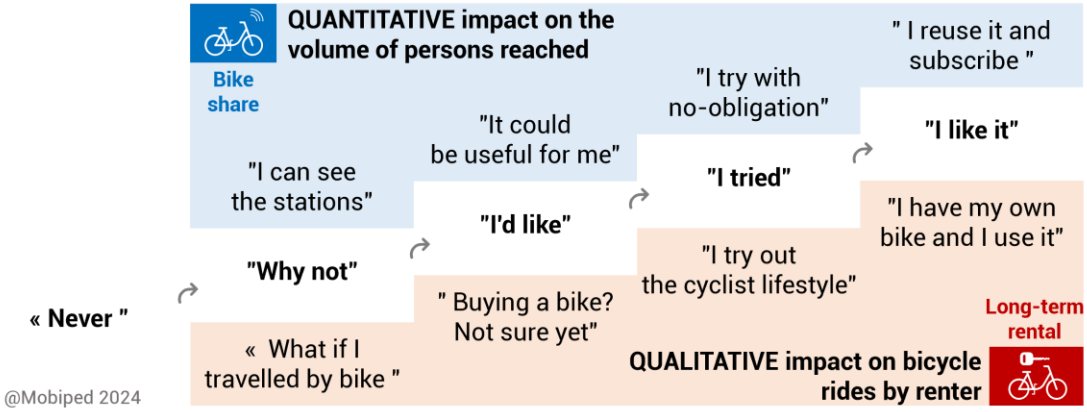


Figure 41: Bike share, a simplified cycling experience (in blue)

	Bike Share An easily accessible bike	**Long Term Rental** Cycling lifestyle experience	**Private bike** Independent cyclist
Knowing/informing	Service communication		Associations, public authorities
Accessing to a bike	Renting a bike		Buying a bike
Clothing/Equipment	In-situ discovery	Support	Experience
Learning to ride	Self-experience	Training	Experience
Safe cycling	Feeling of safety increases with the level of skilfulness		
Finding your way	Search engine + network discovery		Network knowledge
Parking the bike	**Pushing the bike**	Padlock to attach to a bike rack	
Keeping the bike	**No risk**	Risk of theft borne by the cyclist	
Maintaining your bike	**Maintenance-free**	Bike shop and self-repair	

5.3 A probably more efficient investment for LTR

A comparison between Vélib' and Véligo Location requires caution, as they are among the best-performing premium services in Europe *(Figure 43)*. Delivering 100% electric Véligo Location to a territory of 80 by 100 km contributes to higher costs than other LTRs. Published with the support of ADEME in 2016[4], 2021[6] and 2023[6], the few studies that put the prices and impacts of PB and LTRs into perspective concern the French market. The results require caution, as they are sometimes contradictory, and do not systematically specify the type of bikes (pedal or pedelecs), the size of the territories and the costs covered by the community as facilities *(Figure 42)*.

- In 2016, the remaining cost per trip for LTR was five to ten times lower than for PB [6]. In 2023, the outstanding cost per trip was lower for PB than LTR.
- In 2023, the car modal share before and after LTR use decreased from 48% to 18%, and after LTR use from 28% to 8%. However, the data does not specify whether this is the result of a subscription or a renewable or non-renewable rental.
- The impact on car km avoided was clearly in favour of LTR in 2016. In 2023, e-PB seemed to avoid more car km than e-LTR, as in the comparison between Vélib' and Véligo Location.

Figure 42: Financial ratios and impacts of PB and LTR in France (pedal bicycles and pedelecs combined)

Remaining cost (€ HT/bike/year)	€1,981 [6] | €1,490 [6]	€300 ↔ 800 [4] | €225 [6] | €490 [6]
Cost € excl. tax/km	€0.56 ↔ 1.35 [6] | €0.35 [6]	€0.10 [6] | €0.57 [6]
Car km avoided/month	Pedal: 139 | pedelecs: 238	Pedal: 157 | pedelecs: 188

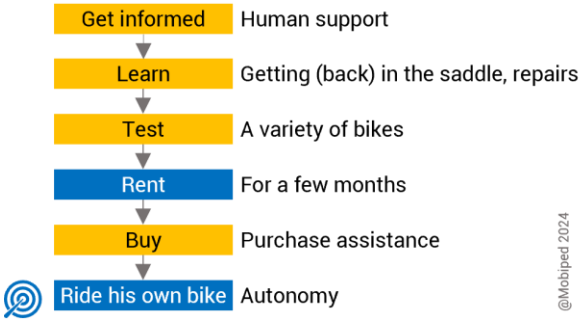
Figure 43: PB Vélib' Métropole and LTR Véligo Location in Paris in perspective (2022 data)

	Vélib' (PB)	**Véligo Location (LTR)**
Supply		
Number of bicycles	20,000 (8,000 ⚡)	20,000 ⚡ + 1,000 cargo bikes ⚡
Usage in 2022		
Long-term subscribers	378,000	22,000
Young people and students	58,800 (16 %)	3,200 (15 %)
Solidarity prices	17,200 (5 %)	2,200 (10 %)
Women	158,760 (42 %)	10,340 (47 %)
Trips	44.2 M	7.8 M
Average distance (km)	3.8 (2.8 for pedal bikes)	4.1
Km travelled	148 M	32 M
Operation		
Repairs	600 bikes/days	600 bikes/month
Paris financial ratios		
Price paid (€ excl. tax/bike/year)	€2,571	~ €1,000
Revenue (€ excl. tax/bike/year)	€1,268	Unknown
Contractual relationship	Public procurement contract	Concession
Remaining cost (€ excl. tax/bike/year)	€1,303	~ €1,000
Remaining cost (€ excl. tax/km)	€0.16	€0.63
Remaining cost (€ excl. tax/trip)	€0.59	€0.39

5.4 Overall bike rental strategies still in need of improvement

5.4.1 LTR perfectly integrated into a mobility management approach

Figure 44: Rental as part of a mobility management approach



FietsAmbassade and Véligo Location integrate LTR into an integrated and coherent vision of mobility management measures. These LTR services enable users to obtain information, learn, test, rent, buy and finally ride their own bike *(Figure 44)*. Véligo Location is also lobbying for changes to the legislation governing bicycle deliveries.

5.4.2 PB are often self-reliant

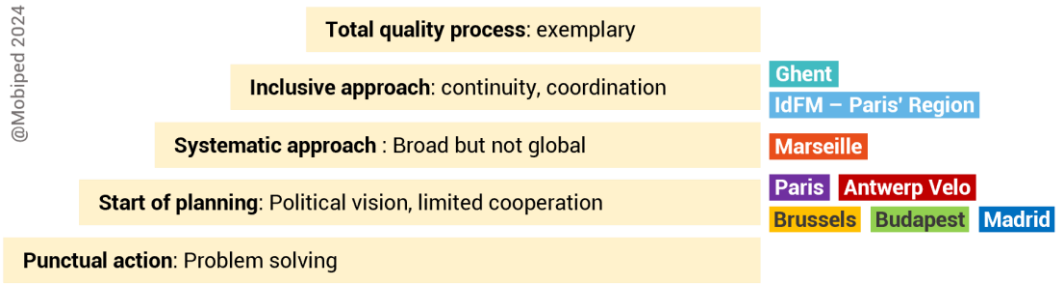
PB services are often self-reliant and poorly integrated into cycling and mobility systems. However, there are many opportunities to support multimodal practices:

- communicate regarding cycling facilities on PB network maps.
- promote the hundreds of digital terminals in public spaces as an info-mobility portal.
- offer a bike route search engine directly on the service app.
- promote other cycling services and culture. Paris promotes private cycling on the Vélib' blog.

5.4.3 Lack of a fully integrated public strategy for all bicycle services

Bicycles are available in a wide range of forms, including PB and LTR rentals, tourist and cycle-tourist use, bicycles for training, delivery, transport and commuting (company bicycles). No city offers an integrated vision of the diversity of these services. In Brussels, there are 5,000 PBs, 400 LTR (Vélo Solidaire) and 7,500 private e-PBs, with no real overall coherence. Marseille offers both LTR and PB. IdFM integrates LTR into a coherent package of bicycle-related services. Ghent offers a wide range of both bike services and bike rentals.

Figure 45: BYPAD-type quality approach applied to the access-to-a-bike strategy



6 Appendices

6.1 World cities ranked by number of PBs on streets

CITY	BIKES	STNS	FEED
Hángzhōu	43234	3887	OK
Suzhou & Wujian	35876	2926	HST
Seoul	30922	2692	OK
Weifang	30799	1379	HST
Xi'an	26925	1825	ERR
New York City	25653	1866	OK
Putian City	18807	871	DEL
Paris	18373	1438	OK
Taipei & Taoyua	17256	1060	OK
Nanning	16746	1011	ERR
Quanzhou & Luoj	16376	834	ERR
Kunshan	15621	1030	HST
Tokyo	15106	4639	OK
Netherlands	14570	279	OK
Taipei NTU	13125	1914	ERR
Xuzhou	12163	753	HST
London	11355	797	OK
Jining	10994	828	OK
Paris	9358	0	DEL
Changshu & Bixi	9028	561	HST
Shanghai	8927	629	HST
Taichung	8519	1115	ERR
Tokyo	8285	1206	OK
Kaohsiung	8173	1100	ERR
Huaibei	7755	330	HST
Chicago	6141	1413	OK
Barcelona	5826	504	OK
Washington DC	5735	722	OK
Toronto	5691	657	OK
Huaian	5669	501	HST
Yangzhou	5211	348	ERR
Berlin	5114	1919	OK
Qingzhou	4808	487	ERR
Fuyang	4734	246	ERR
Milan	4585	322	OK
Zhongshan	4301	461	HST
Lyon	4234	433	OK
Brussels	3907	344	OK
Guilin	3873	260	HST
Antwerp	3832	303	OK
Xuchang	3654	334	HST
Shaoxing	3613	306	OK
Moscow	3534	723	HST
San Francisco	3520	297	OK
Greater Boston	3388	417	OK
Wenling	3347	228	HST
Munich	3324	299	HST
Yiwu & Fotangzh	3281	283	HST
Warsaw	3231	312	OK

Figure 46: Real-time data, March 2023 https://bikesharemap.com/#/3/-60/25/,

6.2 Introduction of 20 cities with public PB services

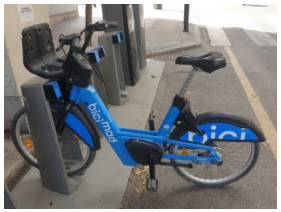
City	Information gleaned in March 2023	Internet sources (visited in March 2023)
Antwerp (Belgium)  *Velo Antwerp*	**Velo Antwerp** • Operated by Clear Channel. • Service among the best in Europe. • Belgian context • Very high bicycle modal share. • Since 2020, use of artificial intelligence in bicycle regulation.	• Official website: https://www.velo-antwerpen.be/en • http://www.clearchannel.be/corporate/velo-antwerpen-souffle-ses-10-bougies/ • https://www.gva.be/cnt/dmf20230117_95587551 • https://www.clearchannel.be/corporate/velo-antwerpen-souffle-ses-10-bougies/
 *Donkey Republic*	**Donkey Republic** • Development of a regional service in 32 towns since 2022, on the initiative of Lantis, the organisation in charge of mobility projects in the Antwerp region. • 1,850 e-PBs and 300 pedal PBs (around 500 in Antwerp), with a range of 100 km, positioned at virtual hubs close to multimodal hubs and Park and Ride sites. The rental period range is extensive, with pay-as-you-go and subscriptions with a fixed number of rentals.	• Official website: https://www.donkey.bike/cities/bike-rental-antwerp/ • https://news.cision.com/donkey-republic/r/donkey-republic-expansion-in-belgium-is-now-becoming-a-reality,c3443999 • https://www.scale-up-project.eu/news/donkey-republic-launch-ant • https://www.slimnaarantwerpen.be/en/news/donkey-republic-launches-electric-shared-bikes-in-antwerp
Barcelona (Spain)  *Bicing*	**Bicing** • Service regularly cited by experts as inspiring, with a high turnover rate. • Clear vision of target audience. The service is reserved for locals, as tourists have plenty of shops in the city centre where they can rent bikes for hours or days. • Transition with change of supplier/operator. • Connection of stations to the electricity grid made by the public authorities. • Regulation shuttles with solar panels and height-adjusted to ease the handling of bikes weighed down by electrification.	• Official website: https://bicing.barcelona/ https://www.bicing.barcelona/es/datos-bicing##reference-2

City	Information gleaned in March 2023	Internet sources (visited in March 2023)
Barcelona (Spain)  *Ambici*	**Ambici** • After an unsuccessful tender process in 2019, the Ambici service was launched in April 2023. • Driven by Barcelona's Metropolitan Area, it is operated by Nextbike (by Tier), with 2,600 e-PBs and 236 stations in 15 municipalities. • Bicing services in Barcelona and Ambici around the city centre will coexist, with combined pricing between the two services.	• Official website: https://www.tmb.cat/fr/barcelona/ambici • -https://www.linkedin.com/posts/nextbikebytier_barcelona-ambici-sustainable-activity-6990972374145728512-hw1w/?originalSubdomain=nl
Bordeaux (France)  *V³*	• Historically, PB have been included in the Public Service Delegation (PSD) for public transport. The latest PSD was signed on 25 October 2022 and officially began on 1 January 2023. Keolis operates PB itself through its subsidiary Cykleo. • There will be a renewing of stations (+50 new stations) and bicycles (more modern, with on-board intelligence and 50% of them electrically assisted). • While public transport has returned to its previous usage levels, PB use dropped by 31% between 2019 and 2022, due in part to the presence of free-floating services. • Bordeaux ranks highly in the CIE benchmark. • In September 2022, six bicycle, scooter and motor scooter operators were selected. • France's first city to offer long-term bicycle rental, in 1999.	• Official website: http://www.infotbm.com/enhttp://www.infotbm.com/en • https://www.bordeaux-metropole.fr/content/download/153993/1942058/version/1/file/Dossier_de_Presse_Conseil_de_Metropole_2022-07-08_web.pdf • https://www.bordeaux-metropole.fr/Grands-projets/Mieux-se-deplacer/Velo • https://www.bordeaux-metropole.fr/Metropole/1-metropole-28-communes/Chiffres-cles-du-territoire
Brussels (Belgium)  *Villo !*	• Very low usage and declining use over time: 1,143,874 rentals (2011) and 997,826 (2022). • Very sparse network, particularly after the 2012 extension. • 1,800 bikes fitted with portable batteries. • One of the cities with the most micromobility vehicles in the world. • A 15 + 3 years contract, linked to advertising space, one of the longest and last PB contracts of the 2000s.	• Official website: http://www.infotbm.com/en

City	Information gleaned in March 2023	Internet sources (visited in March 2023)
Budapest (Hungary)  *MOL Bubi*	• Well-rated by Fluctuo in travel distances, and with a high turnover rate. • Part of the city is hilly. • Vision integrating all free-floating services via an aggregator of data from each service, and enhancing the value of all services, including private initiatives. • Stations with stands or bike racks and over 600 mobility points. • Public distribution of monthly reports. • Information meeting prior to the call for tenders. • Marketing strategy targeting motorists at petrol stations. • The first service (2014 - 2020) was the main tool of the cycling policy. With the normalisation of cycling, the second service (2020 - 2025) helps to promote multimodality, in the hope that those who try shared mobility will be more likely to develop multimodal practices. • Budapest is a showroom for Tier: recent owner of Nextbike, which runs the MOL Bubi as a public service, free-floating Tier bikes and scooters on the streets of Budapest and the presence of Tier offices.	• Official website: https://molbubi.hu/en • https://bkk.hu/downloads/15560/ - https://bkk-hu.translate.goog/hirek/forgalmi-adatok-diagramok/mol-bubi-utazasszam/?_x_tr_sl=hu&_x_tr_tl=en&_x_tr_hl=hu&_x_tr_pto=wapp • https://bkk-hu.translate.goog/utazasi-informaciok/kerekpar-roller-gyaloglas/megosztott-kerekpar-es-roller/megosztott-kerekpar-es-rollerszolgaltatasok/?_x_tr_sl=hu&_x_tr_tl=en&_x_tr_hl=hu&_x_tr_pto=wapp • https://bkk-hu.translate.goog/utazasi-informaciok/kerekpar-roller-gyaloglas/megosztott-kerekpar-es-roller/?_x_tr_sl=hu&_x_tr_tl=en&_x_tr_hl=hu&_x_tr_pto=wapp
Cologne (Germany)  *KVB-rad*	• PB integrated into the multimodal public service offer. • All pedal bikes, made in Germany. • Hybrid service with free-floating and stations with bike racks. • Zonal pricing, with user contribution to regulation costs. • Low usage. • Possible extension of the current contract by two times one year, for a maximum of seven years. • Special offer for students with CampusBike.	• Official website: http://www.kvb-rad.de/de/koeln/ • https://blog.kvb-koeln.de/neue-kvb-raeder-fuer-ganz-koeln • https://ausschreibungen-deutschland.de/562113_KVB_Rad_2019_Koeln • https://www.stadt-koeln.de/politik-und-verwaltung/presse/mitteilungen/22373/index.html • https://www.vrs.de/tickets/abo-multiticket/vrs-leihrad-angebote/kvb-rad • https://www.report-k.de/immer-mehr-menschen-nutzen-das-kvb-rad/ • https://www.vrs.de/tickets/abo-multiticket/vrs-leihrad-angebote/kvb-rad

City	Information gleaned in March 2023	Internet sources (visited in March 2023)
Copenhagen (Denmark)  *Donkey Republic (Official website photo)*	• The city had bought out the private GoBike system, which had gone bankrupt, and was apparently operating it under its own management. The city's official system filed for bankruptcy on 9 December 2022, after the end of operating subsidies. • Introduction of Donkey Republic in Copenhagen in 2016. Since 2021, it has had a contract with Copenhagen Municipality and DSB (Railway company). • Project in partnership with Danish railways to create a regional network and develop Train + Bike intermodality. • A similar project is being developed in Geneva (Switzerland), with a contract signed with the Canton of Geneva in 2020 for seven years and a partnership contract with TPG (Les Transports Publics Genevois) in 2022, with no end date.	• Official website: https://www.donkey.bike/cities/bike-rental-copenhagen/
Hamburg (Germany)  *StadtRAD Hamburg (Official website photo)*	• Public initiative with DB's Call a Bike service. • Deployment of cargo bikes. • Historic SB city in Germany.	• Official website: https://stadtrad.hamburg.de/en/home • https://stadtrad.hamburg.de/en/bikes/#stadtrad • https://www.hamburg-travel.com/discover-hamburg/information/getting-around-hamburg/stadtrad-hamburg/
Helsinki (Finland)  *City bike (Wikipedia photo)*	• Operates from early April to late October in the Helsinki/Espoo area. As a result, turnover rates are overestimated compared with other cities, which have winter months with low usage levels. • Operated in a public-private partnership between the Helsinki Regional Transport Authority (HSL), Helsinki City Transport (HKL) and Espoo City Services. • System incompatible with that of neighbouring Vantaa. • Two parallel free-floating services: Jurobike and Freebike. • Helsinki is said to have conducted a study of 50 PB services worldwide. • Only pedal bikes.	• Official website: https://www.hsl.fi/en/citybikes • https://blog.fluctuo.com/city-dive-helsinki-interview/ • https://www.myhelsinki.fi/en/see-and-do/activities/quick-guide-city-bikes • https://www.eltis.org/in-brief/news/helsinki-announces-expansion-public-bike-sharing-scheme

City	Information gleaned in March 2023	Internet sources (visited in March 2023)
Lille (France)  *V'Lille*	• The V'Lille brand still seems to exist, but it is now the public transport network's brand that is displayed on the bikes. • There is no longer a specific V'Lille site, only the Multimodal Ilevia site. However, unlike public transport, bicycles do not benefit from clear, direct access. • Public transport public service concession began on 1 April 2018 for seven years. New call for tenders for the transport public service contract in April 2023, with awarding of the new contract in June 2024. • 14.6% drop in rentals between 2019 and 2021.	• Official website: https://www.ilevia.fr/ • https://www.transbus.org/actualite/actu-2019-01-ilevia.html • https://www.ilevia.fr/cms/institutionnel/velo/vlille/ • https://www.lillemetropole.fr/sites/default/files/2022-10/Recueil_delib_C0710_TOME1.pdf - Page 385
London (UK)  *Santander cycles (Wikipedia photo)*	• Nicknamed Boris Bikes, since their introduction during Boris Johnson's term as Mayor of London. • No dedicated website. It is a page on the Transport for London website. • The Oyster Card cannot be used. • Naming contract with Santander extended to 2025, i.e. £62,500,000 over ten years. • Introduction of 500 e-bikes on 6 October 2022, with battery swapping, accessible only to subscribers. • Reduced rates for students and healthcare staff. • Contract expires in 2025. Transport For London is considering a renewal or extension for a further two years. Lastly, a new call for tenders was launched in June 2023.	• Official website: https://tfl.gov.uk/modes/cycling/santander-cycles • https://content.tfl.gov.uk/variationforextensionexecutionversion27may2021.pdf • https://tfl.gov.uk/modes/cycling/santander-cycles/docking-stations • https://tfl.gov.uk/info-for/media/press-releases/2022/october/docked-e-bikes-now-available-for-hire-as-part-of-london-s-record-breaking-santander-cycles-scheme • https://data.london.gov.uk/dataset/number-bicycle-hires • https://www.intelligenttransport.com/transport-news/138606/e-bikes-transport-for-london-santander-cycles/ • https://www.ianvisits.co.uk/articles/testing-tfls-new-e-bike-hire-scheme-57992
Luxembourg (Luxembourg)  *Vel'OH*	• Until 2019, the JC Decaux system was similar to the one in Brussels, with a turnover rate of 0.6 in 2018. • Switch to 100% pedelecs with in-station charging, again with JC Decaux, generating improved performance with a turnover rate of 3.2 by 2022. • Micromobility services are prohibited.	• Official website: https://myveloh.lu/en/home • https://edubourse.com/finance-actualites-actu-102143/ • https://www.globenewswire.com/news-release/2023/01/18/2591196/0/fr/Records-en-série-en-2022-pour-les-vélos-en-libre-service-opérés-par-JCDecaux-avec-un-total-de-21-de-locations-à-travers-le-monde.html

City	Information gleaned in March 2023	Internet sources (visited in March 2023)
Lyon (France)  *Vélo'v*	• The world's first large-scale PB deployment in 2005. • Electric bikes with portable batteries, with an attempt to relaunch the offer with a two-month free trial. • 2022, a record-breaking year. • 80% of rentals were made via the app. • Cyclocity, voted Customer Service of the Year 2022 in the Individual Passenger Transport category. • Four bike rental services are available side by side: PB (Vélo'v and e-Vélo'v), Free loan (Freevélo'v with 10,000 free reconditioned bikes for students), LTR (My Vélo'v), Cargo-bike Cargoroo white label from March 2023. • A high-quality cycling network currently being rolled out. • Ban on free-floating bicycle services. • In 2021, study of the economic performance of the PB and Advertising market.	• Official website: https://velov.grandlyon.com/en/home • https://www.jcdecaux.fr/communiques-de-presse/avec-plus-de-105-millions-de-locations-en-2022-velov-surperforme-et-bat-un • https://avelo.grandlyon.com/choisir-son-velo/louer-un-velo
Madrid (Spain)  *BiciMAD*	• The first e-PB service ended in bankruptcy (Bonopark & Booster-bikes). The bikes were not available due to bike-base interconnection errors, resulting in poor quality of service. The contract signed in 2014 was for 12 years. EMT bought the service from Bonopark in 2017 (2,500 pedelecs) after major legal difficulties linked to exclusive ownership of the PB. • Inauguration of a new service in March 2023, with 7,500 bicycles and 611 stations in 21 municipalities. • Over €40 million of investment has been financed through the European Union Next Generation fund. • New bikes (blue) cohabited with old bikes (white) during the transition between 7 March and 31 July 2023. A tricky first month of transition: 500 e-PBs disappeared in a complicated transition with two systems running in parallel, computer system failures, invoicing when the service was supposed to be free, and few bikes available. • The service was free during the election period (estimated cost: €1.7 million) and was extended until the end of 2023.	• Official website: https://www.bicimad.com/en/home • https://www.polisnetwork.eu/wp-content/uploads/2019/06/3c_fernandezbalaguer.pdf • https://elpais.com/espana/madrid/2023-03-23/claves-del-caos-del-nuevo-bicimad-de-almeida-por-que-no-funciona-por-que-hay-tantas-bicis-abandonadas.html?utm_medium=social&utm_campaign=echobox&utm_source=LinkedIn&ssm=LK_CM#Echobox=1679917152 • https://www.emtmadrid.es/Paginas-especiales/BiciMAD/Comunicados/Antecedentes-de-la-cesion-del- • https://www.motorpasion.com/futuro-movimiento/todo-que-debes-saber-nuevo-bicimad-como-usarlo-donde-coger-bicicletas-que-pasa-tenia-abono-antiguo • https://elpais.com/espana/madrid/2023-03-15/primera-semana-del-nuevo-bicimad-de-almeida-500-bicicletas-desaparecidas-caos-y-cobros-que-son-gratis.html

City	Information gleaned in March 2023	Internet sources (visited in March 2023)
Marseille (France)  *Levélo*	• Inauguration end of December 2022 with gradual ramp-up, including some operational difficulties. • In three months of operation (end of December to end of March), the number of rentals doubled compared to the previous service at the same period, with fewer bikes. • Eventually, there will be 2,000 pedelecs (or even 4,000) with a range of 65 km, and 200 stations. • Ultimatum to scooter operators on illegal parking.	• Official website: https://levelo.ampmetropole.fr/en • https://gomet.net/plan-velo-metropole-aix-marseille-retard/
Milan (Italy)  *BikeMi*	• First contract signed in December 2008 integrated with the public transport system (ATM), which subcontracts the supply and operation of pedal PB to Clear Channel. • Introduction of e-PB in 2015 for the World Expo, with swapping charging and a different frame colour to distinguish them. • Two contracts overlap between pedal and electric bikes, and are not renewed at the same time. • Service only deployed in the city of Milan (1.5 million inhabitants). • Now 150 e-bikes with child seats, apparently well used. There are rental tests for children during the summer. • MaaS project to come, as Milan has won a national call for projects with the aim of integrating private PB operators. • 322 stations and 3 virtual ones. • Apparently used for last-mile commuting. • No photos of the bikes on the website.	• Official website: http://www.bikemi.com/en • https://dati.comune.milano.it/dataset/ds574-servizi-di-car-sharing-e-bike-sharing • https://bikemi.com/en/who-we-are • https://web.archive.org/web/20110922193855/http://www.smartbike.com/article_view?a3063 • https://www.mentelocale.it/milano/articoli/88121-bikemi-ecco-nuova-app-tessera-prelevare-biciclette-non-serve-piu.htm • https://www.linkedin.com/posts/urbnsharing_bikemi-ecco-la-nuova-app-e-la-tessera-per-activity-6775843008291057664-a13i/
Munich (Germany)  *MGVRad* *(Official website photo)*	• Very large fleet, but very low usage. • Integrated into the MGV public transport offer. • Managed by Nextbike. • In MGV's annual report, the service is classified as an "Other mobility solution".	• Official website: https://www.mvg.de/services/mobile-services/mvg-rad.html • https://www.muenchenwiki.de/wiki/MVG_Rad • https://www.nextbike.de/de/news/mvg-rad-rollt-in-muenchen • https://www.mvg.de/services/mvg-rad.html • https://www.mvg.de/dam/mvg/ueber/unternehmensprofil/mvg-in-figures-s

City	Information gleaned in March 2023	Internet sources (visited in March 2023)
Paris (France)  *Vélib' Métropole*	**Vélib' Métropole** • Europe's largest service, with the prospect of increasing the fleet for the 2024 Olympic Games. • One of Europe's most popular services, with five bike rentals per second at peak times. • An extremely delicate transition, with some problems still present five years later, which was the subject of a report by the Inspectorate General. Vélib' has become a highly political issue. • One of Europe's first in-station e-PB charging services. Pedelecs are more widely used than pedal bikes. • Complex governance, between a metropolitan syndicate, the City of Paris, the Region and 61 communes. • Numerous legal battles by unsuccessful candidates and numerous amendments with the contractor. • Symbolic world capital of micromobility, with a people's referendum on shared e-scooters on 2 April 2023. • The paint on the bikes does not age very well. • Tips on the blog about how to electrify your own bike or receive purchase subsidies.	• Official website: https://www.velib-metropole.fr/en • https://www.bfmtv.com/economie/entreprises/transports/un-rapport-accablant-decrypte-l-origine-du-fiasco-velib_AV-201903290025.html • https://www.affiches-parisiennes.com/les-difficultes-de-velib-a-nouveau-au-premier-plan-94683.html
 *Véligo Location*	**Véligo Location** • Long-term rental with the slogan "Six months to test an electric bike before buying your own". • 20,000 pedelecs and 500 cargo bikes. • New call for tenders underway. • Project managed by the Ile-de-France Mobilités transport authority.	• Official website: https://www.veligo-location.fr/parlons-prix/

City	Information gleaned in March 2023	Internet sources (visited in March 2023)
Stockholm (Sweden)  *Stockholm eBikes* *Photo, source unknown*	• In 2017, JC Decaux won the contract for 5,000 pedelecs and advertising space. But there was an appeal to the administrative court due to a formal defect. • In 2019, VOI was announced as the winner of the contract to install 7,500 bikes and 550 cargo e-bikes, but a new problem arose. • In May 2022, Inurba managed the new service with the Vaimoo solution, with the possibility of selling advertising space via 350 locations near stations. Eventually, the aim will be to cover the entire territory with 7,000 pedelecs, with a minimum of 300 stations beyond the city centre. • The service brand remains Stockholm eBikes. • The stations are geofenced, with markings on the ground and a Bluetooth terminal that is a priori more accurate than GPS to guarantee correct returns to the zone. • In February 2023, the situation seemed to be one of industrial, financial and legal disaster, thanks to a technical solution that seems not reliable. The many technical problems involved the batteries, which lost power after five hours. • In March 2023, the city no longer paid Inurba, which had penalties of €10/bike/day if 90% of bikes were not available for hire, or €1,000/month if a station was frequently empty for more than an hour. • The contract was terminated in summer 2023.	• Official website: https://stockholmebikes.com • https://www.svt.se/nyheter/lokalt/stockholm/stockholms-stad-stammer-hyrcykelbolag-pa-10-miljoner • https://cykla.stockholm/lanecyklar/ • https://www.di.se/digital/totalsagar-stockholms-lanecyklar-trafikkontoret-en-skitdalig-produkt/ • https://www.svd.se/a/APbB9x/anstallda-larmar-om-fusk-med-stockholms-hyrcyklar • https://www.vice.com/en/article/g5vm8x/stockholm-thinks-it-can-have-an-electric-bikeshare-program-so-cheap-its-practically-free • https://www.jcdecaux.com/press-releases/jcdecaux-awarded-10-year-contract-stockholm-city-5000-e-bikes-funded-advertising • https://www.lemonde.fr/europe/article/2018/03/25/a-stockholm-des-batons-dans-les-roues-de-jcdecaux_5276072_3214.html • https://lepetitjournal.com/stockholm/un-nouveau-systeme-de-velos-electriques-stockholm-259182
Vienna (Austria)  *WienMobil Rad*	• New system launched on 1 April 2022 with Nextbike, replacing the former JC Decaux service. • Hybrid system with 185 fixed and 50 digital stations. • Brand name adapted from that of public transport services. • Five-year contract, which can be extended by four years (2*2 years). • Low usage rate.	• Official website: https://www.wienerlinien.at/wienmobil/rad • https://www.derstandard.at/story/2000134574110/citybikes-werden-ab-freitag-von-wien-mobil-rad-abgeloest • https://www.wien.gv.at/verkehr-stadtentwicklung/wienmobil-raeder.html • https://de.wikipedia.org/wiki/Citybike_Wien

6.3 Comparative data for the 20 cities

City	Country	Service	Public Authority	Système provider	Service Operator	Start	End	Lenght	Content	Type of station	Number of stations	Total number of bicycles	Number of pedal bikes	Number of pedelecs	Shared cargo bikes	Trips numbers	Trips/1,000 inhabitants (e)	Bike/inhabitant (e)	Bike/Station	% Pedelecs	Trips/inhabitant	Trip lenght (e)	Trips/bike/day (e)	Trip/bike/day (f)
Location		Name	Stakeholders			Contract (b)				Supply (c)						Use (d)	Supply inidicator				Use indicator			
Anvers R	Belgium	Donkey Republic	Lantis	Donkey Republic	Donkey Republic	2022	2032	10	PB only	Virtual hubs	400	2 000	0	2 000					5	100%	0,0			0,1
Anvers C	Belgium	Velo Antwerpen	City of Antwerp	Clear Channel	Clear Channel	2011	2027	11	PB only	Station	305	4 200	4 200			6 028 493	n°3	n°3	14	0%	11,5		n°15	3,9
Barcelona	Spain	Bicing	City of Barcelona	PBSC	Pedalem Barcelona (Cespa + PBSC)	2019	2029	10	NC	Station	509	7 000	4 000	3 000		16 298 596			14	43%	4,4	n°15	n°6	6,4
Bordeaux	France	V³	Greater Bordeaux	Cykleo	Cykleo (filiale de Keolis)	2023	2030	7	PT + PB	Station	186	2 013	1 013	1 000		1 700 000	n°2	n°1	11	50%	2,3	n°13		2,3
Brussels	Belgium	Villo!	Brussels Capital Region	JCDecaux	JCDecaux	2008	2026	18	PB + adverstising	Station	345	4 100	2 300	1 800		1 000 000			12	44%	0,8			0,7
Budapest	Hungarie	MOL Bubi	BKK	Nextbike	Csepel Ltd.	2020	2025	5	PB only	Station	178	1 761	1 761			2 910 767			10	0%	1,7	n°4	n°14	4,5
Cologne	Germany	KVB-rad	KVB Transit	Nextbike	Nextbike (pour le compte de KVB Transit)	2021	2026	5	NC	Station & Virtual hubs	77	3 000	3 000			1 900 000			39	0%	1,8		n°13	1,7
Copenhagen	Denmark	Donkey Republic	Copenhagen & Frederiksberg	Donkey Republic	Donkey Republic	2021	-	-	PB only	Virtual hubs	2 300	2 600	2 600			2 000 000		n°12		0%	3,6			2,1
Hambourg	Germany	StadtRAD Hamburg	City of Hamburg	DB Connect GmbH (Call a Bike)	DB Connect GmbH (Call a Bike)	2019	2028	9	NC	Station	250	3 600	3 600		37	1 700 000			14	0%	0,9	n°10		1,3
Helsinki	Finland	City bike	Helsinki Region Transport HKL/HST	Fifteen	Moventia (City Bike)	2016	2025	9	NC	Station	460	4 600	4 600			2 475 000	n°7	n°15	10	0%	3,8	n°14		2,6
Lille	France	V'Lille	Greater Lille	Cykleo	Cykleo (Keolis)	2018	2025	7	PT + PB	Station	223	2 327	2 327			2 546 665			10	0%	2,7			3,0
London	United Kingdom	Santander cycles	TFL	PBSC	Serco	2015	2025	10	NC	Station	800	12 000	11 500	500		11 505 872			15	4%	1,3			2,6
Luxembourg	Luxembourg	Vel'OH	City of Luxembourg	JCDecaux	JCDecaux	2018	2028	10	PB only	Station	116	1 000	0	1 000		1 200 000			9	100%	10,4			3,3
Lyon	France	Vélo'v	Greater Lyon	JCDecaux	JCDecaux	2017	2032	15	PB + adverstising	Station	428	5 000	2 949	2051	20	10 535 931	n°5		12	41%	8,3		n°5	5,8
Madrid	Spain	BiciMAD	City of Madrid	PBSC	EMT (Régie -Empresa Municipal de	2014	2022	8	PB only	Station	264	2 964	0	2 964		3 412 000			11	100%	NC			3,2
Marseille	France	LeVélo	Fifteen	Fifteen	Inurba	2022	2033	11	PB only	Station	135	700	0	700	0	NC			5	100%	0,4			5,9
Milan	Italy	BikeMi	City of Milano	Clear Channel	Clear Channel (pour le compte de ATM)	2008/ 2016	2023/ 2031	15	PB + adverstising	Station	325	5 430	4 280	1 150		2 763 000	n°10	n°9	17	21%	0,7			1,4
Munchen	Germany	MGVRad	City of Munich	Nextbike	NextBike (pour le compte de MGV)	2015	2025	10	NC	Station	320	4 500	4 500			620 000			14	0%	0,4	9		0,4
Paris	France	Vélib'	Syndicat Autolib' / Vélib'	Smoove (Fifteen)	Moventia (pour le groupement Smovengo)	2017	2032	15	PB only	Station	1 443	19 000	11 400	7 600		44 300 000	n°1	n°8	13	40%	4,3	n°3	n°3	6,4
Stockholm	Sweden	Stockholm eBikes	City of Stockholm	Vaimo	Inurba	2022	2029	7	PB + adverstising	Virtual hubs	NULL	1 000	0	1 000		NC				100%	NC			NC
Vienna	Austria	WienMobil Rad	City of Vienna	Nextbike	Nextbike (Pour Weiner Linien)	2022	2027	5	PB only	Station	240	3 000	3 000			300 000			13	0%	0,1			0,3

April 2023 | Authors: Mobiped, TML | Sources: (a) Greater city 2018 or 2019 population from Eurostat | (b) press articles or private operator market monitoring | (c) Meddin Bike-Sharing World Map Data Base 17/02/2023, ajusted by latest researches | (d) 2021 or 2022 data from press articles, local government or service websites | (e) Ranking of top n° for the CIE benchmark fulfilled by Fluctuo, integrating both public and private bike sharing (2023) | (f) Estimated figures based on the number of bikes and annual rentals (can be a rough estimate / can be approximate numbers) particularly for systems recently rolled-out | (g) Fluctuo Dive, https://dive.fluctuo.com/city, 17 mars 2023 | (h) https://en.wikipedia.org/wiki/Modal_share (17 mars 2023), TEMS is not operating anymore | (i) TML, Mobiped, STIB and Brussels Mobility expert considerations. NC : Not communicate.

Location		Name	Territorial context					Micromobility *(g)*			Modal split *(h)*				City network							Inspiring cities (i)				
City	Country	Service	Population *(a)*	1 M < inhabitants < 1.5 M	Brussels' weather	Belgium	Dutch speaking	Topography	E-scooters (nb)	E-bike (nb)	E-mopeds (nb)	Walking	Cycling	Public Transport	Private motorised mode	Good Move benchmark	2016 e-PB benchmark	POLIS Member	EUROCITIES Member	100 Carbon Neutral City	Conference of Mayors	Brussels' twin city	Public Bicycles	Long-term rental	MaaS	Public Transport	PT-Bike intermodality
Anvers R	Belgium	Donkey Republic	1 000 000		✓	✓	✓	Flat, Large river									✓		✓								
Anvers C	Belgium	Velo Antwerpen	523 591		✓	✓	✓	Flat, Large river	3	3						✓		✓		✓							
Barcelona	Spain	Bicing	3 665 687					Mostly flat, partly hilly in the north east (+150 m), Seaside	4	9	9	34%	2%	37%	26%	✓		✓	✓	✓	✓				✓	✓	✓
Bordeaux	France	V³	735 143					Flat, Large river	2	2	2					✓			✓	✓	✓			✓			
Brussels	Belgium	Villo!	1 205 492	✓		✓	✓	Hilly, +100 m, ups and downs to the east	8	5	1	25%	3%	28%	43%	✓		✓	✓	✓				✓			
Budapest	Hungarie	MOL Bubi	1 749 734					Flat at east and hilly at west Large river	3	1	1	32%	1%	47%	20%			✓	✓	✓	✓						✓
Cologne	Germany	KVB-rad	1 080 394	✓	✓			Flat, River	4	5		25%	19%	21%	35%				✓							✓	
Copenhagen	Denmark	Donkey Republic	559 440					Flat	2	5		10%	30%	36%	26%	✓			✓	✓	✓						
Hambourg	Germany	StadtRAD Hamburg	1 830 584					Mostly Flat	4	4	1								✓		✓						
Helsinki	Finland	City bike	643 272					A little hilly	2			31%	7%	15%	45%	✓			✓	✓	✓				✓		
Lille	France	V'Lille	951 461		✓			Flat									✓	✓	✓				✓				
London	United Kingdom	Santander cycles	8 866 541					Mostly Flat, Large river	3	5		26%	3%	45%	27%			✓	✓		✓			✓				
Luxembourg	Luxembourg	Vel'OH	115 227		✓			Strongly hilly, Narrow river											✓								
Lyon	France	Vélo'v	1 265 618	✓				85% flat + 3 hills (+100 m) 2 rivers	2	1							✓		✓	✓	✓		✓	✓		✓	✓
Madrid	Spain	BiciMAD	4 955 432					A little hilly, on a slope between 550 and 750 m,	5		4	34%	1%	25%	40%		✓	✓	✓	✓	✓	✓			✓		✓
Marseille	France	LeVélo	965 330					Hilly, Sea side															✓				
Milan	Italy	BikeMi	4 106 356					Flat	7	4	4	18%	10%	41%	29%		✓	✓	✓	✓						✓	
Munchen	Germany	MGVRad	1 456 039	✓				Flat, Large river	4	5	1					✓			✓	✓						✓	✓
Paris	France	Vélib'	10 240 964					Mainly flate, but lot of false flat, Hills north and north east	3	3		15%	5%	59%	20%			✓	✓	✓	✓		✓	✓				
Stockholm	Sweden	Stockholm eBikes	1 745 766					Flat, Many rivers	6			14%	7%	47%	32%			✓	✓	✓	✓					✓		
Vienna	Austria	WienMobil Rad	1 766 746					Flat, River	4	2		26%	7%	39%	28%			✓	✓		✓				✓		✓

April 2023 | Authors: Mobiped, TML | Sources: (a) Greater city 2018 or 2019 population from Eurostat | (b) press articles or private operator market monitoring | (c) Meddin Bike-Sharing World Map Data Base 17/02/2023, ajusted by latest researches | (d) 2021 or 2022 data from press articles, local government or service websites | (e) Ranking of top n° for the CIE benchmark fulfilled by Fluctuo, integrating both public and private bike sharing (2023) | (f) Estimated figures based on the number of bikes and annual rentals (can be a rough estimate / can be approximate numbers) particularly for systems recently rolled-out | (g) Fluctuo Dive, https://dive.fluctuo.com/city, 17 mars 2023 | (h) https://en.wikipedia.org/wiki/Modal_share (17 mars 2023), TEMS is not operating anymore | (i) TML, Mobiped, STIB and Brussels Mobility expert considerations. NC : Not communicate.

6.4 Inspiration from other cities classified by country

Country	City	Brief information collected during 2023
England	Liverpool	Service launched in 2014. Closed in July 2022 after annual losses of €300,000. Replaced by Voi.
Argentina	Buenos Aires	Simplified access to the service with the public transport map. Free to use.
Australia	Brisbane	Public service replaced by private operators via a non-exclusive memorandum of understanding without a call for tenders to define the minimum characteristics to be met: identification of bikes, quality of bike condition, number of bikes, confidentiality of users, "licence" duration of 12 or 24 months. Lime operates electric bikes and scooters.
Brazil	Rio	Partnership with delivery companies Uber-Eats and E-food. Usage never really took off.
Canada	Montreal	Pay-as-you-go available. For OPUS card users (public transport), no deposit required.
	Vancouver	The multimodal pass enables employees of 13 employer organisations to use public transport, car-sharing and shared bikes for business trips. With the Qcit logistics optimisation software, the number of kilometres travelled for regulation purposes has been reduced by 39%.
Columbia	Bogota	After 14 years of upheavals (the urgent need for a service and therefore a humanised solution, decisions taken without listening to the consultants, problems with the advertising industry, an unsuccessful call for tenders because the service requested was too perfect), the first third-generation service was set up in 2022 by PBSC and operated by Tembici. At the same time, the same city department launched a call for tenders for free-floating.
Denmark	Copenhagen	The service closed at the end of 2022 following the end of subsidies.
United States	Atlanta	Recognised as good practice for integrating local communities, especially those concerned about gentrification.
	Chicago	"Divvy for everyone" programme for the underprivileged, with the option of paying in cash. Shared e-bikes and shared e-scooters can be parked at the same charging stations. Possibility of offering station sites.
	Kansas City	Faced with the difficulties of obtaining data on e-scooters, the city carried out a pilot project itself.
	Los Angeles	The original aim of the Ford GoBike (before Bay Area Bike Share) was to complete the last mile for passengers at Caltrain and BART transit stations. Integration of the Mobility Wallet (MW), a prepaid debit card loaded with $150/month to pay for private and public travel.
	Minneapolis	After 13 years of service, closure in March 2023 following the termination of Blue Shield's $3 million annual sponsorship, in the post-George Floyd murder context.
	Philadelphia	Solar panels not efficient enough, so need to swap. Recognised as good practice for integrating/involving low-income local communities.
	Pittsburg	Setting up of mobility hubs and a single multimodal interface for planning and booking micromobility, shared cars and public transport. Pilot programme to enable 100 people on low incomes to use all modes free of charge for six months. In 2022, PBSC replaced Nextbike who use the 3G network, which was about to be discontinued.
	Sacramento	Payment to Lime of revenue per journey/bike/day.

Country	City	Brief information collected during 2023
	San Francisco	The Bay Wheels system allows users to rent a bike at night, from 7 - 8 p.m. once the rush has finished. But vandalism increased maintenance costs, generating a risk of service closure, avoided thanks to a $15.9 million contribution from the Metropolitan Transportation Commission.
France	Auxerre	Launch in 2023 of the Fifteen system, which lets users rent the same bikes for either a few minutes or a few months.
	Avignon	Call for tenders combining several bicycle services.
	Besançon	First-generation contract with JC Decaux ending in 2024, as the deadline was extended due to Covid-19.
	Dijon	Keolis flagship. The service best connected with public transport.
	Grenoble	LTR service is 20 years old in 2024, with average usage increasing by 10%/year. Separated from PT after being included with it. New call for tenders launched in March 2023 to pool bicycle services for a four-year period: rental (+10,000 LTRs of 12 different models), repair, management of four agencies, events (e.g. mobile agencies), provision of furniture (removable parking, bicycles), parking management. No PB. Awarding of a monopoly via two calls for expressions of interest for private e-SB and private e-scooters, both won by Dott. Deployment according to the interest of communes, from 4 to 17 communes. On-street parking only in place of a car parking space.
	La Rochelle	Acquisition of the Flexbike solution and management by the company.
	Lorient	The PB was vandalised in mid-May 2022 and are unavailable until further notice.
	Mulhouse	First-generation contract with JC Decaux ending in 2024, as the deadline was extended due to Covid-19.
	Nantes	Change from an PB + Advertising contract to a bicycle services contract (PB, LTR, social LTR and parking) for a period of seven (+ two) years, awarded after a 1.5 year competitive dialogue procedure. One communication on all offers. Consideration of discontinuing the service and redistributing the money to other bike schemes, but it is difficult to offer an alternative to the tens of thousands of subscribers.
	Nice	Cohabitation of two services: in-station pedal PB (Transdev) and free-floating e-PB (Fifteen). The name is the same, "Vélo Bleu", but the access channels are different. Identified fraudulent temporary accounts with prepaid cards.
	New Aquitaine Region	18-month trial of a hybrid PB service with the Fifteen solution: 25 stations in eight stations, several stations in three cities. Three months after inauguration, 1,226 users, 3,717 journeys and 19,426 km covered *(Source: Congrès des villes et territoires cyclables 2023)*.
	Strasbourg	PB services but with return to the same station. 34,000 rentals in 2022, i.e. a turnover rate of 0.78 for 120 bicycles on the ground at 20 stations in the city centre. Change of PSD on 1 August 2023, which includes a shop, 16 reception points in post offices, one reception point on the university campus, 300 days of mobile activities/year, 4,000 LTR including 1,200 pedelecs (student fares becoming more expensive every year), and 300 PBs in 38 stations with back to one, with the aim of getting people cycling (again), allowing them to try it out and convincing people who are far removed from cycling.

Country	City	Brief information collected during 2023
	Toulouse	Awarded at the end of June 2023 to JC Decaux with 475 stations, 3,825 PBs (50% pedal, 50% electric) for €97,609,790 over 12 years. If the turnover rate, spread over one year, falls below three for two consecutive years, the Metropole can terminate the contract. 13,000 trips/day are expected. The subscription is €25/year for pedal bikes and €80/year for pedelecs.
	Vienna	Fredo clip-on padlock for use with traditional bicycles or special bicycles.
Italy	Turin	Service closed on 13 February 2023.
Mexico	Mexico City	Recent system change with 9,300 bikes in 687 PBSC stations. Ecobici is fully integrated into the TCDMX multimodal card, which allows use of the metro, trains, buses and PB. "Open contract" selection procedure.
Netherlands	Amsterdam	800 e-PBs sponsored by the public transport operator and managed by Donkey Republic, but with no stations in the city centre. 110 self-service cargo bikes (with return to the departure point), with a target of 750 by 2024 and a maximum of 1,250 in the long term.
	The Hague	500 PBs in virtual hubs, mainly at public transport stops, set up by the public transport operator. The turnover rate is 0.47.
Poland	Poznan	PB interacts with the public transport network (proximity of stops, reduced prices for subscribers). Identification of a positive relationship between PT frequency and PB use over short (-1,500 m) and medium distances (1,500 m to 300 m), especially for station-based PB, but less so for non-station-based SB (for longer journeys, especially on the outskirts, PT integration less valued).
Portugal	Lisbon	Gira's PB service is free for residents.
Sweden	Gothenburg	One of the initial objectives was to encourage people to use bicycles rather than public transport for short distances. Bikes are integrated into the public transport app. The turnover rate has been around one for several years. Launch of a Request for Information on self-service cargo bikes.
Switzerland	Basel	Few rentals in a city where cycling is already very popular, with questions about whether or not to increase the fleet as the system is not working very well. Presence of private-initiative shared micromobility, including speed-pedelecs (remaining Pike e-bike as Bond has closed).
	Bern	Ten years after the first political intentions, the service was fully operational in 2019 for a five + two-year contract. Citizens were able to give their opinion on the location of the 180 stations (marked out but unattached). The fleet is 50% pedal and 50% pedelecs. A regional service is currently being considered. The bicycles are in a virtual station, on stands only. Previously operated by a work-integration programme, the 2,000 bikes are now operated by PubliBike.
	Geneva	First project in 2013 but public funding refused as it was not considered a priority. In 2015, the contract was awarded to Transports Publics Genevois (TPG), but legal action was taken in relation to the benefit in kind provided by making public space available without financial consideration. In 2019, the canton of Geneva launched a call for tenders. The contract was awarded to Donkey Republic, which pays a public space usage fee of 10 Swiss francs/m² (1 bicycle)/year. The concession runs from 2020 to 2027. SB is not considered a public service. 20 of the canton's 45 communes are in favour of bicycle parking. Bicycles are parked in bicycle racks. Padlocks had been added, but were rarely used. The latest generation of bicycles no longer have

Country	City	Brief information collected during 2023
		padlocks. There were 13,000 rentals for 500 bikes in April 2023. The orange colour of the bicycles corresponds to SB, TPG, Just Eat and the "Christian Democrat" political party. A partnership with TPG is currently being implemented.
	Lausanne	Collaboration between the PT operator and PubliBike.
	Lucerne	Recently chose Nextbike.
	Neuchâtel	Donkey Republic service, with humanised station in summer.
	Schaffhausen	Competition for sharing (including car-sharing), with three out of seven projects selected. Tier will offer 200 scooters and 20 bikes.
	St. Gallen	Discount on Tier SB for PT subscribers.
	Thun	Purchase or rental of the Donkey Republic system, partly operated by the company.
	Zurich	In 2023, PubliBike and several private players were present. Selection process for the PB with a call for tender in 2023.

6.5 Thematic lessons paraphrased for each service

6.5.1 Antwerp Region - Donkey Republic

- **Motivation**: alternative to car use for outlying municipalities, in parallel with new road and motorway projects.
- **Coverage**: a first on such a large scale, with such a wide range of municipalities. Minimum one six-bike station/municipality. Tariffs can be adapted by type of bike and by municipality.
- **Call for tenders**: ten applications, four really involved, three final responses. Approach of proposing objectives and letting applicants explain their methods. Increase in the amortisation period from seven to ten years, in line with the construction period of the road project. The promises are more ambitious than reality.
- **Contract**: no exclusivity but better to have a monopoly on an area. Flexibility of system and contract for "tailor-made" solutions for each municipality.
- **Public price**: Lantis pays €1.5 M/year to cover around 1/3 of costs.
- **Deployment**: eight months planned, but in reality, over a year, with logistical delays. Inexpensive and effective communication package with 70 events in four months.
- **Supervision**: not too strict on KPIs at first, with time to adapt to reality.
- **Parking**: virtual stations near public transport stops. Full hubs are no longer displayed on the app. 6% of parking outside hubs despite awareness campaigns and fines. This rate is set to fall as the number of available hubs increases.
- **Operation**: tolerance for empty hub for 48 hrs. Two logistics centres. Battery swapping. 80% of repairs on the street. 50/60 batteries in the trailer. Furthest hub 26 km from centre. One maintenance/bike/month. One service/bike/year in winter.
- **Human resources**: one local Dutch-speaking supervisor (after pressure from Lantis). Swappers and mechanics, some of whom specialise in electronics. High absence rate among swappers and mechanics, with a 15% margin for additional staff. Work with social integration companies. Mechanics on the ground act as ambassadors and talk to users. Work on the app is carried out by a dedicated team at the Copenhagen headquarters.
- **Pricing**: no social pricing. Assumed that not everyone has access.
- **Functionality**: 100% digital experience on the app. Reservations possible.
- **Bikes**: mix of pedal bikes and pedelecs. 20-30% of bikes are not available for rental (instead of the estimated 10%). Bikes considered as heavy.
- **Use**: mainly used in the centre of Antwerp, where it is profitable. 20% tourists. A lot of night-time use between 7 pm and 7 am. Very few subscriptions. Average distance of 8 km. Used for journeys that would otherwise not have been made.
- **Link with Velo Anvers**: synergies could only be created if Donkey wins the next contract.
- **Link with public transport**: no cooperation with De Lijn.

6.5.2 Antwerp City – Velo Anvers

- **Cycling**: 85% of Antwerp residents own a bicycle (83% in 2017). Increase in cycling accidents due to the wide variety of cyclists and bicycles (different sizes and speeds). Less parking than in Copenhagen and Amsterdam.
- **Motivation**: improve the bicycle parking supply. Specifications managed by the Parking Department of the City of Antwerp.
- **Contract**: dedicated to PB and separate from advertising. Commercial risk transferred to the operator, who receives 100% of revenues. Fixed, controlled public cost. Switch to a per-subscriber subsidy model (for an unchanged total amount) to lower VAT to 6%.
- **SLA**: percentage of full stations (2%) and empty stations (5%) calculated over 24 hours. Very well respected.
- **Supervision:** two FTE divided between three to four people who are not full-time.
- **Coverage**: very high city-centre density. Growth starting from the centre. Four districts without stations. Clause for moving/adding stations and bikes.
- **Operations**: a highly committed operator with a dedicated PB operations team that considers itself more Velo Antwerp than Clear Channel. 60 employees, including 13 mechanics (permanent contracts, temporary staff, trainees) and 30 regulation staff. In-house call centre (with outsourcing for busy periods and weekends). Eleven regulation vehicles with artificial intelligence. Workshop repairs only: 20,000 repairs/maintenance/year. Each bike returns to the workshop 4.8 times a year. Each repair is inspected by a second person.
- **Pricing:** reasonable but not cheap either.
- **Revenue**: €4 M/year.
- **Waiting list**: the system cannot operate with too many subscribers. Scarcity marketing.
- **Regulation**: no regulation at night. Weekly discussions on the operation of the stations around the train station, even after 12 years of operation. Logistics vehicle parking space to be provided close to each station.
- **Vandalism/theft**: provision of 10% of reinvested surplus if vandalism is low.
- **Image**: naming proposals rejected. Clear Channel employees are perceived as civil servants. The brand belongs to and represents the city.
- **Usage**: 7 million rentals in 2019. Drop during Covid-19. 6 million in 2022. 1 million/year for the five stations at the central train station. Velo Antwerp is seen as a guarantee of mobility. Peak usage, but fairly even throughout the day. 70% of subscribers live in the city centre.
- **Free-floating SB**: authorised only if the turnover rate exceeds three rentals/bike/day. Donkey Republic would not be authorised without public funding from Lantis.
- **Next contract**: end of contract in 2027. Continuity of service is not called into question. Certainly an PB with station (but possibility of including free-floating or pedelecs). Clear Channel has not developed a version 2.0 of the bike, but may apply as an operator.

6.5.3 Budapest

- **Motivation**: first version at the heart of cycling policy. Second version to develop a multimodal culture. Bike project, but also marketing, policy and data.
- **Procedure**: information day for potential candidates in 2011.
- **Transition**: total stop for six months. Previous furniture retained, without electronics.
- **Network**: gradual expansion. Refusal to extend if insufficient density.
- **Parking**: a highly diverse and sometimes confusing offer: mobility hub/drop zone/old de-electrified station/ground markings.
- **Intense communication**: BKK needs to be in control internally to be responsive. It is easier to communicate about a service than an infrastructure. Positive communication for all audiences from 8 to 80 and without headphones. Development of a sense of belonging and pride (including local NGOs). Limits vandalism. Naming by an oil company to target motorists at service stations and gain national visibility: BUBI was voted Word of the Year 2017 in Hungary.
- **Supervision**: six FTE. Difficulty encouraging the operator to increase rentals, as there is no financial incentive to do so, and even the opposite. Mistrust of the data transmitted with no possibility of counter-expertise. Need to have data in MBS format.
- **PT-Bike culture**: Micromobility improves access to public transport, which remains the backbone of multimodality. BKK, historically dedicated to public transport, is becoming a multimodal player. Rather than focusing on the PT journeys "stolen" by bicycles, BKK advocates putting energy into attracting new customers who will increase overall revenues. A cyclist is more likely to use public transport than an everyday car driver. Shared mobility appears in the modal share.
- **Feature**: multiple simultaneous rentals possible with a single account.
- **Usage**: much better figures with version 2. Transparency sharing data. 70% of MOL Bubi users also have private bikes.

6.5.4 Ghent

- **Cycling policy**: modal share keeps rising. No one-way PB in public policy. Bicycle services strategy via FietsAmbassade, made up of several branches offering bicycle services: parking, repair, rental, training (20 training courses in 2023, 30 expected in 2024). Supply dedicated for companies. Refurbishment and sale of second-hand bikes (1,000 bikes sold between €100 and €400).
- **Bike ownership**: 90% of families in Ghent have a bike. 84.5% of Ghent residents own a bike (Buurtmonitor Stad Gent, 2020).
- **Strong parking policy**: giant bike parks at stations. Goal of a bicycle parking facility within 100 metres of each house entrance (useful for the old town). Exploration of new parking concepts (flexible parking, peak-hour parking). Private parking at €65/month for the user.
- **Free-floating**: 1,600 bikes available via three groups of operators (Donkey Republic, Dott + Baqme, Bolt) who share a maximum budget of €50,000 in annual subsidies of €100/bike or €125/pedelecs. Five districts are subject to territorial service constraints. The city has no precise data on users.
- **Subsidised LTR for students:** 8,000 bikes and 7,628 rentals by students in 2023 for €70/year.
- **Unsubsidised rental**: five rental outlets. 676 bicycles of 34 types for around 10,000 rentals in 2023, representing a total of 68,518 rental days for short-term rentals to individuals and groups, which account for 20% of sales.
- **Other shared bikes services include** Swapfiets, Blue-bike at train stations, Cambio and a sharing platform for neighbours (Dégage, in the Rabot district www.bakfietsdelenrabot.be).

6.5.5 Madrid

- **Cycling**: few personal bikes visible, unlike the blue Bicimad. No restrictions on individual car use. Cyclists are not allowed to go through green pedestrian lights.
- **Governance**: acquisition of the technological system for 3 + 12 years of maintenance. European funding of +€40 M obtained.
- **PBSC solution**: supply chain challenges from Canada and China, with purchases in dollar. Deployment capacity of eight stations/day. Observation by the delegation of recurring problems with warped rear wheels and faulty rear lighting.
- **Operation**: everything is done in-house by the EMT bus company. This governance seems to be a continuation of the previous service recovered after Bonopark went bankrupt. Clear, shared objectives.
- **PT complementarity**: operated by EMT, which manages the bus network, but there are few economies of scale (the warehouse will soon be separated). No fear of competition from bicycles, because even with a turnover rate of 10, which is very optimistic, the 70,000 PB rentals/day would be low compared to the 1.6 million bus journeys/day. Two separate mobile applications. Cyclists are not allowed in bus lanes. €10 discount for PT subscribers in Bicimad 1.
- **Transition**: Frenetic pace imposed by elections. Free service during the transition period (80 days before the elections, estimated cost €1.7 M before the free service period was extended). Technological developments to merge the new service with the old one (as both services had GPS in the bike), but the merger was very complex.
- **Deployment**: visibility of stations in public spaces. High density in city centre.

6.5.6 Marseille

- **Cycling practise**: few personal bicycles observed, but some PB.
- **Contract**: competitive dialogue. Need to properly test bikes and fraud possibilities.
- **Deployment**: PB in places with the greatest demand potential, with a few exceptions due to political negotiations. For the other zones, there is the LTR.
- **Transition**: dismantling/installation schedule. Recovering electrical connections from old stations is a plus. Complex electrical connections. Five months after the expected delivery date, service not delivered with 25% of stations and 65% of bikes missing. Gradual ramp-up of operations (adaptation, flexibility, turnover).
- **Collaboration:** three players (authority, supplier, operator) who have a vested interest in making things work and therefore form a team. Need to accept that an PB system cannot be perfect.
- **Communication**: a basic name, "Levélo". Territorial marketing to strengthen the new metropolitan entity. General public document on its operation.
- **Usage**: much higher performance levels than the previous service.
- **100% pedelecs:** a real game changer when it comes to climb slopes for non-cyclists. Better distribution between the city's high and low points (impression to be verified in the figures). A homogeneous fleet avoids overuse/wear of pedelecs and differentiated balancing between stations and bike types.
- **A technological solution that has yet to prove itself**: first large-scale deployment of this Fifteen system. No choice of bike. Users have to contribute a lot to keep the system running. No charge if bikes are incorrectly stacked by the user. Bicycle area defective but information not easy to read and bicycles not blocked. Substantial additional operational costs (bicycles not robust enough, various possibilities for fraud, 150 lost bicycles, battery swapping due to non-electrified stations, underestimated operating human resources, detection of bicycle anomalies not yet perfected). Technological solution needs improvement and is currently being improved.
- **PT**: 5,000 people have two subscriptions (PB and PT) thanks to free access for PT subscribers.
- **Access**: no smartphone required. Bank card mandatory but minimum amount €15. Some former users are not convinced by pedelecs and price increases.
- **Preventing vandalism**: employees come from sensitive districts and facilitate dialogue with social mediators. Removal of all bicycles during the riots in June 2023.

6.5.7 Paris - Vélib' Métropole

In brief

- **Cycling policy**: "developing a cycling culture" part of the cycling plan, with a blog promoting personal cycling. "Luxury" service it is unthinkable to remove.
- **Contract**: separation from advertising (poor political image, fear of litigation, need for transparency). Very long term (15 years). Competitive dialogue: two final responses, numerous amendments, differing interpretations between the operator and the public authority of the slop/bike rate at the heart of service sizing.
- **Service still not received**: 16% of bikes missing from the public authority point of view. Data not certified yet. Penalties that prevent the operator from investing to improve service.
- **Touchy transition**: project "too" ambitious. Shared responsibilities between the mobility authority, the outgoing operator, the new service provider and the electricity grid operator. Very poor service for months, declining usage and repercussions still present six years later (see next page).
- **Fragile economic model**: €200 million loss for the operator over the first six years (undervaluation of operating prices), with an optimisic target of €100 million at the end of the contract. The public authorities contribute 60% and users 40-50%. Contract indexed to inflation.
- **Divergent needs of stakeholders**: users (more bikes available), Public Authority (more uses and user revenues), Operator (economic equilibrium and positive cash flow).
- **Dynamic market monitoring**: multi-tool control. Unsuitable penalties. Too many indicators. Data duplication and data analysis at the public authority.
- **Mix of pedal bikes and pedelecs**: complex pricing structure. Overuse of pedelecs. Longer journeys. Breakdowns in cold weather. 100% infra-chargeable to be questioned. Cost imbalance.
- **Overflow**: false good idea to think that this will reduce costs.
- **Innovation**: launch of a hackathon.

Reasons for the difficult transition from Vélib'1 to Vélib'2 in Paris

- **A highly ambitious project**: change of governance and business model. Retention of the same pricing model. Service continuity. New technological solution. 100% charging stations. +1,000 almost simultaneous public worksites with road network and other constraints: trenches, administrative intermediaries, asbestos diagnoses, excavations, deadlines, electrical connections, opening of electric meters, etc.
- **Call for tenders**: only two responses, so fewer elements for comparison. Confidence in an SME backed by a major consortium that failed to meet its commitments.
- **Mobility Authority**: late wake-up call. Lack of a critical eye on technology (IT systems, power supply, maintenance in line with the high standards in Paris). Complex governance transfer: late transfer of authority, late creation of a team, search for consensus among 60 communes. Deadlines maintained despite appeals. Lack of risk management culture.
- **Outgoing operator**: lengthy negotiation of the end-of-contract amendment. Legal recourse on the awarding of the contract and on the non-reinstatement of former employees. There may be a commercial interest in complicating the transition to maintain an outgoing advantage with other cities.
- **New provider**: theoretical offer but unfeasible within the initial timeframe. The consortium's inability to fulfil its commitments. No experience on this large scale. Non-functional technological solutions. Failure to anticipate equipotentiality and amperage standards in public areas. Late sharing of difficulties. Lack of risk management culture.
- **Power grid operator**: complex coordination. Distinct temporalities. Challenges linked to the opening of 1,000 construction sites almost simultaneously.
- **Consequences**: service deterioration. From +35 M rentals/year to 7.1 M rentals in 2017. The service is still not considered delivered six years later.

6.5.8 Paris - Véligo Location

- **Cycling policy**: LTR's clear objective is to "encourage people to test an electric bike before buying their own", then to promote the bike purchase subsidy. Véligo Location 2 will create even more synergies between bicycle services: 20 bicycle houses with the full range of IdFM bicycle services (reception, information, advice, promotion, bicycle testing before rental, subscription assistance, bicycle distribution, minor repairs, etc.), including rental with testing of bicycle models eligible for IdFM purchase assistance. Free access to IdFM bicycle parking with a Véligo Location subscription.
- **Initial fleet increased according to usage:** initial fleet of 10,000 + 5,000 + 5,000 pedelecs then + 1,000 cargo bikes. Véligo Location 2 will offer folding bikes, pedal bikes, adapted bikes and cargo bikes (extended with tray, box or trailer).
- **Launch**: contracted in 2018, launched in 2019, with beneficial effect of PT strikes in late 2019.
- **Investment**: IdFM financed the investment with the purchase of the bicycles (and, in the near future, the facilities for the bicycle houses). Bicycles are returnable goods, and an outgoing and incoming inventory is drawn up between contracts. IdFM finances a fixed contribution to operations, calculated based on operating expenses and commercial revenues.
- **Supervision**: Over the three last years, the cycling team grew from one to five FTE. 2 non full-time employees share the contract supervision.
- **Amount**: Véligo Location 1: (€111 M over six years, €18.5 M/year), i.e. approximately €1,000/bike/year. Véligo Location 2 (max. €300 M over eight years, i.e. €37.5 M/year).
- **Set-up**: public service delegation, as for bus services in the outer suburbs, subject to competition, whereas IdFM contracts with PT operator are by mutual agreement.
- **Operations**: apart from regulation, the business is similar to that of an PB, with logistics and repairs, but with very different volumes. The network of players capable of operating this type of service is relatively small, as there is no multi-city network player yet.
- **Cost**: €1,000/bike/year due to extensive logistics. Substantial storage and maintenance.
- **Relationship with private players**: green light after legal study, as development of a regional offer and non-renewable limited in time offer. Adding value to other long-term rental services. Partnership with a distribution network (traffic generation). Partnership with 35 bike shops.
- **PT relationship**: bicycle 0.5% and LTR 0.18% of IdFM budget. A cautious political order turned into a masterstroke, aided by the context (strike, post-lockdown). Its success was surprising and had a positive impact on the image of cycling for top management, with IdFM receiving a lot of media coverage. There was a consensus on bicycles, with no opposition from the Board of Directors, and even a desire to go further. An internal acculturation to cycling has begun but seems slow.
- **Customer experience**: continuous improvement to make subscription easier and simpler. Only available on the website for Véligo Location 1.
- **Usage**: 40% buy a bike within 30 days of the end of the rental period.
- **LTR versus PB**: different targets. Complementary services. Better assistance to start cycling.
- **Meal delivery cyclists**: access prohibited. GPS flow analysis to identify potential delivery practices. Consideration of support for private leasing (e.g. Swapfiets, Zoomo). National lobbying for meal delivery companies to provide bicycles.
- **Challenges**: managing bike theft and authorising GPS tracking.
- **Véligo Location 2**: doubling and diversifying the fleet, with a target of 40,000 bikes. Regional network of 20 to 40 cycling house with specific criteria (surface area, proximity to stations, in stations or station districts). Circular economy (reconditioning, resale, donation and recycling of current and future fleets). Eight-year contract in line with the lifespan of the bicycles and to amortise the investment in the bicycle fleet and the fitting-out of the cycling house. One year from contract signature to commissioning.

6.6 Summary tables

6.6.1 Context, supply and demand

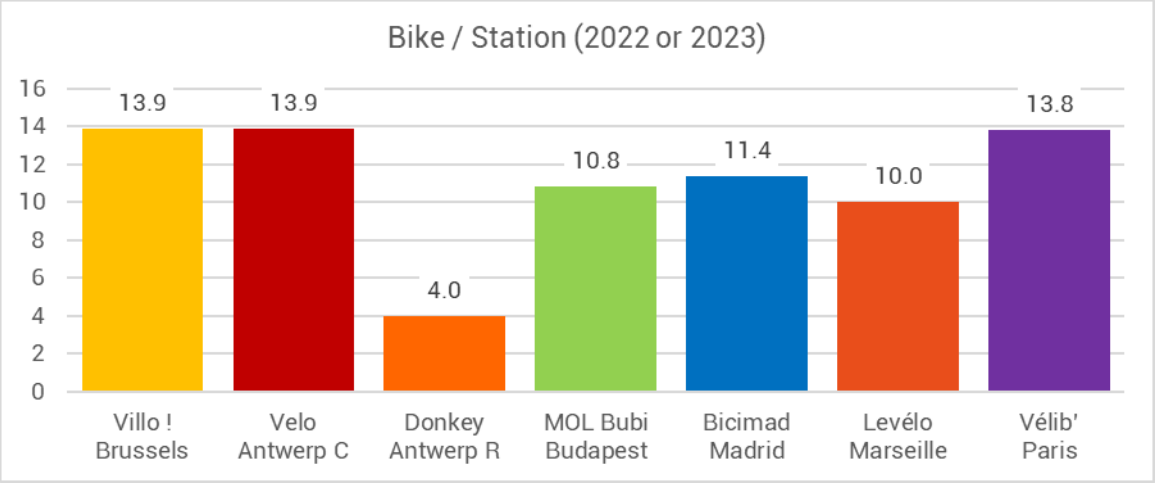
	Brussels Villo !	Antwerp C Velo	Antwerp R Donkey R.	Budapest MOL Bubi 2	Madrid Bicimad 1	Marseille Levélo 2	Paris Vélib' 2
Reference year	*2022*	*2022*	*2023*	*2022*	*2022*	*2023*	*2022*
Context							
Population of conurbation or urban area	1,222,637	510,000	1,135,000	1,774,000	6,780,000	1,903,173	5,200,000
Population of the main city	188,737	510,000	510,000	1,774,000	3,300,000	870,321	2,100,000
Administrative area	163 *Region*	204 *City, port*	1 207 *Région*	525 *City*	606 *City*	241 *City*	402 *Greater Paris*
Density (inhabitants/km²)	7,505	2,500	940	3,379	5,446	3,611	12,935
Topography	Flat, Hilly	Flat	Flat	Flat, Hilly	Flat, Hilly	Hilly	Flat, Hilly
Mobility							
Bicycle (modal share)	9.3%	32.0%	28.0%	2.0%	0.6%	1.0%	2.3%
Public Transport (Millions of journeys/year)	338	71	n.c.	1,135	1,861	121	2,920
Public Bicycles System						*06.2023*	
Stations	345	303	430	178	264	155	1,443
With parking hook	*345*	*303*	*0*	*0*	*264*	*155*	*1,443*
Géofences	*0*	*0*	*430*	*178*	*0*	*0*	*0*
Stations in theory	345	303	430	190	264	200	1,450
Parking slots (nb)	8,435	9,600	0	0	6,336	3,100	45,476
Bikes in the contract	5,000	4,200	2,150	2,060	3,000	2,000	20,000
Bikes availables	4,103	4,200	2,150	2,060	2,964	700	17,019
Pedal bikes	*2,303*	*4,200*	*300*	*2,060*	*0*	*0*	*10,258*
Pedelecs	*1,800*	*0*	*1,850*	*0*	*2,964*	*700*	*6,761*
Territorial coverage							
Residents concerned	1,222,637	480,000	1,135,000	909,301	1,500,000	870,321	5,200,000
Perimeter area (km²)	132	80	1,368	61	51	84	442
Area 150m radius (km²)	24	19	19	13	n.c.	13	89
Average distance between to nearest stations (m)	387	289	710	313	n.c.	350	277
Pricing					*Pedelecs*	*Pedelecs*	*Pedelecs*
Monthly subscription	€3.0	n.c.	n.c	€2.7	n.c.	€6.0	€9.3
Yearly subscription	€36	€58	€600	€23	€25	€72	€112
PB Demand							
Annual rentals	997,826	6,028,472	364,000	2,791,509	3,412,000	2,197,135	44,202,115
Members (nb)							
Membres >1 month	*18,861*	*59,000*	*n.c.*	*4,447*	*56,746*	*20,000*	*378,000*
Users< 1 month	*45,272*	*90,965*	*n.c.*	*351,102*	*0*	*37,000*	*708,886*
Main users	Higher education (74%) Male	Higher education (75%) Male	Leisures trip Foreigners	Higher education (72%)	Higher education Male	n.c.	Male (58%)
Average length / trip (km)	1.9	2.3	8.6	2.0	2.6	3.2	Pedal : 2.8 Pedelecs : 3.8

6.6.2 Governance and finance

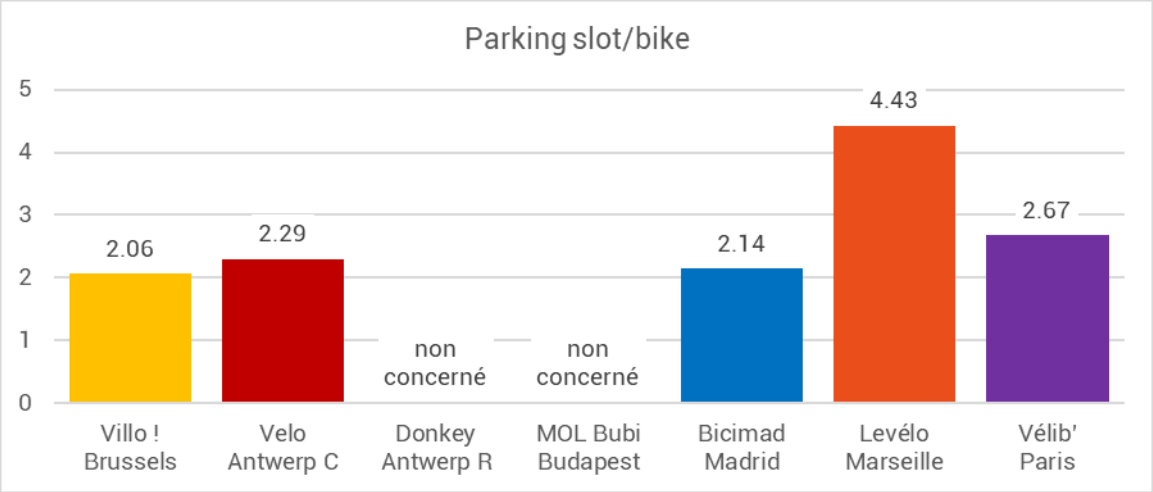
	Brussels Villo !	Antwerp C Velo	Antwerp R Donkey R.	Budapest MOL Bubi 2	Madrid Bicimad 1	Marseille Levélo 2	Paris Vélib' 2
Governance							
System provider	JC Decaux	Clear Channel	Donkey Republic	Nextbike	Bonopark & Booster-bikes (Bicimad 2 : PBSC)	Fifteen	Fifteen (ex-Smoove)
Service operator	JC Decaux	Clear Channel	Donkey Republic	Csepel	Bonopark -> EMT	Inurba	Smovengo
Contract							
Start	2008	2011	2021	2020	2014	2022	2018
Length (years)	18	16	10	5	12 -> 9	11	15
Provision (€)	n.c.	n.c.	n.c.	€10.8 M	€27.6 M	€42.9 M	€478.0 M
Operation/year (€)							
Price paid by the local authority (€ public excl. VAT)							
€/year	€0.0 M	€4.4 M	€1.6 M	€2.2 M	€11.5 M	€3.9 M	€51.4 M
€/bike/year	0 €	€1,048	€724	€1,046	€3,821	€1,950	€2,571
Revenue (assumed Excl. VAT)							
€/year	€0.63 M	€4.00 M	n.c.	€1.19 M	€3.00 M	€1.00 M	€25.35 M
Beneficiaries	Operator	Operator	Operator except 10 %	Authority	Operator	Authority	SAVM : 70-85% Smovengo : 15-30%
Coverage rate	n.c.	48%	66%	55%	39%	26%	49%
Remaining cost (€ exc. VAT/bike/year)							
€/year	n.c.	€4.40 M	€1.56 M	€0.96 M	€8.46 M	€2.90 M	€26.06 M
€/bike/year	n.c.	€1,048	€724	€468	€2,821	€1,450	€1,303
Ratio (€ public excl. VAT)							
€/trip	n.c.	€0.73	€4.28	€0.35	€2.48	€1.32	€0.59
€/km travelled	n.c.	€0.32	€0.50	€0.17	€0.95	€0.41	€0.18

6.7 Supply ratio graphs

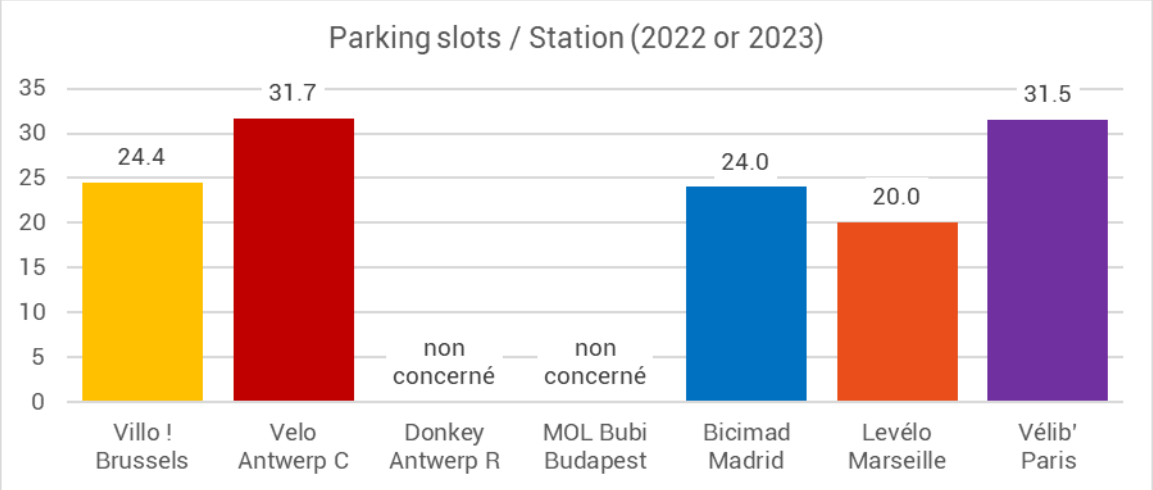
6.7.1 Contractual bikes/station



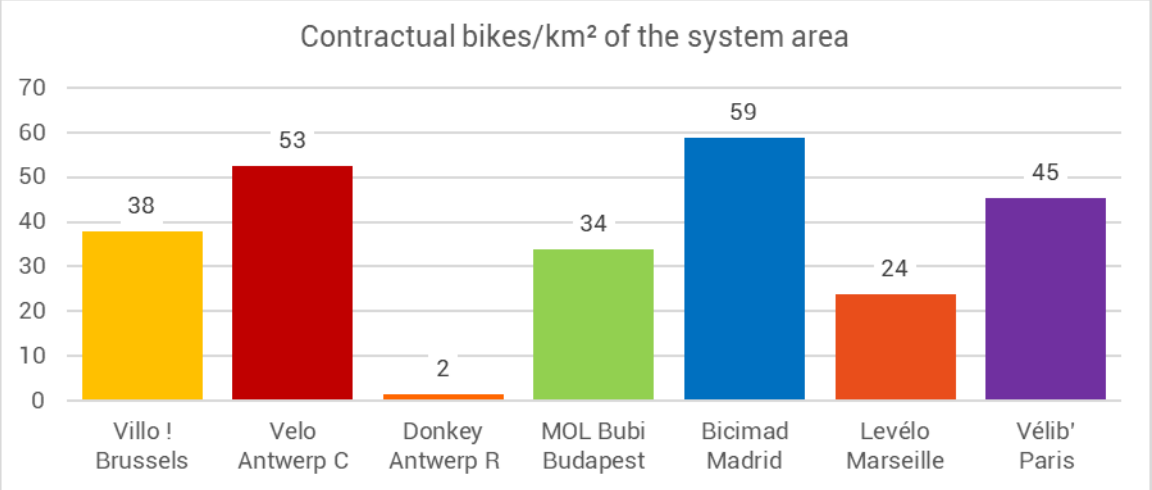
6.7.2 Slots per bikes on the ground



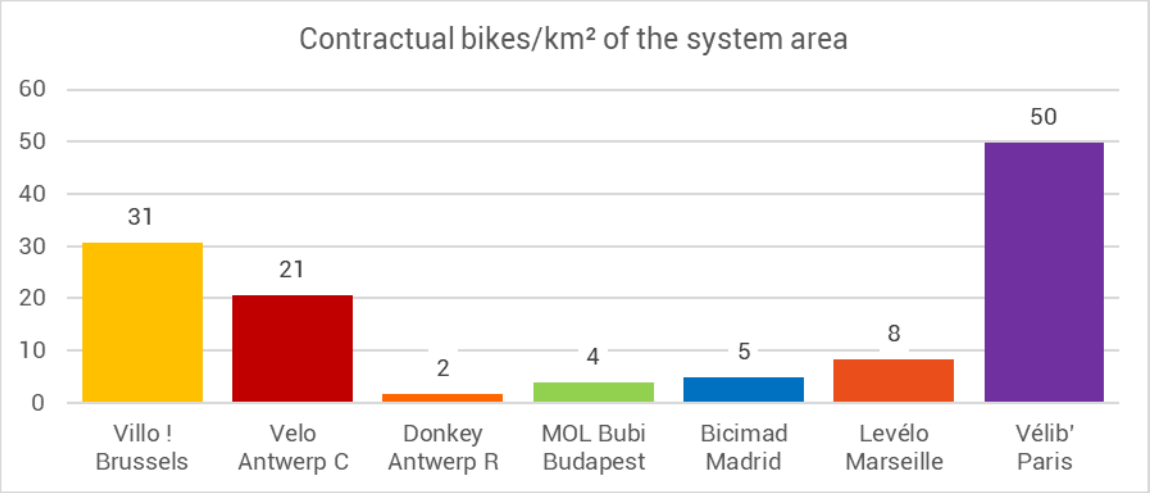
6.7.3 PB parking capacity/station



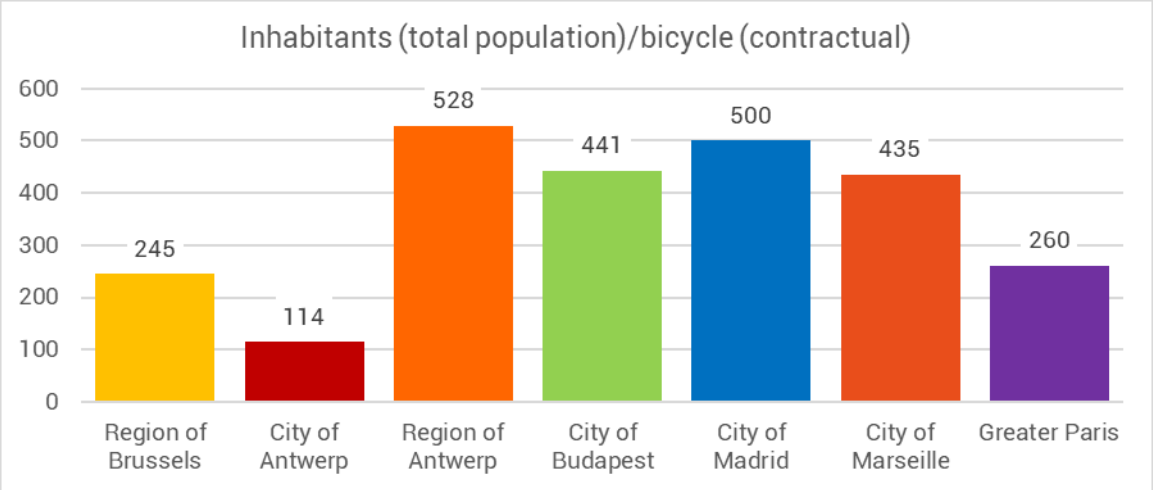
6.7.4 Contractual bikes/km² (System area)



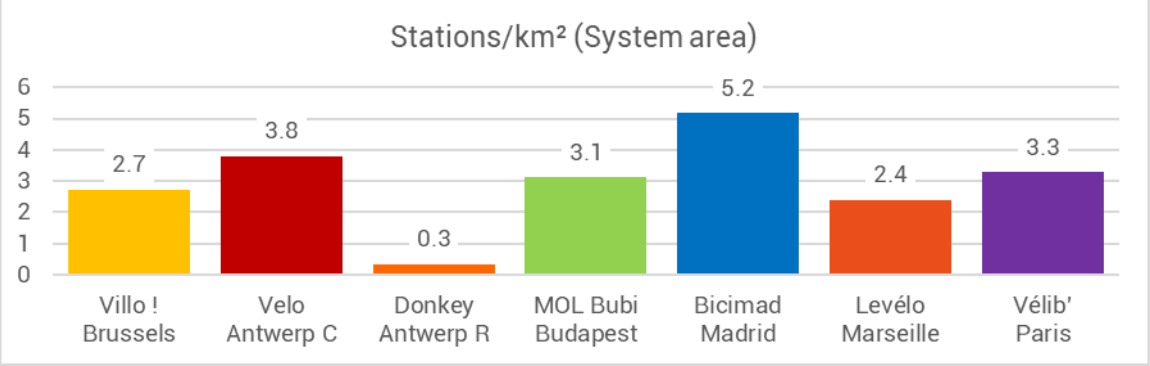
6.7.5 Contractual bikes/km² (Administrative area)



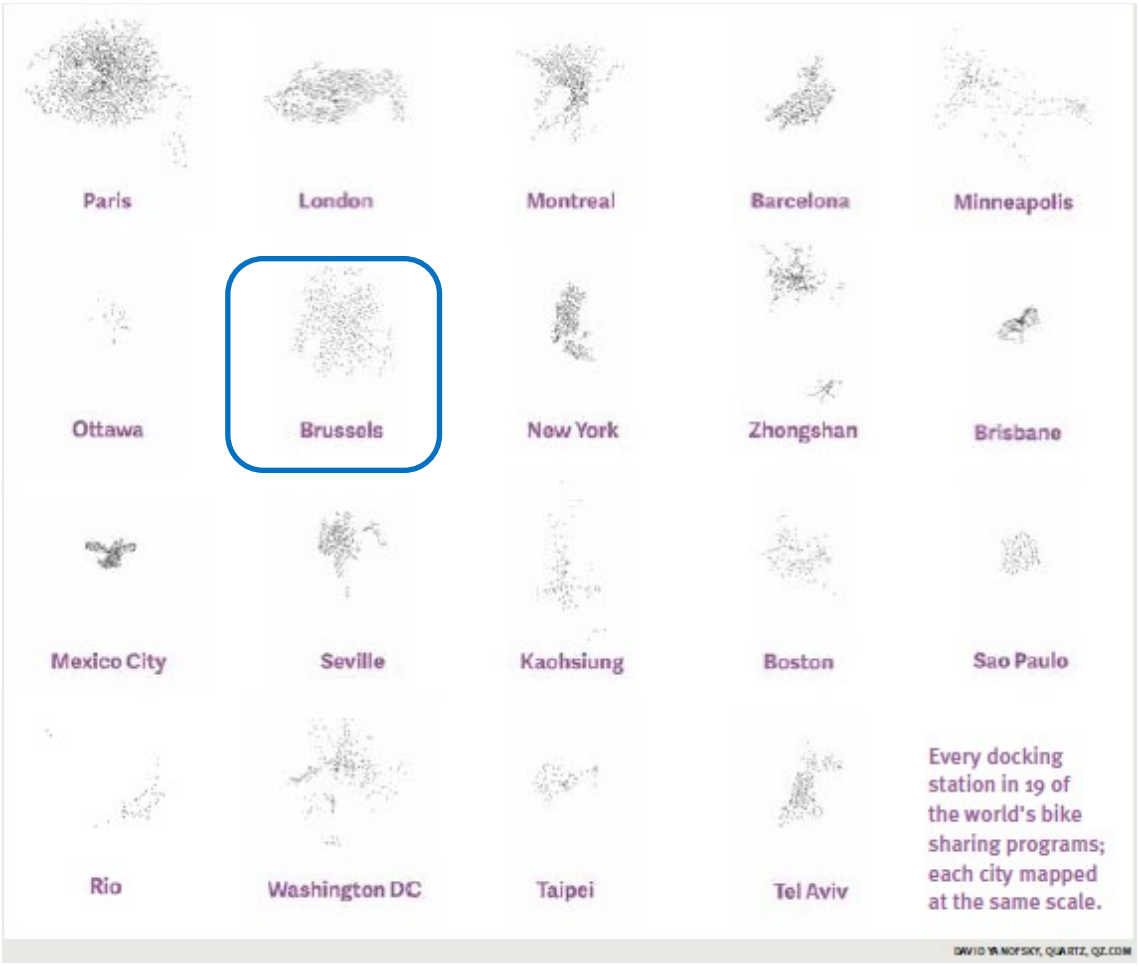
6.7.6 Inhabitants for one contractual bike



6.7.7 Stations/km² (System area)

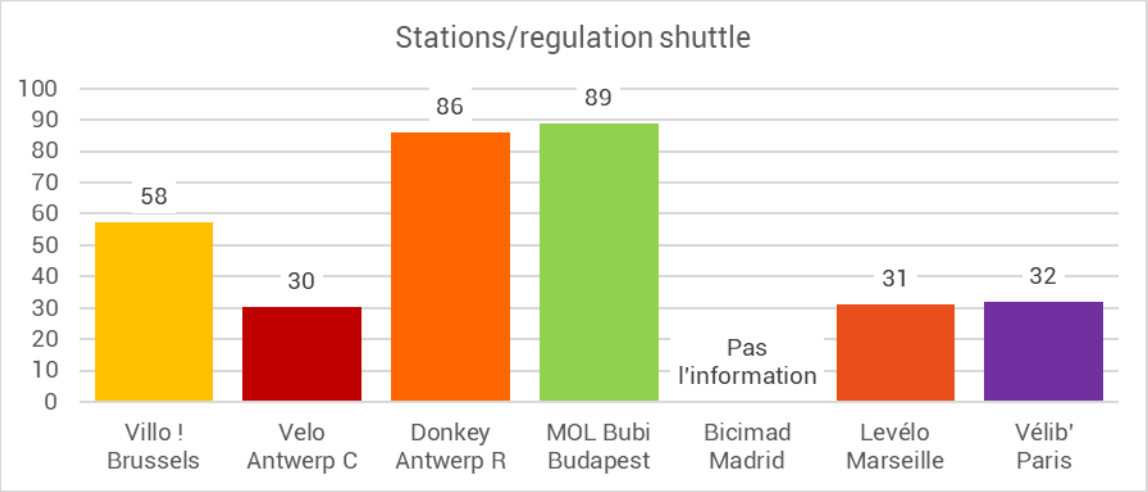


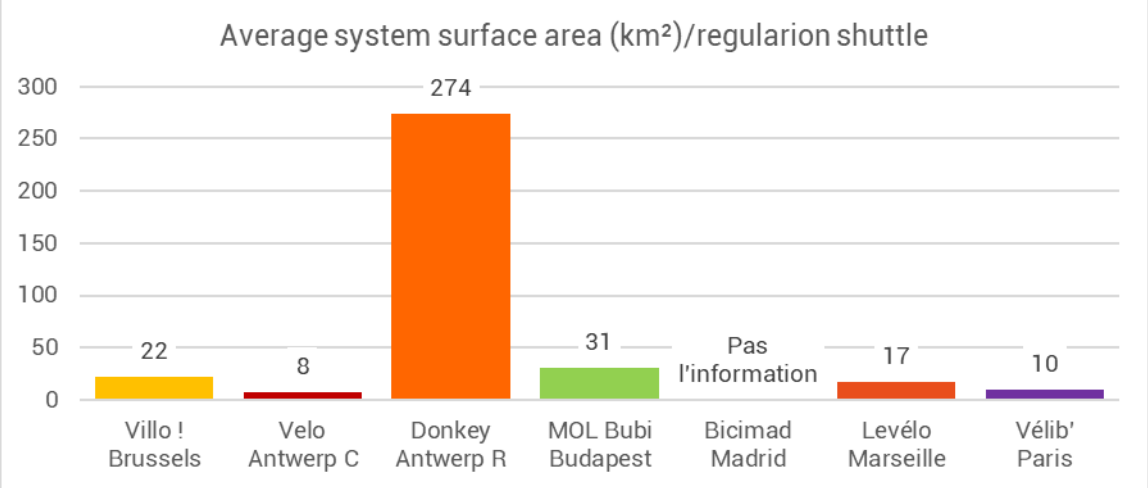
6.8 Density of PB stations worldwide in 2013



Source 11

6.9 Shuttle ratios



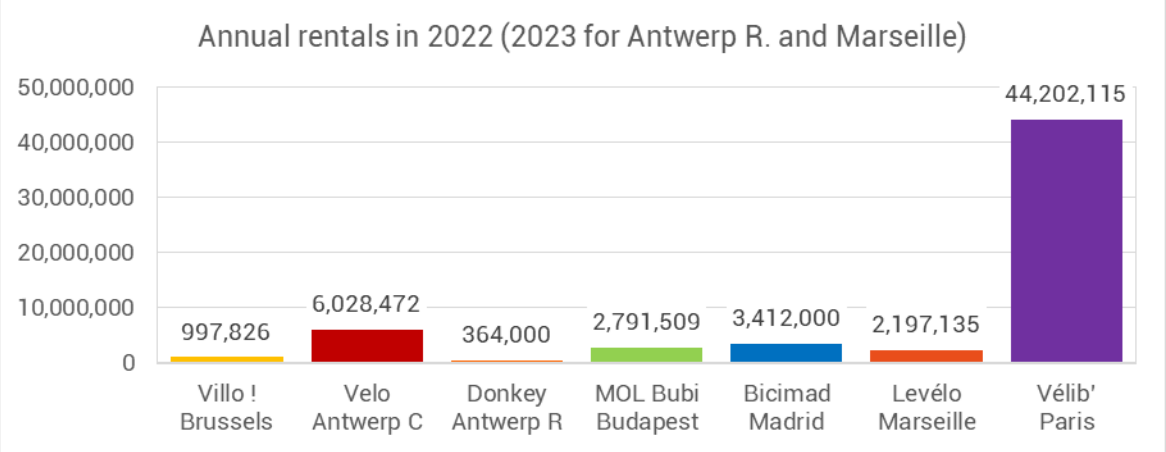


6.10 PB service operating volumes

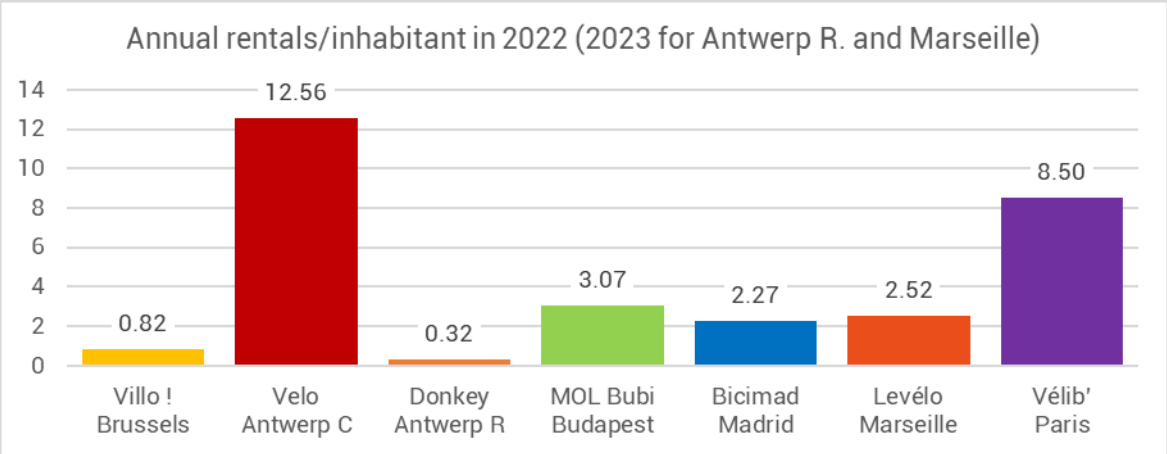
	Brussels Villo !	**Antwerp C** Velo	**Antwerp R** Donkey R.	**Budapest** MOL Bubi 2	**Marseille** Levélo 2	**Paris** Vélib' 2
Authority employees (Full Time Equivalent)	1	2	1	6	1	20
Operator employees	40	60	24	15	25	500
Warehouses	1	1	2	3	1	2
Bike repaired/day	40	60	n.c.	100	300	500 - 700
Regulation shuttles	6	10	5	2	6	45
Regulated bikes/day	800-900	1,166	n.c.	250	n.c.	970

6.11 Demand ratio graphs

6.11.1 Annual rentals in 2022 (2023 for Antwerp Region and Marseille)



6.11.2 Annual rentals per inhabitant



6.12 Calculation of STIB's financial ratios

Figure 47: STIB's financial ratios (STIB 2022 data | Author: Mobiped)

Expenditures	€ excl. Taxes	%	2022 STIB Financial report
OPEX	779,059,000	73.2%	Page 36
CAPEX	284,531,874	26.8%	Page 37
Total STIB	1,063,590,874	100.0%	

Traffic revenues	€ excl. Taxes	% expenditures	2022 STIB Financial report
Directs	190,684,907	17.9%	Recette Traffic (recettes directes) page 36
Allocation for preferential rates	74,555,000	7%	Recette Traffic (recettes directes) page 36
TOTAL REVENUE	265,239,907		

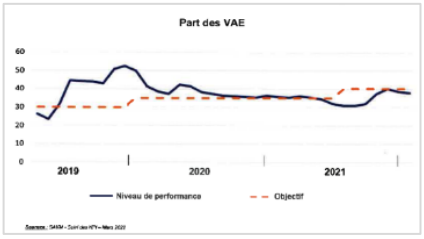
Reste à charge (€ public/déplacement)	
CAPEX + OPEX - Direct revenues	872,905,967
Number of journeys in 2022	337,700,000
€ public (CAPEX+OPEX)/journey	€2.58
Remaining cost (€ public/km travelled)	
Average distance (OVG 6)	6.85
Total distance	2,313,245,000
€ public (CAPEX+OPEX)/km	€0.38

6.13 PB objectives by city

	Initial objectives
Villo ! Brussels	Modal shift to soft modes.
Bicycle Antwerp City	- Improve bicycle parking. - Supplement the range of alternatives to the car. - Ensure that as many Antwerp residents as possible have access to bicycles.
Donkey Republic Antwerp Region	Reduce car use by targeting commuters.
MOL Bubi Budapest	1. Promote cycling. 2. Promote multimodality to reduce car use.
Bicimad Madrid	- Promote cycling. - Better connect public transport. - Aim for the first and last km. - Reduce car use. - Reduce greenhouse gas emissions
Levélo Marseille	- Increase the modal share of cycling over short and medium distances and long distances to complement public transport. - e-PB: attract non-cyclists.
Vélib' Paris	Vélib 1: remove disincentives to bicycle use (purchase, fear of theft, repairs). Make cycling accessible to all and improve quality of life in the city (less pollution, less travel time, more physical exercise). Vélib'2: develop new forms of mobility and attract new audiences.

6.14 Feedback on pedelecs bike shared

- **Deployment**: more and more mixed (New York, Paris, Milan) or 100% electric (Marseille, Madrid) for PB services. Private SB are almost all pedelecs.
- **Economic balance**: even if operating costs are higher, pedelecs increases the number of rentals and kilometres (+ 1 km in Paris).
- **Problems linked to e-PB start-ups**: Madrid, Copenhagen, Paris, Stockholm.
- **Pricing**: greater willingness to pay.
- **Mixed fleet**: complex fare structure, ratio of e-PBs on the ground to be calculated and monitored (diagram on the right of Paris: average monthly number of e-PBs/mechanic at 12 h), parallel logistics, overuse of pedelecs.



- **Battery**:
    - Emerging recycling channels.
    - 36 V required for e-PB vs. 48 V for e-scooters.
    - Limited short-term prospects for increasing battery life without increasing volume and weight.
    - In Brussels, Lyon and Bordeaux, the portable battery has not found a large audience.
    - Variable service life, natural discharge and risk of malfunction if not used for several months.
    - Shutdown/safety mode in hot weather (> 40° in Barcelona).
    - Bikes blocked if battery < 10 - 20% (London).
    - Need to double the number of batteries for swapping.
    - Acquisition costs.
    - Diversity: bike battery, connected padlock battery, phone battery.
- **Motor**: the bike may be mechanically operational, but unusable because of the battery or electronics. Allow light repair of a wheel without removing the motor.
- **Charging**: swapping bike battery, station battery, wireless, stacking.
- **Charging station on public land**: dependent on the electricity grid operator. Roadworks. Take a new meter. Change the PC block. Equipotentiality standard.
- **Charging as a service**: the beginnings of multi-operator charging stations for private SB operators. Incumbent PB providers are reluctant to abandon their proprietary solutions. Development of battery kiosk networks (OKAI, Gogoro type), but it is illusory to leave this task to the end user on a shared vehicle.
- **Charging problems**: oxidation (cold, salting). Shutdown (> 40°). Bicycle incorrectly positioned/stacked (Marseille). Discontinuous and insufficient parking time with random cycle. Charging time and capacity dependent on temperature and humidity.
- **Operation**: need to be connected almost all the time for remote monitoring. Problems with connectors, wiring and controllers (components that manage the motor and electric assistance). Breakdown rate of 2-4% per day. Engine monitoring. Longer, more complex repair cycle. Need for skilled electronics workers. Charging time. Increased costs. Challenge of making pedelecs more efficient and robust to reduce operating costs.
- **Safety and watertightness standards for hazards**: fire, hydrocution, electrocution, electromagnetic fields.
- **Vandalism, theft**: components that attract thieves, so extra security.
- **Usage**: increase the number and distance of rentals with new profiles.

6.15 Notes from workshop between cities

6.15.1 Participants

Organisation	City	PB service	Name	Position	Group
BRUSSELS					
BCR	Brussels	Villo !	Jade KAWAN	General politic and mobility advisor at the Minister's cabinet	1
BCR	Brussels	Villo !	Stefan VANDENHENDE	Advisor at the Minister's cabinet	2
BCR	Brussels	Villo !	Christophe DE VOGHEL	Cycling services officer at Brussels Mobility	2
STIB	Brussels		Mathieu NICAISE	Senior Officer, Strategy & Business Transformation	1
STIB	Brussels		Didier DUMONT	Director Business Development & Hub Operations	2
STIB	Brussels		Martin LANGLOIS	Director Network	1
TML	Leuven		Bruno VAN ZEEBROECK	Mobility consultant	1
TML	Leuven		Emanuela PEDUZZI	Mobility consultant	2
Mobiped	Lyon		Benoît BEROUD	Mobility consultant, expert in Public Bicycles	2
INVITED CITIES					
BKK	Budapest	MOL Bubi	Péter DALOS	Expert, Direction of Mobility development	1
SAVM	Paris	Vélib' Métropole	Fatima ULRICH	CSR and external relationship	2
SAVM	Paris	Vélib' Métropole	Matthieu FIERLING	Studies and expertise department chief	1
Ile-de-France Mobilités	Paris	Véligo Location	Aline GILETTE	Active modes officer	2
Ile-de-France Mobilités	Paris	Véligo Location	Ivana CABELLO	Active modes officer	1
Aix-Marseille-Provence Métropole	Marseille	Levélo	Pierre JAMIN	Active modes officer	2
EMT	Madrid	Bicimad	Carlos MATEO MARTIN	Director of the Mobility Direction	1
City of Antwerp	Antwerp	Velo Antwerp	Hanne LYSSENS	Urban furniture officer	2
City of Antwerp	Antwerp	Velo Antwerp	Jelle DE KEYSER	Shared Mobility officer	1
Lantis	Antwerp	Donkey Republic	Candide DE BRUYN	Sustainable mobility department chief	2
FietsAmbassade	Ghent	FietsAmbassade	Jan VANHEE	FietsAmbassade Manager	1

6.15.2 Discussion 1: shared bicycles yes or no? Why? *E*lements brought forward by individual participants

Public shared bicycles		Commercial shared bicycles		Subsidised commercial shared bicycles		Long term rental		Second-hand bicycle + coaching disadvantaged	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Keep user fees low-ensure basic mobility. Assure reliable service/mobility insurance. High impact with limited number of bicycles. Good for bicycle promotion - high density and visibility in the centre. Sustainability. Image Alternative for car/decrease car use. Opportunity for not regular cyclists to cycle all year long.	High (operational) cost. Challenge to keep good bicycle availability. Inefficient use of public money, rather use the money to subsidise private bicycles. Underusage risk - actual unsuccessful service. Public space taken away by stations. Station limit freedom. Not first best solution - cycle infrastructure would be.	Cheap (3*). Allows/generates competition. Risks is for private actor. Attractive for youngsters from "popular" neighbourhood. Boost innovation.	Need for (complex) regulation (3*). Risks for pedestrians. Accessibility, apps for certain user groups =problem. Expensive for user (3*). Commercial goals <>public goals. Risk of market fragmentation. No quality guaranteed, no guarantee in time.	Lower user price, more inclusive. No stations, less infrastructure/civil works. Effectively incentivize service providers for better performance. Dynamic market evolution.	Lack of control by city. Public interest not main goal - goal is profits, rather than mobility. Not cost efficient.	Effective tool for modal shift/high conversion ratio. Allows to test/access a good bicycle. Change in mobility behaviour= habits. More variety in bikes. Satisfy demand of different user groups. Liberty of movement (not limited to stations). Limited cost.	Only for limited number of people - locals. Limited synergy with PT. Testing should be free. There is a good market for LT rentals/testing in B (Flanders). Not ideal for irregular cyclists. Well designed system necessary. Too expensive -Risk of theft. Focus should be on short trips, not on commuter trips.	Cycling/cities needs to be inclusive (for everyone) (3*). Get all people on board for mobility transition, not only the highly educated. Focuses on people who need it. Good for modal shift. Leverage small company economics.	Labour intensive Low mobility impact-few people reached. Low political impact. How to stimulate demand
It is a multimodal option that is part of public transport. More control from the city. Possibility to include less popular zones. May avoid people becoming car drivers.	High cost for the expected impacts, not the most efficient. Modal share of the city is already high. It doesn't affect non-cyclists. No evident impact on the modal split.	Free market and the best option will be the one to survive. Can assure better coverage. Responsibility is given to the user. Note: commercial does not imply there are no stations (it can be station based or free floating). No risk for the city.	The objective is only making profit. Public space is used for commercial activities. It is difficult to regulate - the city has less leverage. Volatility of the market - they can disappear in a day but subsidizing it can solve part of the problem.	Local monopoly. Combines local knowledge with bike sharing knowledge. Can add constraints to the operators, rules from the City. Include less popular zones. More inclusive - city embedded in the project. Increases leverage for negotiation.	Subsidizing one party takes away free competition. Gain from the use of public space. Equity objective?	Cheaper, easier to integrate. Alternative to buying for students and visitors. Impact on modal shift. Better care of the bike because it is your own bike. Theft prevention	You need parking space. Usage per bike is less efficient. When your rental is over you need a solution.	Inclusion Address mobility poverty. Real attractiveness of bikes. Complementary to other systems. Create bike culture. Working with local communities. No need for redistribution. Gives responsibility to the user.	Low impact. Need for parking spaces. Only for 'second-class' residents - feeling of not being good enough? Usage per bike is less efficient. People can take years to get used to riding a bike.

6.15.3 The preferred system for a Brussels-like city and reasons why

Opinion 1

- Being pragmatic, the commercial system is there now. Let's see how it behaves.
- Best solution would be to drastically reduce car use and drastically build cycle infrastructure. But this seems to be hard/difficult for different reasons. Therefore, opt for LT rental and public or subsidised shared bicycle system.
- The coaching for disadvantaged is very important but is part of another type of project, projects combating transport poverty.

Opinion 2

- Go for public shared bicycle system. You can easily cover the whole region (1m inhabitants = small region) and the basis is already there.
- Complement it with a LT rental system with particular attention to social aspects (coaching for disadvantaged as it is highly effective).

Opinion 3

- Go for different systems and make them complementary. Insert the public shared bicycles in the PT company and policy. Integration took years, 3 to 6 for Budapest and Madrid.
- Do a concept test for the different systems/options to check if users are ready to use it.

Opinion 4

- Go for public bicycle sharing system, however, get the details on actual use (and non-use) of the actual service from the operator.
    - Traffic jams are an enormous opportunity.
    - Go for 100% electric.
- No long-term rental because already relatively high bicycle possession.

Opinion 5 (group 2) - Long + short term rental without BSS

- Publicly subsidized long and short-term rental - address students or people who live in Brussels for a certain period of time and provide help for the poor. The public shared bike system is too expensive for less dense regions and Brussels has already reasonable share of cyclists. You need to take an extra step to reach more people. Grenoble is inspiring.

Opinion 6 (group 2) - Long term rental + subsidized commercial BSS with public involvement.

- There could be racks available as virtual hubs with a lot of control of the local government. All money that is avoided for docking stations should be put into bike shelters.
- Antwerp, there is little space to provide parking for bikes... car parks moving underground to get people not to park in the city. In Paris, car parking has a huge potential.

Opinion 7 (group 2) - Bike sharing system.

- From the point of view of the PT operator, you should go for a public shared bike system because it is the closest to the core business. It is for everyone; it can be included in the tariffs. Not necessarily the best solution but the more evident.
- When complementing a BSS with long term rental there should be coherent management. Also there should be a big budget and a high-quality service. Maybe in 5 or 10 years we may not need to be subsidized anymore and only help the poor part of the population.
- Operator incentives if reaching disadvantaged people - careful though, reduced fare users can be 'meal deliverers'.

6.15.4 Discussion 2: Seamless PT-shared bike integration

Set of elements brought forward by individual participants

What is the value added?	How do we reach it? What to do?

• Better door-to-door service - Boost for PT end-to-end solution -optimisation of PT services.
• Services when no PT available (nights).
• Replace offer with very low passenger numbers.
• Avoid one or two stops PT use.
• Limit pressure on PT in peak hours.
• Fully integrated intermodality - perfect user experience - one mobility experience with more options - more options= extra satisfaction - integration of all shared mobility also including car sharing and other PT operators (railways...) -one stop shopping.
• More potential bicycle users.
• Better image for PT. BS refreshes PT.
• Better data on customers.
• According to Madrid and Budapest, bike-sharing service has not led to any changes in existing public transport lines. The orders of magnitude are not the same. However, the availability of a good bike-share service may lead to questioning the need to increase some frequencies, for example in the evening. PB is an investment that can help limit other expenses.
	• INTEGRATION of
	  • Tariffs - joint subscription - payments-app
	  • Infrastructure (mobihubs) –
	  • MaaS - branding - customer care
	  • Technology
	• Make it matter politically.
	• Political agreement on finance, governance.
	• Communication - visibility of city.
	• Organise participation - taskforces - events via an onion strategy (convincing first people close to you and then gradually people further away).

6.15.5 Discussion 3: good quality and high rotation rates

Set of elements brought forward by individual participants.

How do we provide high rotation rates?	How do we provide good quality?

• What is the optimal rotation rate? Between 5 and 7 was mentioned, not to increase maintenance cost too much.
• High quality of service at low price: but you have to find the right balance, or the quality will deteriorate.
• Provide a solid and reliable system.
• Make it interesting for the operator to achieve high rotation rates:
  • Give incentives dependent on the number of annual subscribers - people who really put the system in their daily routine.
  • Give incentives dependent on rotation - the higher the rotation the higher the incentives.
  • Let the operator collect the revenues.
• Target the right user groups through ad hoc communication and events.
• The system should be a monopoly at least in terms of the type of bike and service considered.
	• Include quality indicators in your contract:
	• Lower and higher limits on the occupation
	  • Rates of the docks - with financial penalties if they are not respected.
	  • Financial penalties to ensure a minimum availability of bikes.
	  • Other indicators like - bike should be clean, info service kind, satisfaction of the user.
	• There should be a good balance with the penalties in terms of on one side providing an incentive but on the other not killing your operator. There should also be an adjustment period before these penalties are applied.
	• There should be a business model that provides enough incentives to reduce to the minimum the supervision of the PTO (but you should be prepared for the worst). There is, however, a need for a team of several people to coordinate the project for the PTO and PTA, at least for the first years.
	• Communication is important also to adjust expectations of the users.

6.15.6 Main elements from the benchmark discussion

6.15.6.1 PB rents versus cycling trips

- Trips per public bike vs cycling trip, Velib is down to 20% from 50% at the lower part beginning. It is true the share is lower but Vélib'rents have increased, lower than the number of cycling trips which has increased 5 times! It is not easy to draw any conclusions, but it is important to give people a bike culture.

6.15.6.2 PB Benefits, difficult quantitative assessments

- You should consider that for all mobility frameworks it is impossible to make a pure rational and realistic analysis - mobility is human behaviour which is not perfect/predictable.
- In Budapest, we can only estimate the number of trips per bike in the city and it is difficult to measure the change of perception towards cycling. Even if there is no way to prove it, public bikes made a huge impact. Bubi was the word of the year when it started.
- Survey is not sufficient either. Even surveying after 6 months, Véligo Location users have not made up their minds on whether they will keep on cycling or not. The main reasons for people not to continue cycling is the lack of parking, lack of cycling lanes, lack of infrastructure (safety). It would be great to compare the cost/km between PB and LTR.
- Bike-sharing can be seen as an opportunity to develop cycling. But also, multi-modal behaviour. If we want to decrease the use of cars, we need to have different mobility solutions (but also discourage the use of cars!).
- Don't underestimate the attractiveness of Ebikes!

6.15.6.3 Invest public money in PB?

- Do we over-question the need for investment in cycling? We do not do the same for cars. It is not because you invest in bikes that you will discourage car use. What are the objectives? Some of them we can meet with a bike sharing system, but some we will not - for reducing car use we just must discourage car use. However, we also need to know why we are doing bike sharing.
- Remember that car sharing is not really inclusive, but that's ok, it's not a reason not to do it. All solutions have draw-backs. Bike-sharing is not worse than the other options. Bike-sharing can be seen as a mobility insurance - if the tram is broken there is another option. Parisians are using Velib as a complement to PT, but also the other way around.

6.15.6.4 Misuse and availability rely on technology provider

- Madrid - the problem of availability and misuse is very much related to the technology provider. The technology will impact maintenance cost. Anti-vandalism features are very important, and a higher CAPEX today will mean lower OPEX in the future.

6.15.7 Other discussions

- Even if the shared bicycle transport volumes will always remain very marginal compared to the bus, tram, metro transport volumes, the image impact is tremendous and cannot be underestimated. It is a "hot" political topic.
- Be cautious about easy shift between PT and shared bicycles. These modes are not perfect substitutes for a part of the PT users.
- MaaS, getting the money for the MaaS intermediary can be challenging (Paris experience).

6.15.8 Cities' current challenges

	Challenged question
Brussels Villo !	• Is a (public) bike sharing system really needed? • Is the money well invested? • Can integration into Public Transport be a game changer?
Antwerp City Velo Antwerpen	• How to shift from one operator to another • How to shift from one type of infrastructure to another • How to be able to manage temporary overflow • Integrating other kinds of shared mobility or public transport • Contractual forms for infrastructure and operation
Antwerp Region Donkey Republic	
Budapest MOL Bubi	• Role of PB in micromobility services
Madrid Bicimad 1	•
Marseille Levélo	• Cost: team sizing to maintain a good level of availability of bike? • How can we avoid a "start from scratch" scenario every 10 years?
Paris Vélib'	• Make users more responsible? • How to make the service more available
Paris Véligo Location	• How to reduce the level of theft/robbery/misuse • How to collect data on bike use while respecting private data • How to encourage cycling and promote the service in less dense areas
Ghent FietsAmbassade	• What should cities subsidize, what not? • How can we reach people with less money? • How can we prevent people only wanting to rent electrified bikes and no longer non-electric ones?

Left to right: I. Cabello, A. Gilette (ILE-DE-FRANCE MOBILITÉS), C. Mateo Martin (EMT MADRID), P. Dalos (BKK), C. De Voghel (BRUSSEL MOBILITY), D. Dumont (STIB), M. Nicaise (STIB), B. Beroud (MOBIPED), B. Van Zeebroeck (TML), J. Vanhee (FIETSAMBASSADE), M. Langlois (STIB), F. Ulrich (SAVM), P. Jamin (AIX-MARSEILLE-PROVENCE METROPOLIS) and M. Fierling (SAVM). Also present: J. Kawan, S. Vandenhende (GBCR), E. Peduzzi (TML), H. Lyssens and J. De Keyser (CITY OF ANTWERP) and C. De Bruyn (LANTIS) | Photo: E. Peduzzi (TML)

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8 Tables of illustrations

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NextGenerationEU is a temporary stimulus package of over 800 billion euros to help repair the immediate economic and social damage caused by the coronavirus pandemic. Post-Covid-19 Europe will be greener, more digital, more resilient and better adapted to current and future challenges.

The Recovery and Resilience Facility, the centrepiece of NextGenerationEU, is endowed with 723.8 billion euros in loans and grants to support the reforms and investments undertaken by EU countries. The aim is to mitigate the economic and social consequences of the Covid-19 pandemic and make European economies and societies more sustainable, more resilient and better prepared for the challenges and opportunities of the ecological and digital transitions.

The "Preparatory study for the public bicycles service of the Brussels-Capital Region in 2026: Benchmark and Recommendations" is part of these priorities established by the Brussels Government and at European level, and concerns in particular the Mobility axis and the Acceleration of MaaS deployment component. More specifically, it aims to plan the Brussels-Capital Region's future public bicycle service. In financial terms, the "Preparatory study for the public bicycles service of the Brussels-Capital Region in 2026: Benchmark and Recommendations" is supported to the tune of €197,816.75 incl. VAT.

C Public bicycles in Brussels: Assessment, Scenarios, Recommendations

April 2024

@STIB

Benoît Beroud - MOBIPED

Bruno Van Zeebroeck - TML

Emanuela Peduzzi - TML

Commissioner

BRUSSELS-CAPITAL REGION

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Consultancies

TRANSPORT & MOBILITY LEUVEN

Mobiped

Authors	Benoît Beroud (MOBIPED) Bruno Van Zeebroeck (TML) Emanuela Peduzzi (TML)
Reviewers	Christophe De Voghel (BRUSSELS MOBILITY) Mathieu Nicaise (STIB)
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RÉGION DE BRUXELLES-CAPITALE

Sponsor
Brussels-Capital Region | Brussels Mobility Regional Public Service
Organising Authority for Mobility
Place Saint-Lazare 2 | 1035 Brussels
https://mobilite-mobiliteit.brussels/en
Christophe De Voghel: cdevoghel@sprb.brussels

STIB MIVB .brussels

Partner
STIB-MIVB - Brussels public transport company
(Société des Transports Intercommunaux de Bruxelles – Maatschappij voor het Intercommunaal Vervoer te Brussel)
Rue Royale 76 | 1000 Brussels | www.stib-mivb.be
Mathieu Nicaise: mathieu.nicaise@stib.brussels

TRANSPORT & MOBILITY LEUVEN

Mobility research office
TRANSPORT & MOBILITY LEUVEN
Diestsesteenweg 71, 3010 Leuven | www.tmleuven.be/en
Bruno Van Zeebroeck: bruno.vanzeebroeck@tmleuven.be

Mobiped

Public bicycles expert
MOBIPED - Mobility of Bipeds
10 bis rue Jangot, 69007 Lyon | www.mobiped.com/en
Benoît Beroud: benoit.beroud@mobiped.com

Summary

Glossary

Cycling

BS	Bike Share (service or system)
e-PB	Public e-Bicycles (Public pedelecs)
e-SB	Shared e-Bicycles (Shared pedelecs)
GBFS	General Bikeshare Feed Specification
LTR	Long-Term (cycle) Rental
PB	Public (funded) Bicycle
SB	Shared Bicycles
SSEB	Social and Solidarity-Based Economy Bicycle

Stakeholders

BCR	Brussels-Capital Region
BM	Brussels Mobility
GBCR	Government of the Brussels-Capital Region
STIB	Brussels Inter-Municipal Transport Company

Vocabulary

B2C	Business to Customers
B2G	Business to Government
B2G2C	Business to Government to Citizens
CAPEX	Capital expenditure
ET	Excluding tax
KPI	Key Performance Indicator
MAAS	Mobility-as-a-Service
OPEX	Operational expenditure
PI	Performance Indicator
PSD	Public Service Delegation
PT	Public Transport
SGEI	Service of General Economic Interest
SLA	Service Level Agreement
T&C	Terms and Conditions of sale

1 Preamble

1.1 A thwarted history. Is it worth persevering beyond 2026?

After the failure of *Cyclocity* between 2005 and 2009 in Brussels, *Villo !* became the Brussels-Capital Region's public bicycle (PB) sharing service. *Villo !* faces many challenges:

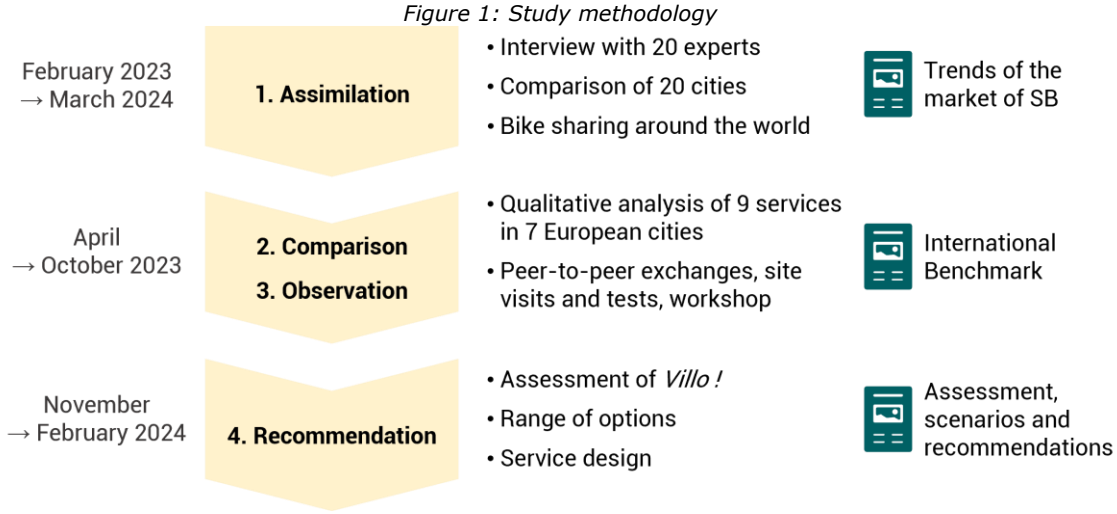
- number of rentals/bike/day declining steadily and among the lowest in Europe.
- weariness of an 18-year concession (15 + 3) and limited room for manoeuvre.
- strong cycling policy, in which PB is not seen as the best investment.
- failure of portable batteries, competition from private shared e-bikes (SB) and the supervision of micromobility via private licences.

With the *Villo !* concession with JC Decaux coming to an end on 16 September 2026, Brussels Mobility's mobility authority is looking ahead to the future with this study. The study's steering committee is open to all scenarios and had a number of questions:

Purpose	What is the point of an PB service? Why invest public money?
Service	PB, LTR (Long Term cycle Rental), both or neither? What about e-scooters?
Operators	How many operators are needed: 0, 1, 2, 3?
Governance	Could private players be trusted? What role can public authorities play? What role for STIB, the Brussels public transport operator? Are PB a public service to be financed or a private service to be supervised?
Bikes	Are pedelecs essential? If so, in what proportion? How is charging carried out: at the station or by swapping batteries on the street?
Station	Is it better to have stations with furniture or just virtual stations?
Contracts	Should the PB service continue to be linked to outdoor advertising space contract? How much will it cost the public authorities? How long should the contract be?

A robust methodology involving benchmarking, investigations and explorations was implemented to inform decision-making *(Figure 1)*. This report presents the assessment, scenarios and recommendations.

Figure 1: Study methodology



1.2 Political ambition

To provide access to a bicycle and develop shared mobility, in line with Good Move the regional mobility plan for 2020-2030, the Government of the Brussels-Capital Region considers "public bicycles to be the fourth pillar of public transport in Brussels (metro, tram, bus and bicycle)". This ambition has been a guiding principle throughout this study.

2 Assessment of Brussels' Public Bicycles

2.1 History and deadlines

2005 The City of Brussels launched Cyclocity, with 250 bikes and 25 stations.

2009 End of Cyclocity. The Brussels-Capital Region awarded JC Decaux a contract to supply and operate 5,000 *Villo !* units, 360 stations and 347 advertising spaces, in two-phase.

2017 Billy-Bike and Obike were the first private free-floating SB, joined in subsequent years by Gobee.bike, Dott, Jump, Lime, Pony, Bolt, Dott, Voi, Tier, Poppy *(Figure 2)*.

2018 Bike share ruling | 30% of *Villo !* vehicles are electrified with removable batteries.

2024 Awarding of three-year licences to Bolt, Dott and Voi to deploy up to 7,500 bikes in 3,000 dropzones, shared with scooters (1,600 deployed by end of 2023).

2025 Cohabitation of 12,500 theoretical bikes: 5,000 *Villo !* + 7,500 private SBs.

2026 16 September: end of the *Villo !* concession; next step is to be decided in 2024 *(Figure 3)*.
31 December: end of the three private licences.

Figure 2: Arrival/departure of micromobility players in Brussels from 2017 to 2024 (Brussels Mobility)

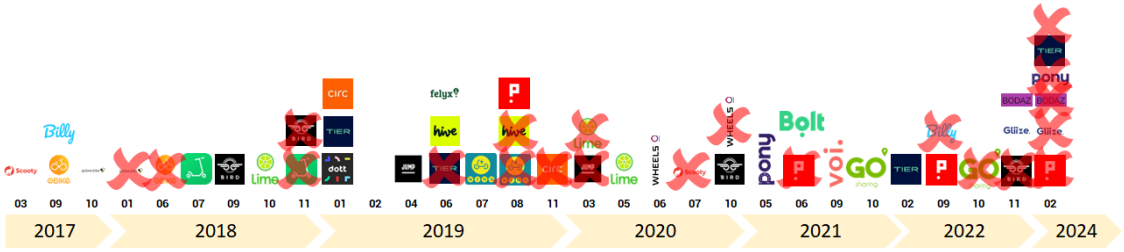


Figure 3: A tight schedule for smooth installation and operation

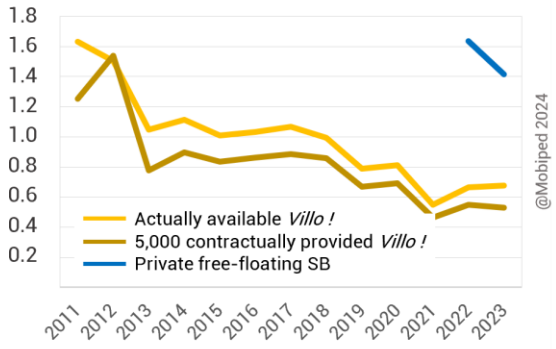
2.2 Usage rates have been falling steadily for over ten years

Public Bicycles: since its launch, the number of *Villo !* rentals per bike per day has been falling steadily *(Figure 4)*. In 2023, there were 970,000 rentals, i.e.:

- 0.53 rental/contract bike (5,000)/day (brown line).
- 0.67 rentals/bike available for rent (3,935)/day (orange line).

Private Shared Bicycles: with an average of 2,346 bicycles available in the street in 2023, private shared e-bicycles generated 1,212,000 rentals, or 1.42 rentals/bicycle available/day (blue line).

Figure 4: Theoretical and actual rentals/day/PB from 2011 to 2023



2.3 The opinion of associations

Brussels-based associations BRAL, GRACQ, FIETSERSBOND and CYCLO shared their feedback and perspectives on PB and Long-Term cycle Rental (*Source 33*), summarised below.

2.3.1 *Villo !*, a service to be improved

Several difficulties were shared: heavy bikes not always in working order, users not listened to enough (customer service, committee), poor image of the service, complex process for a single use/test.

2.3.2 Consider PB as a tool

PB can be a tool to facilitate acceptance of the Good Move plan's traffic changes, for example by organising a consultation on the location of stations and supporting the transformation to a calmer public space *(Photos below)*. Furthermore, PB contributes to the functionality economy. However, PB does not allow people to get cycling for the first time of their life.

2.3.3 PB, a public service

The associations prefer a public governance to abandoning the service to the private market, with its more precarious working conditions. The associations:

- warned of the digital divide in public services.
- consider that PB could be integrated into the public transport offer.
- call for consultation before setting up stations in working-class neighbourhoods. This can be seen both in the target audiences and staff recruitment *(Source 35)*.

Transformation of a car street (Credit: NYC Department of Transportation, Source 20)

Consultation between authorities and residents (Credit: NYC Department of Transportation, Source 20)

2.3.4 Diversifying bicycle investments

The associations are in favour of the idea of a LTR and call for continued investment in the bicycle "system" to promote cycling.

2.4 Feedback from user and non-user surveys

2.4.1 2017 user survey

In 2017, the user survey (*Source 52*) provided the following results:

- 70% of users and non-users felt that *Villo !* boosted cycling in Brussels.
- 47% of those interviewed had intermodal PT + *Villo !* practices.
- 17% started cycling thanks to *Villo !* compared with 50% in 2012.
- 25% of users in 2012 and 2017 had less need for a personal bike because of *Villo !*.
- 3% had acquired a personal bicycle to become regular cyclists.

2.4.2 2023 user and non-user surveys

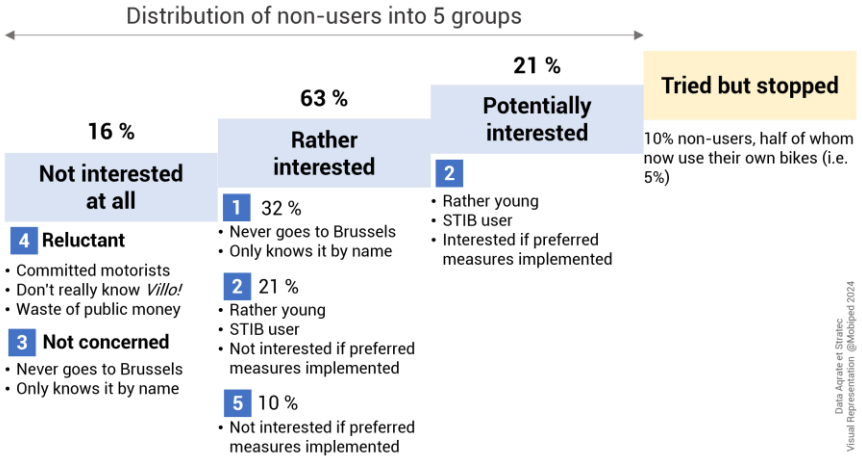
Surveys published in 2023 of micromobility users *(Source 43)* and non-users *(Source 44)* help to identify obstacles and possible improvements *(Figure 5)*:

- access time and the type and condition of the bike were the main obstacles to *Villo !* use.
- *Villo !* had a positive image among users. Among non-users, the image was rather neutral. However, 62% considered it positive to keep in Brussels an PB service in stations.
- integration with STIB is welcomed.
- 21% of non-users interested in case of a more attractive offer *(Figure 6)*.
- beyond the 30% who did not ride a bike because they did not have one, *Villo !* use was primarily dependent on the cycling insecurity feeling: risk of accident, lack of facilities.
- 86% of *Villo !* respondents in 2023 had a driver's licence *(Source 43)*.

Figure 5: Opinions of Villo !- and micromobility users and Villo !-non-users living in the Brussels Region

Survey participants	Barriers to using *Villo !* (1 answer)	Barriers to using *Villo !* (Several answers)	Villo ! image	Future user if …	Other comments
Regular users *Villo !* [15] *660 responses*	42% Bike condition 22% Access time 17% Bike weight	73% Bike condition 69% Access time 64% Bike weight	79% 15% 6%		87% of *Villo !* users cite "saving time" as a reason for using it. It is the main reason for 56% (*1,350 responses*).
All micromobility users [15] *2,411 responses*	30% Access time 24% Bike condition 12% Type of bike + No e-PB	50% Weight + bike condition 40% No e-PB 38% Access time	42% 36% 22%	61%: Rates < free-floating 56%: Pedelecs 35%: Basket	A declared interest in: > 60%: STIB-MIVB bicycles > 70%: PB + STIB-MIVB offers > 80%: PB in STIB-MIVB fares, shared mobile app, stations closed to the STIB-MIVB network.
***Villo !* non-users, BCR residents** [16] *304 responses*	33% Access time 18% Bike type 15% Bike condition	40% Transport of children and goods not possible 32% Bike weight 31% Bike type (No pedelecs)	33% 49% 18%	With a more attractive offer 35% 25% 40%	Keep a PB with docking stations: 62% | 23% | 15% Do not cycle because 55%: Risk of accident 32%: Weather 30%: No bike 25%: Lack of facilities

Figure 6: Distribution of Villo ! non-users who may or may not live in the BCR (Data 44)

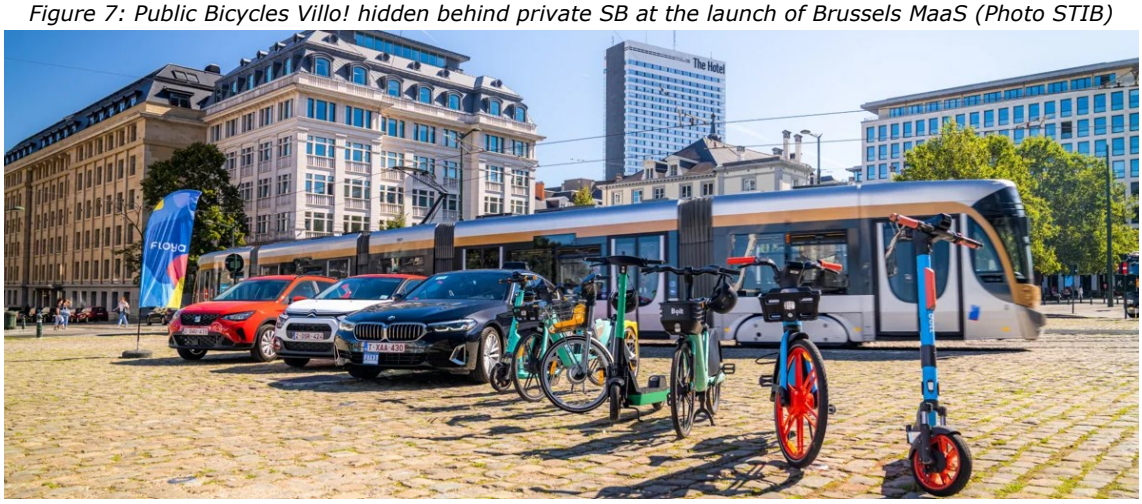


2.5 *Villo !*: disappointing results but real improving opportunities

The following SWOT (Strengths Weaknesses Opportunities Threats) analysis is the result of taking a step back after learning from the benchmark and analysing market trends, as well as the SWOT of cycling in Brussels (*Appendix 10.1*). These opportunities call for a closer look at the subject, and a questioning of the public objectives of such a service.

***Villo !* Strengths**	***Villo !* Weaknesses**
• Region-wide coverage • Good user value for money • 16% of Brussels residents have tried *Villo !* [3] • *Villo !* a brand familiar to 98% of Brussels residents [3] • 15 years of experience • Public space footprint, with power supply	• Insufficient station density • Unsatisfactory user experience • Competition from free-floating SB (highly visible shimmering colours, positioned on paths, pedelecs, simpler user experience, absence of architectural constraints, promotion by public authorities - *Figure 7)* • Women and low-income earners under-represented • Low direct impact on cars and bicycles • Disadvantageous contract for local authorities • Inadequate and non-assessable objective
Opportunities	**Threats**
• Weaknesses identified and can be improved • Improve access to a bicycle to 50% of Brussels residents, and to 90% to a pedelecs. • Integration with public transport • Pedelecs, better adapted to topography • Many service providers interested • Complementary with Long-Term Rental	• Feeling unsafe cycling in traffic • Transition and electrification at risk • Competition from private SB in dropzones • Unsecured budget and risk of vandalism • Disregard for vulnerable profiles • Culture, budget and limited resources of the mobility authority to supervise a service operator.

Figure 7: Public Bicycles Villo! hidden behind private SB at the launch of Brussels MaaS (Photo STIB)



Despite the current low level of use, there are real opportunities to be explored for a future attractive public bicycles service.

3 Public Bicycles possible objectives

3.1 Need to temper the expected impact of bike share

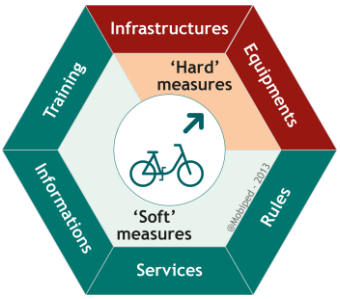
While bike share contributes to more sustainable mobility, it is not THE solution for reducing car use, developing cycling or providing access to a bicycle.

3.1.1 "Reducing car use": too ambitious for bike share alone

"Aiming for a modal shift towards soft mobility", as with the *Villo !* concession, is too ambitious for bike share on its own. Rather, it is a goal for the Good Move[47] regional mobility plan, with measures to restrict car use and the development of a wide range of alternatives to be used in combination or alternatively. The PB contribution to the Good Move plan remains modest, with three actions out of 50 *(Appendix 10.2)*:

- C1: Support the development of MaaS.
- C3: Develop cycling services and other light means of transport.
- C11: Strengthen shared mobility services.

3.1.2 "Develop cycling": bike share does not remove all obstacles



To travel by bike, a number of obstacles need to be overcome: access to a bike in good condition, knowing how to cycle in an urban environment, feeling safe, and having a journey time that is competitive with other modes. It is therefore essential to provide safe, attractive and comfortable cycling conditions. To this end, the Brussels-Capital Region's 2020 Bicycle Plan helps to create to a bicycle system as part of a mobility management approach *(figure right)*. As a result, bike share is a sub-action within the "Good Service" focus *(Figure 8)* with more or less impact on each Good Move focus.

Figure 8: Cycling actions declined with the Good Move approach (Data 48 | Author: Mobiped)

	Good Move focus	Description
A	Good Neighbourhood	Neighbourhoods that make keen to ride by bike (links and 30-zones).
B	Good Network	A high-performance network for cycling everywhere, by creating a coherent, hierarchical cycle network with good intersections. The comfort bike network will be completed in 2025 and the Vélo plus (structural) network in 2030.
C	Good Service	• Bicycle services to eliminate the need to own a car • Bicycle identification to prevent theft • Secure parking • Cycling as a Service: - cargo bike sharing - *Villo !* optimisation - other rental systems (long-term, free-floating, etc.) - Infovélo in Mobility Points - Routeplanner.bike.brussels - bike points in major stations - accessibility and transport of bicycles on metro trains and trams
D	Good Choice	Add bikes to the options catalogue
E	Good Partners	Create partnerships within the administration
F	Good Knowledge	Ongoing policy evaluation

3.1.3 "Provide access to a bicycle": one solution among many

One of the initial motivations for the study was to give the people of Brussels access to a bicycle. Bike share provides rapid bicycle access from public spaces throughout the country. But to really enable access to a bicycle, a number of measures are required to enable people to own, use or hire a bike, with varying levels of intervention by public authorities *(Figure 9)*. To reach different audiences and usages, Bike share needs to be integrated into a mobility management approach while complementing other bike rental services *(Figure 10)* and be accompanied by investments to reduce the obstacles it addresses *(Figure 11)*.

Figure 9: Bicycle access systems as a whole

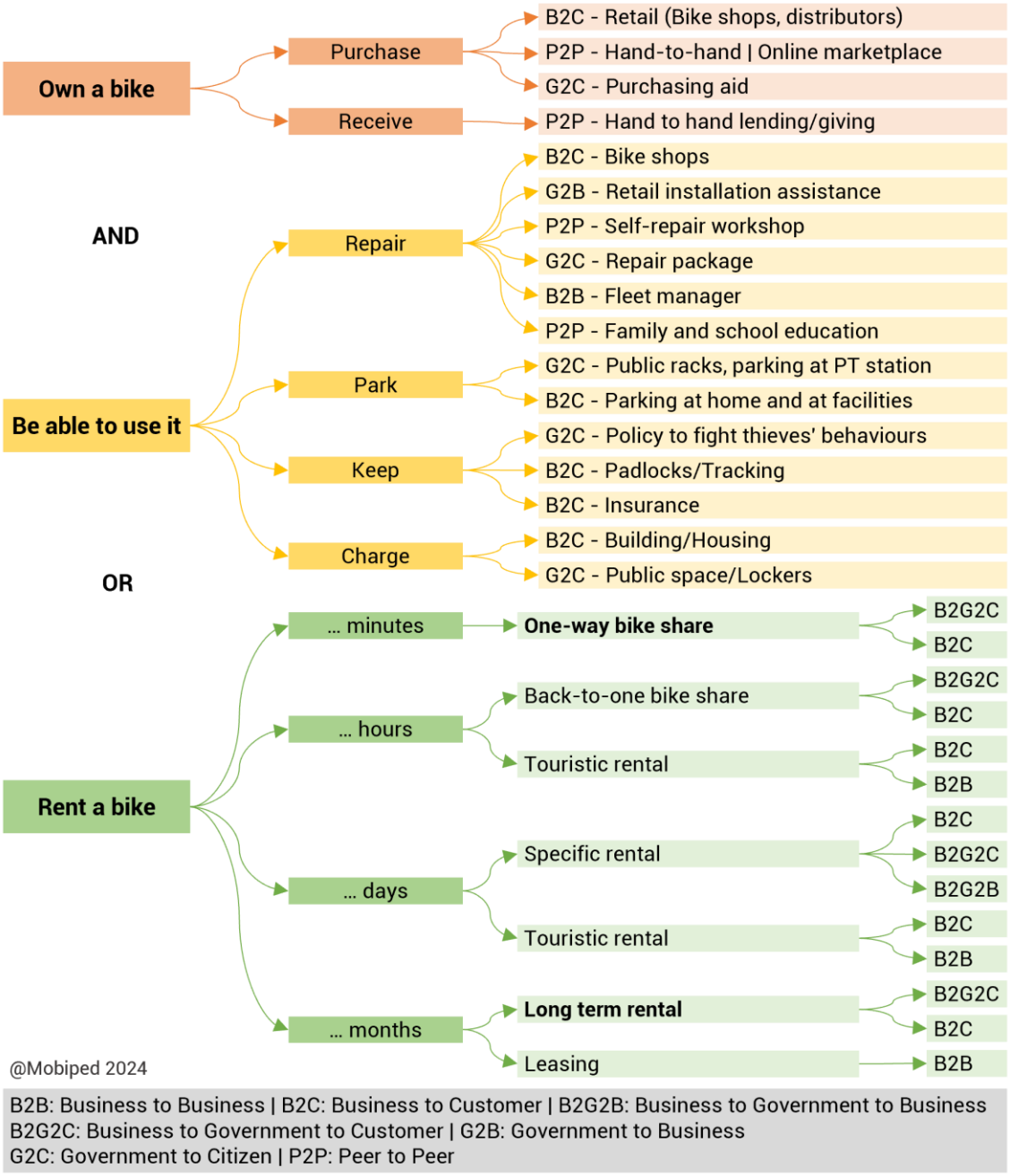


Figure 10: Diversity of bicycle rental services

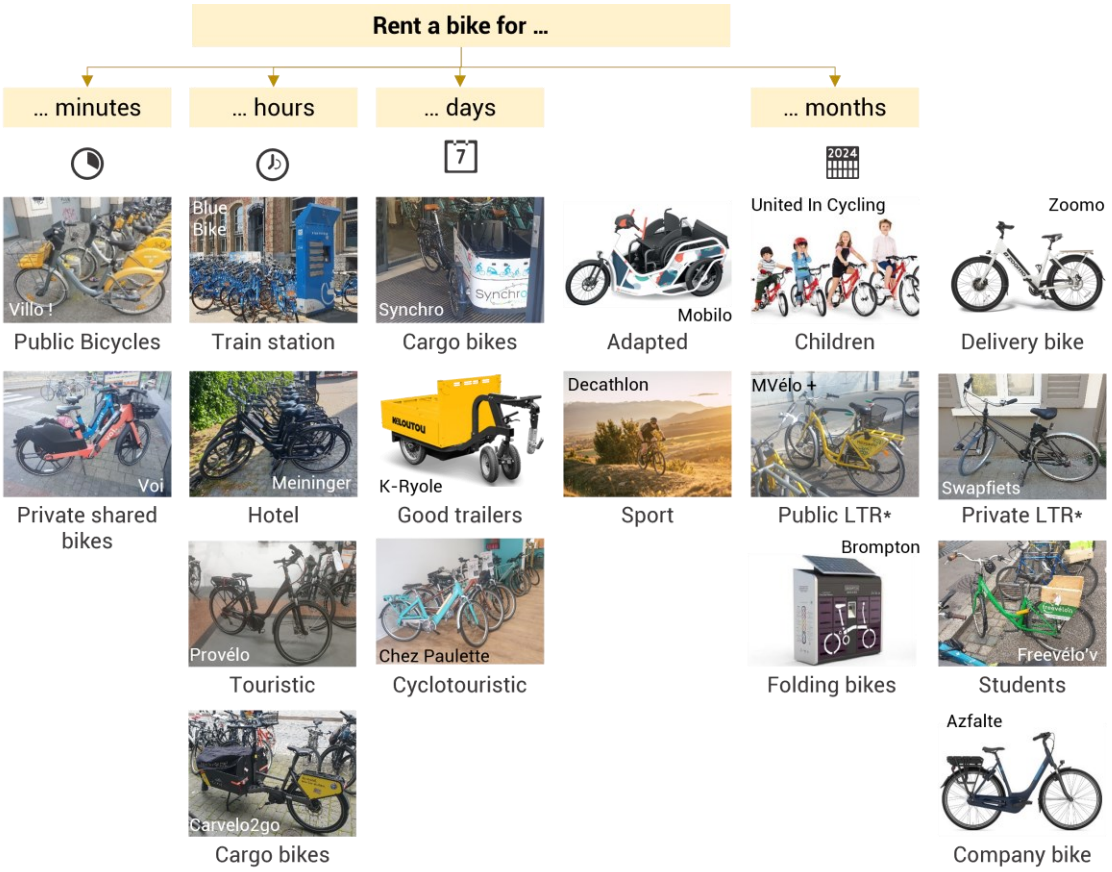


Figure 11: Actions to remove obstacles to accessing a personal bicycle

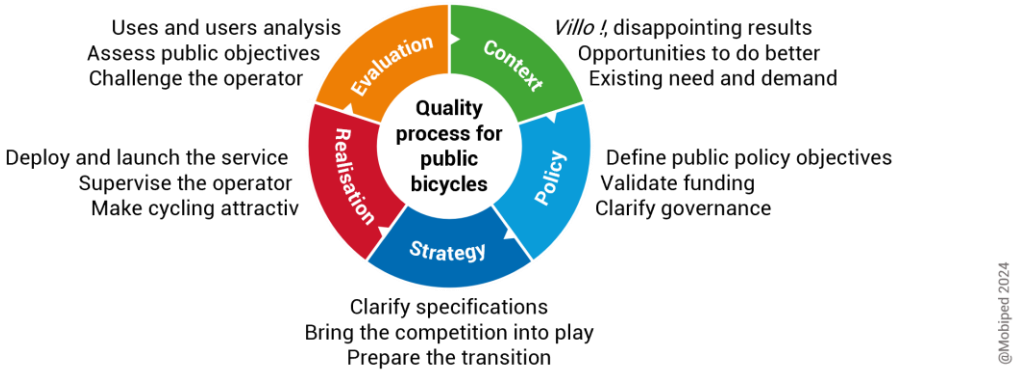
The obstacles removed by bike share	Cycling policy investment to address problems at source
Ownership	Purchasing aid Support for bicycle retailers.
Repairs	• Business financial support for the creation of bicycle repair shops. • User financial support to repair the bike stored and not used for years. • Fair financial support for bicycle self-repair associations, such as a SSEB services (Social and solidarity-based Economy Bicycle) *(Source 61)*.
Bike theft	Fight against bike thieves.
Easy-to-use parking	• Public areas: racks, secure racks (e.g. Bikeep, Edock, Locky, Sharelock etc.), stalls. • Intermodality: large parking areas at train stations, Metro, P&R, etc. • Building: local parking areas, parking areas in residential and office buildings.

3.2 How to fix precise, appropriate and measurable objectives?

3.2.1 Implement a quality-focused approach

With a view to public investment in a new PB service, a quality approach applied to PB, in the spirit of BYPAD [38], helps to define and evaluate public policy *(Figure 12)*.

Figure 12: Proposed quality-focused approach applied to PB in Brussels



3.2.2 List and prioritise possible performance indicators

To be evaluated, an objective must respect the SMART principle (Specific, Measurable, Acceptable, Realistic, Time-bound), with a precise collection and analysis methodology that may already exist (STIB Barometer, Good Move Indicators). For example, *Vélib'* in Paris has over 170 quality indicators, due to the complexity of the PB systems and their semantic subtleties. Potential indicators are listed in the appendix, including some inspired by Good Move and the International Transport Forum *(Appendix 10.3)*.

The method is to distinguish and prioritise the indicators, striking a balance between:

- efforts to collect/update data (e.g. contradictory field survey, counting, annual survey, user committee, automated data, observatory).
- utility and interdependencies: assess public policy, define contractual relationships, monitor service quality, generate knowledge, communicate *(Figure 13)*.
- data temporality, taking into account implementation times (order date, vision at a given moment, once implemented).
- deployment phases (different requirements in the first year).

To avoid being bike share centric approach and weight the impact of bike share, the indicators are also compared with those of the bicycle, mobility and territory sectors *(Appendix 10.5)*.

Figure 13: Categories of Key Performance Indicators (KPIs)

Topic	Type	Purpose
Public policies	KPI	Translate the public investment political ambition, with a view to evaluating and improving public policy.
Contractual	KPI	Incentivise the delivery of a high-performance service by distinguishing between resources/results and penalties/remuneration to specify the amounts paid. They are extremely precise, limited in number and can have an indirect impact on other sub-indicators. They can be discussed with candidates during the selection process.
Quality of service	PI	Improve user satisfaction and the service's image. These criteria can be ranked in order of perceived service quality.
Knowledge	PI	Conduct studies to understand how the service works.
Communication	PI	Communicate with the public.

3.3 Possible public policy objectives for a public bicycles service

In the Brussels-Capital Region government's vision of an bike share as the 4th pillar of public transport in Brussels, public bicycles would be a cross-reference:

- of the City Vision and Good Move focus areas *(Appendix 10.6)*.
- of BCR values.
- of STIB's mission (Figure 14).

Figure 14: Fundamentals of Good Move, the Brussels-Capital Region and STIB

Public policy objectives can be stated:

- for each Good Move focus *(Figure 15)*.
- by major PB theme *(Figure 16)*.

Figure 15: Possible public policy objectives of a public Bicycles service for each Good Move focus area

	Good Move focus	Challenges and objectives to be assessed annually
A	Good Neighbourhood	**A useful service for the people of Brussels** 50% of female subscribers and 10% of Brussels residents are subscribers.
B	Good Network	**A dense network** 50% of households are less than 150 m from an PB station.
C	Good Service	**A high-performance service** PB rentals account for more than 2% of STIB journeys.
D	Good Choice	**Multimodal practices** 20% of STIB subscribers use PB at least once a year.
E	Good Partners	**Local players gather around and thanks to cycling** Elected representatives, BM, STIB, Sibelga, etc. work together to ensure a smooth transition.
F	Good Knowledge	**Continuous improvement** Assessing usage and public policy.

Figure 16: Possible public objectives for efficient and effective PB, by theme

SERVICE EFFICIENCY	NUMERICAL CRITERIA
Annual rentals (> 2 min)/(contractual) bike/365 days	> 2 (relevance of shared parking compared to private bicycles) > 3 (minimum ambition) > 5 (European example)
PB rentals as a proportion of STIB journeys	> 2 %
POPULATION PENETRATION RATE	
Subscribers	> 10% of over 14s
Gender	> 50% female subscribers
People with up to secondary education	> 30% of subscribers
Former users who now ride their own bikes	> 5% of people surveyed
MULTIMODAL PRACTICES	
% of Brussels residents who consider cycling an integral part of the STIB offer	> 75 %
% of Brussels residents who have used PB at least once a year	> 20 %
% of new STIB customers thanks to bicycles	> 1 %
EFFICIENCY OF PUBLIC INVESTMENT	
Remaining cost (CAPEX + OPEX)/TRIP	< €2.58/trip (STIB reference) < €1/trip (ambition)
Remaining cost (CAPEX + OPEX)/KM	< €0.38/km (STIB)
Coverage rate (CAPEX + OPEX) of user revenue	> 18% (STIB) > 30% (low benchmark average) > 50% (high benchmark average)
OTHER IMPACTS	
Carbon footprint (Life cycle)	> 0 tons avoided (minimum)
% of users who would have travelled by car	10% of subscribers surveyed
Sale of a vehicle or not buying one	10% of subscribers surveyed
Average journey distance	> 3 km
Number of deaths, serious injuries and minor injuries per km	< than cyclists with their own bikes
Public healthcare spending avoided	To be defined

Before considering the contractual criteria to be required of the operator, the public authorities set their own public policy objectives.

4 Scenarios explored

4.1 Requests from the study steering committee

4.1.1 Public service ambitions

The steering committee invites an exploration of scenarios with PB and/or LTR. PB would be part of a public service perspective that includes:

- territorial coverage of the Brussels-Capital Region.
- guaranteed long-term service continuity.
- a fast, simple user experience that is as inclusive as possible.
- a public authority service with a public brand.
- a range of prices including social pricing.
- 100% pedelecs with an integrated battery.
- the integration of PB as a 4th mode of public transport service to:
    - extend the range of public mobility services, bicycles included.
    - aim towards a shared experience.
    - develop complementarity between PB and PT.

4.1.2 Why have a 100% pedelecs fleet with integrated battery?

First, pedelecs with integrated battery are:

- more widely used than pedal PB in mixed fleets, generating premature wear and tear, higher operating costs and less well-charged bikes.
- more high-performance than those with removable batteries like *Villo ! (Figure 17)*.

Second, and even if they present a number of challenges *(Appendix 10.4),* pedelecs have many benefits relevant to the Brussels context:

- a boost in hilly areas like Luxembourg and Marseille *(Figure 18)*.
- longer distances travelled in the hope of shifting journeys previously made by car.
- audience diversification: +9% women, +7 years average age in the examples studied.
- 89% of Brussels residents do not have access to a pedelecs *(See section 5.1)*.
- a credible offering in the face of comparison from privately-licensed SB.
- having electric *Villo !* is citizen request no. 10 in the Good Move plan *(Source 47)*.

Lastly, a homogeneous rather than a mixed fleet is preferred:

- on the user side: clarity and readability of the pricing structure.
- on the operator side: simplified control and maintenance, without double logistics.
- on the public authority side: lighter contractual monitoring without having to track and distinguish the actual proportion of pedal and pedelecs available for rental.

Figure 17: Overuse of pedelecs with integrated batteries and underuse of removable batteries

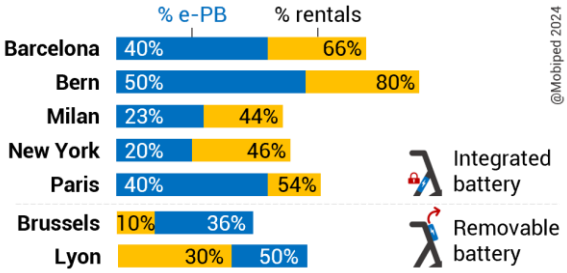
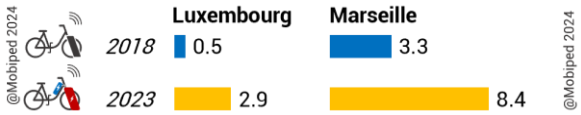


Figure 18: Rental trends before and after PB electrification



4.2 Proposal and presentation of five scenarios

The scenarios and recommendations are explorations by the consultants to inform the political and technical decisions taken, to be taken later. One LTR scenario and four PB scenarios are studied *(Figure 19)*, with a detailed presentation (*Figure 20)*, a description of the distribution of risks *(Figure 21)* and possible governance arrangements *(Figure 22)*.

Figure 19: Overview of the five scenarios up to 2027

1 | LTR + training + sales

- At home, at the destination or in racks in public places
- 2,100 pedal bikes (1,600 + 500) and 2,400 pedelecs (+ cargo bikes, longtails, accessories)
- Subsidised user price
- Home or in facilities
- 1 B2G2C public service. Other private services possible.
- Classic LTR: Liège (*Vélocité*), Paris (*Véligo Location*)
  Social LTR: Brussels (*Vélo Solidaire*), Leuven (*Fietsschool*)
- Rental for up to six months, with the option of home delivery | Vulnerable groups can take part in training courses to learn how to ride a bike or get back in the saddle, then purchase the bike at a reduced price.

2 | Private e-SB in dropzones (DZ private SB)

- 3,000 dropzones in public spaces shared with shared e-scooters
- 7,500 SB
- Battery swapping by operators
- 0 B2G2C public service
  3 licences granted to B2C players, like the 2024-2027 licences.
- Amsterdam, Brussels, Ghent, Geneva

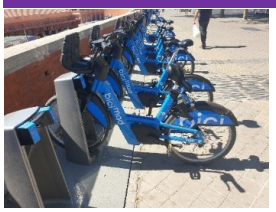
3 | e-PB in dropzones (DZ public PB)

- 3,000 dropzones in public spaces shared with shared e-scooters
- 7,500 PB
- Battery swapping by the operator
- 1 B2G2C public service to meet the requirements of a public service (accessible pricing, territorial service, white label) such as a subsidy per journey, km or bicycle. 0 B2C private services.
- Rouen, Gdansk

4 | e-PB stations + dedicated rack (Hybrid PB)

- 350 stations + 350 dedicated rack batteries in public spaces
- 7,500 PB
- In station + battery swapping by the operator
- 1 B2G2C public service with macro-subsidies
  1 to 3 B2C private services in licences
- Stuttgart

5 | e-PB charging stations (Dock-based PB)



- 600 dedicated stations in public spaces
- 7,500 PB
- In stations
- 1 B2G2C public service with macro-subsidies
  0 to 3 B2C private services in licences
- Luxembourg, Madrid, Marseille, Paris

Figure 20: Detailed presentation of scenarios

	1 | LTR + training + sales	2 | Private e-SB in dropzones	3 | e-PB in dropzones	4 | e-PB in e-stations + parking racks	5 | e-PB in e-stations
SYSTEM					
Bikes	4,500 (2,400 ⚡ & 1,600 pedal bikes) + 500 pedal bikes	7,500 ⚡			
Stations	1-5 premises	0		350	700
Dropzones	-	3,000	3,000	350	0
Parking in public spaces	Bicycle racks	Dropzones		E-stations + bicycle racks	Dedicated stations
Pedelecs charging	Home, work	Swapping		In-station and swapping	E-stations
SERVICE					
Rental period	6 - 12 months	~ 30 min			
Transaction	Human	Human-machine interface			
Training	Specific	Possible	Service ownership assistance		
Bike purchase	Possible	No			
GOVERNANCE					
Initiative	Public	Private	Public		
Public financing	Yes	Possible	Yes		
B2G2C player *	1	0	1		
B2C players *	Possible	3	0	0 to 3	
PUBLIC SERVICE					
Affordable prices	Prices set by BCR	✖ Decided by operators	Prices set and capped by BCR		
Brand	Public	✖Commercial	Public brand		
Territorial coverage with SLA	Delivery possible + events	~ Reduced availability criteria	Yes		
Fight against the digital divide	Yes	✖ 100% App	✖ Return of bicycles with smartphones, in the racks		Yes

* As in Lyon, setting up a monopoly for Public Bicycle with the cessation of private SB in option 3 (and potentially in scenarios 4 and 5) would make it possible to:

- promote the service in which public money is invested, rather than promoting private SB offers, as in the communication to launch Floya *(see part 2.5)*.
- generate a mass effect, increase the visibility of the service in public spaces (a single bike colour) and simplify the user experience with a single interface and app available. 26% of Brussels respondents use all micro-mobility services without distinction, 44% sometimes a different one and 30% only one *(Source 43)*.
- reduce walking distances with a nearby bike available. 61% of micromobility users look for the nearest bike, regardless of service *(Source 43)*.
- reduce the complexity of multimodal alternatives to the private car, with more than 35 distinct offers counted in Brussels in mid-2023 *(Appendix 10.12)*.
- increase peace of mind for the operator, who can be more transparent without the presence of competitors at meetings with public authorities.

Figure 21: Risk distribution for each scenario

RISKS	1 | LTR + training + sales	2 | Private e-SB in dropzones	3 | e-PB in dropzones	4 | e-PB in e-stations + parking racks	5 | e-PB in e-stations
Industrial	BCR (purchase of bikes)	B2C operators	B2G2C operator		
Commercial (if concession)	LTR operator	B2C operators	B2G2C operator		
Commercial (if public contract)	BCR	Not applicable	BCR		
Policy (GBCR)	Reaction of private B2C players	Complaints from citizens if bikes are incorrectly parked, especially with a public brand.			Impact of the transition
			Criticism if low usage and lack of money for other cycling measures *(Source 61)*.		
Image	BCR	B2C operators	B2G2C, BCR and STIB operator		
Bike theft	LTR customers	B2C operators	If bike not properly attached or returned: PB customer If little theft: BCR (included in initial price) If a lot of theft: B2G2C operator		

Figure 22: Governance options for each scenario

	1 | LTR + training + sales	2 | Private e-SB in dropzones	3 | e-PB in dropzones	4 | e-PB in e-stations + parking racks	5 | e-PB in e-stations
Initiative	BM	Private	BM	BM	BM
Financing	BM	Private	BM	BM	BM
Consultation	BM	BM	BM or STIB	BM or STIB	BM or STIB
Supervision	BM	BM	BM or STIB	BM or STIB	BM or STIB
Provision	Private	Private	Private	Private	Private
Installation	Private	BM	BM	BM + STIB or private	STIB or private
Operation	Private	Private	Private	Private	Private
Customer relations	Service operator	Private	Private	Private	Private

BM: Brussels Mobility | STIB: Brussels urban public transport operator

4.3 Quantitative analysis

4.3.1 Preamble

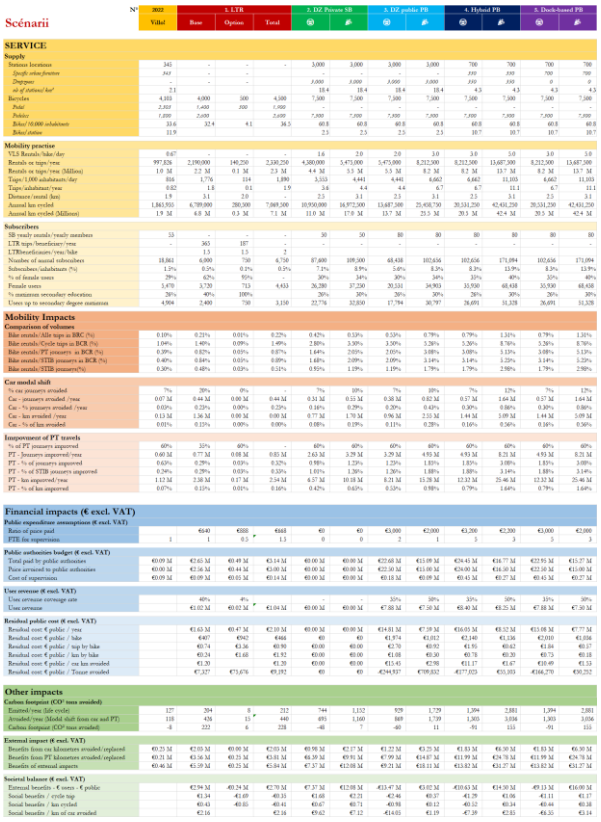
The socio-economic analysis provides a simplified view of the cost-effectiveness of each scenario. Predictive in nature, with inherent uncertainties, the calculation model is based on simplified assumptions and estimates, with certain factors not parameterised.

The results should therefore be considered as orders of magnitude only, in the knowledge that they depend on the assumptions and ambitions adopted. All the data in the table *(Figure 23)* is available in *Appendix 10.7*.

The analysis distinguishes between the basic LTR and the social LTR, which have different characteristics, allowing the qualitative social aspect to be highlighted.

As there are very few international studies on LTR. Many assumptions are based on the results of the AAVP (French Public Bicycles players network) study carried out by Inddigo among over 200 PB and LTR services in France and over 4,500 users of bike share and LTR services *(Source 17, Appendix 10.8)*.

Figure 23: Overview of scenario socio-economic evaluation table



For bike share options, conservative and ambitious variants are designed to explore possible extremes *(Figure 24)*.

Figure 24: Variants applied to SB and PB services

	Conservative	Ambitious
Turnover rate	↘	↗
% under-represented audiences	↘	↗
Car modal shift	↘	↗
Revenue coverage	↘	↗
Costs for public authorities	↗	↘
HR supervision	↗	↘

4.3.2 Service sizing

Basic LTR

The assumption is 4,500 bicycles, or 32 bicycles per 10,000 inhabitants *(Figure 25)*. This is a reasonable assumption in the light of French and Belgian experience, bearing in mind that the fleet can easily evolve over time. In Belgium, 15% of the LTR fleet is powered by pedelecs. The assumption used is that of the French market, with an average of 65% pedelecs and 35% pedal bikes (*Source 17*). Special bicycles are recommended, but not included in this analysis for the sake of simplicity.

Figure 25: Number of LTR bike per 10,000 inhabitants in Wallonia and France

Small towns in Wallonia	15
Average in France	33
Liège Vélocité*	40
Grenoble	250

** Services operated by Pro Velo*

Social LTR

The social LTR is inspired by the experiences of *Vélo Solidaire* in Brussels and *Fietsschool* in Leuven *(Appendix 10.8)* with training to learn to start cycling, the provision of a bike for a long period at a low price, and then the possibility of buying a cheap second-hand bike. The assumption is 500 light pedal bicycles, divided between:

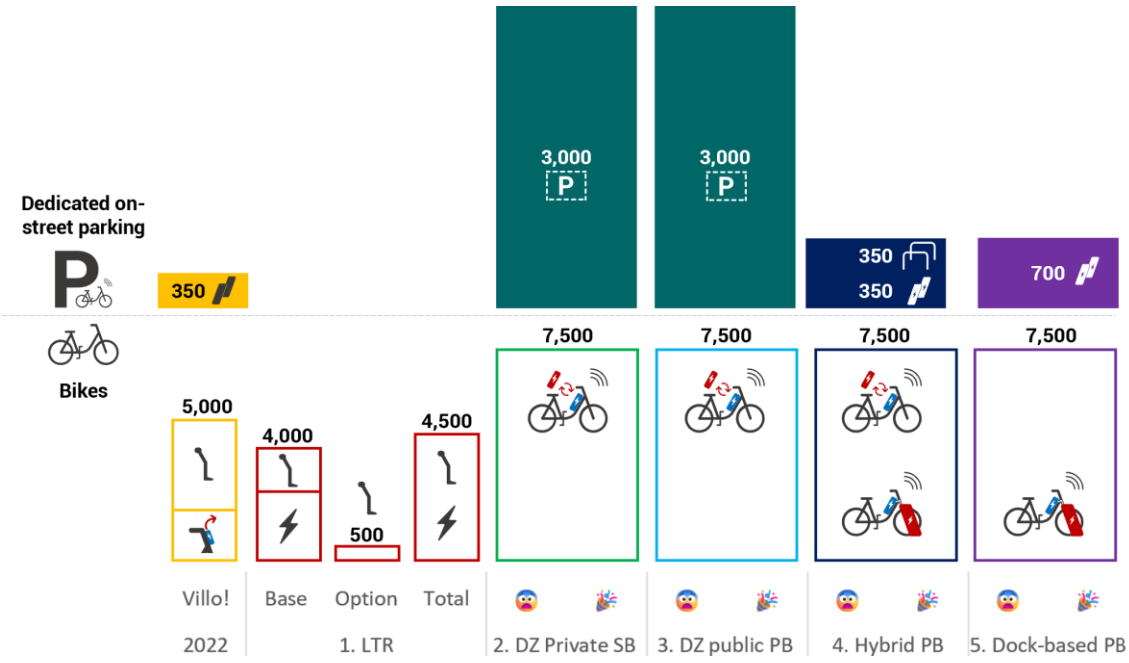
- 300 *Vélo Solidaire* bikes, which seems excessively low given the waiting list.
- 200 *Fietsschool* bikes, which, extrapolated to the Brussels population, would represent 1,500 bikes.

Bike share

To provide a more ambitious service than the current *Villo !* and in a perspective where there could be only private SB, the assumption made is 7,500 bicycles, as the maximum for private licences *(See 2.1)*. The fleet would be 100% electric *(See section 4.1.2)*. The scenarios differ in terms of parking facilities, with either:

- the 3,000 dropzones planned for the end of 2026 *(Appendix 10.10)*.
- 700 charging stations to massively increase network density, either 100% charging or in a hybrid format with 50% charging stations and 50% bicycle rack batteries dedicated to PB. In a utopia of simplification, it was imagined proposing a simple, easy-to-understand rule: "Each bicycle rack is a virtual station. As with private bicycles, free-floating bikes could be attached to bicycle racks". But this idea has been ruled out *(Appendix 10.10)*.

Figure 26: Assumptions for bicycle fleets and dedicated parking areas in public spaces



4.3.3 Uses

4.3.3.1 Assumptions

Basic LTR

Average distance (km)	3,7	Assumption corresponding to the average distance for all types of bicycle journeys in OVG 6, compared with 3.9 km for pedelecs as the main mode *(Source 41)*. This is a low assumption, given that the Brussels Bike Observatory indicates an average distance of 6.86 km for pedelecs and 5.47 km for pedal bikes. Cyclists who stop during their commute to be surveyed are probably motivated, and their commute trip is a long one *(Source 36)*.
Bike trips per year	365	Corresponds to seven bike journeys per week. This would represent: • a third of all journeys made by bicycle, since each inhabitant of the BCR travels an average of 3*/day, or 21*/week *(Source 41)*. • fewer than the 10 journeys/week made by 79% of the cyclists surveyed by the Bike Observatory *(Source 36)*. In France, 73% of LTR beneficiaries use it frequently to go to work and study (*Source 17)*.
Female beneficiaries	62 %	Average percentage of LTRs in France *(Source 17)*.
People up to secondary degree max	40 %	Managers and senior professionals are over-represented in LTR surveys, and even more so for SB and PB. *(Source 17)*. This assumption is therefore higher than the *Villo !* subscriber rate of 26%.

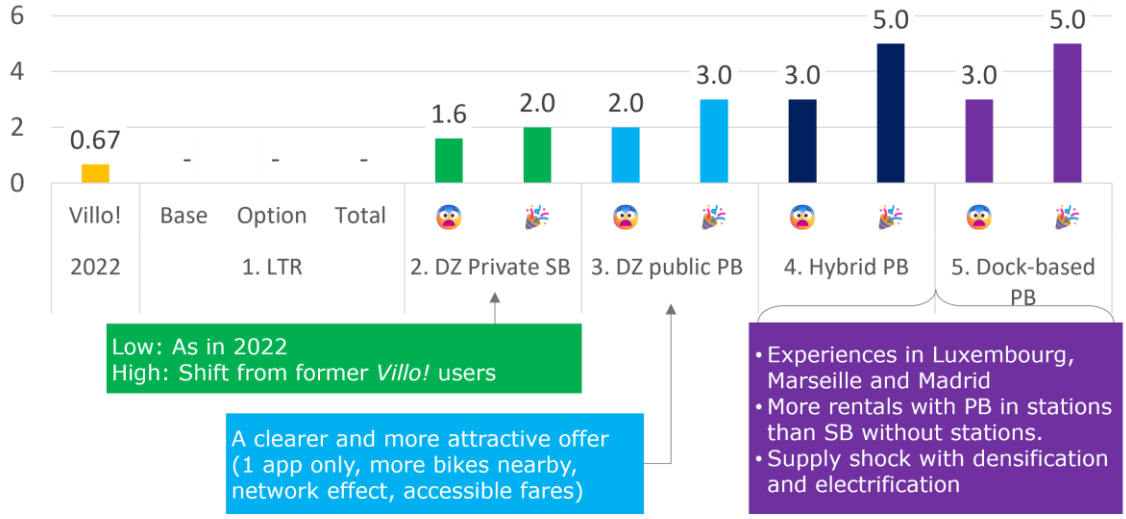
Social LTR

Potential audiences		The social LTR meets the huge challenge of getting people on bikes who are often forgotten by cycling policies, and who face several obstacles: • never learned to ride a bike *(> 6% of Brussels residents, See part 48)*. • cultural and social representations far removed from cycling, linked to the social environment of origin or a link with a country where cycling is not widely practised. • limited schooling and economic vulnerability.
Number of trips/year	0.5	By the time beneficiaries have gained the confidence to get around independently, they rarely travel by bike. *Vélo Solidaire*'s observations show one travel/week during the support period, i.e. two trips/week. The assumption of 3.5 trips/week, or 183 trips/year, is more optimistic, as it also takes into account journeys made during training.
Average distance	2	In the absence of available data from the Brussels and Leuven experiments, the average distance is estimated at 2 km, as the beneficiaries have limited use and are less likely to venture out on long journeys.
End-of-rental purchase	65 %	Data observed for *Vélo Solidaire* and *Fietsschool*.
Female beneficiaries	95 %	Data observed for *Vélo Solidaire* and *Fietsschool*.

Bike share

Turnover rate	1.6 to 5	Description in *Figure 27* on next page.
Rentals per subscriber	80	Ratio of the total number of rentals to the number of long-term subscribers. It is 43 for *Villo !* and over 100 in Antwerp and Paris *(Appendix 10.11)*.
Female subscribers	30-50 %	In 2022, 29% of *Villo !* subscribers were women *(Source 22)*. The goal is to reach 50%, given that they account for only 40% of cyclist counts *(Source 36)*.
People up to secondary degree max	26-30 %	In 2022: 26% *(Source 43)*. Objective: 30%

Figure 27: Assumed turnover rate (trips/bike/day) spread over one year



4.3.3.2 *Impacts*

As results are directly dependent on initial assumptions, it is difficult to draw conclusions. However, it appears that:

- a LTR reaches fewer people, but has a qualitative impact, as women and people with few qualifications are better represented among subscribers than bike share. But in nominal terms, there are more female or low-education subscribers to a successful PB service. Bike share has a quantitative impact, reaching a large number of residents *(Figure 28)*.
- the social LTR generates few kilometres travelled. But that is not its primary objective.

Figure 28: Share of Brussels' population to subscribe in the scenarios

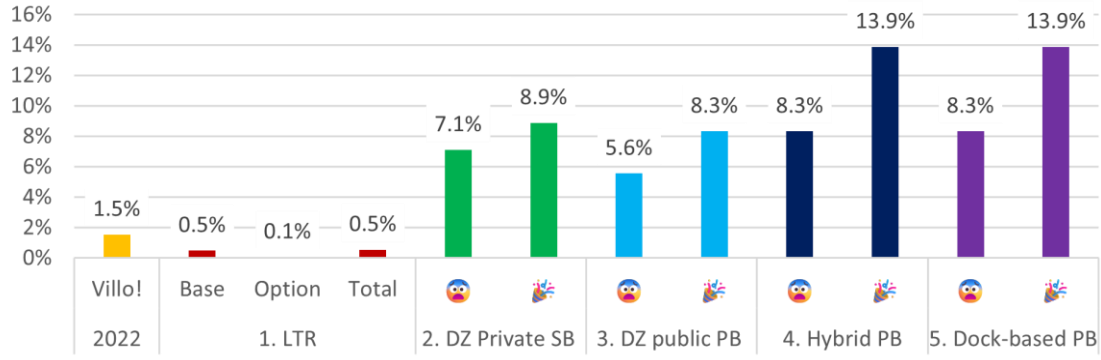


Figure 29: Main usage impacts of the scenarios

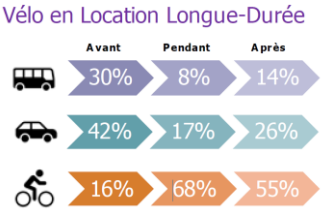
	LTR 6 months	LTR social	Bike share 100% pedelecs
USAGE			
Trips/bike/day			1.6 ↔ 5
Trips/year (millions)	2.2 M	0.14 M	4.4 ↔ 13.7 M
Trips/1,000 inhabitants/day	1,776	114	3,500 ↔ 11,100
Kilometres travelled (millions)	6.8 M	0.3 M	11 ↔ 42.4 M
% subscribers in the population	0.5 %	0.1 %	5.6 ↔ 13.9 %
Number of subscribers	6,000	750	68,000 ↔ 171,000
Female subscribers	3,700	713	20,000 ↔ 68,000
People up to secondary degree max	2,400	750	18,000 ↔ 51,000

4.3.4 Mobility impact and modal shift

4.3.4.1 Assumptions

Basic LTR

From the car	20 %	Firstly, modal shares for home-to-work journeys before, during and after LTR rental show a clear increase in bicycle use in France *(Source 17)*. The modal share of bicycles increases by 52% during LTR rental. To calculate the shift, these 52% represent 100% of new bicycle journeys. On this basis, the 22% drop in the modal share of public transport corresponds to a 42% modal shift from public transport. And the 25% drop in the car modal share corresponds to a 48% modal shift from the car. Secondly, respondents to the Brussels Bike Observatory 2023 considered that without a bicycle (pedal or electric), 13% would travel by car, 68% by public transport and 15% on foot *(Source 36)*. Although pedelecs has the greatest potential for convincing car drivers to choose cycling, and the service could deliberately target these profiles, the assumptions made are very conservative, with a modal shift of 20% from the car and 35% from public transport.
From PT	35 %	
To bikes	39 %	After leaving the service, the modal share of bicycles on the home-work journey increased by 39 %, from 16% to 55% *(Source 17)*.



Social LTR

New bike journeys	100 %	The beneficiaries did not know how to ride a bike before. Those who buy a bike will probably use it more. But this is not guaranteed in Brussels, where the cycling culture is less deeply rooted than in Leuven.
From the car	0 %	These audiences own few or no cars.
From PT	60 %	Data for *Fietsschool*, but not available for *Vélo Solidaire*.

Bike share

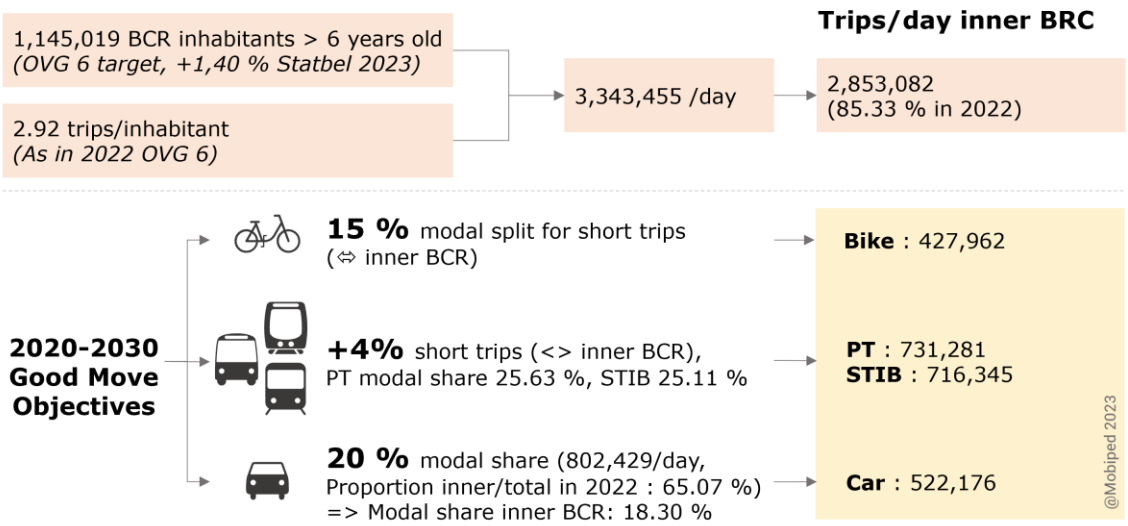
From the car	7-12 %	*Villo !* 2017 data *(Source 52)* and hope for an increase thanks to a more attractive service and pedelecs.
From PT	60 %	*Villo !* 2017 data *(Source 52)*.

Brussels mobility context in 2030

To simplify forward-looking calculations (population, Good Move targets), 2030 is used as a representative year for LTR and bike share services.

As the origins-destinations of journeys made using the PB service are all within the Brussels-Capital Region (before perhaps considering an extension to neighbouring municipalities - *See section 5.3.3*), PB is positioned in the intra-regional travel market. This market accounts for 85% of the volume and 37% of the km of journeys estimated in OVG 6 *(Source 41)*. For the 2030 timeframe, the assumption is the achievement of the Good Move targets, which have been translated into the number of trips for each mode *(Figure 30)*.

Figure 30: Estimated mobility context and journey volumes in 2030



4.3.4.2 *Impacts*

LTR, trips induced over time

Over and above the short-term impact during the rental period (52% increase in cycling), LTR is particularly interesting for its long-term effects, since 39% of the journeys made using another mode prior to rental are now made by bike *(Source 17)*.

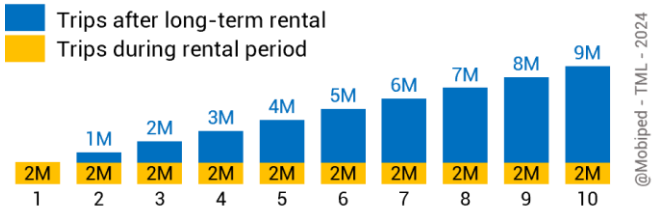
This means that beyond the trips made during the rental period, former users continue to ride by bike - the induced effect *(Figure 31)*. Applied to the 2.2 million trips generated per year by LTR beneficiaries, around 40 million trips in ten years will have been made by bicycle by people who did not cycle before using a LTR. People who would have taken up cycling without a LTR are not included.

Figure 31: Long-term induced trips calculations for a LTR service

		Years										
		1	2	3	4	5	6	7	8	9	10	TOTAL 10
Annual trips when renting a LTR bike	1	2.2 M	2.2 M	2.2 M	2.2 M	2.2 M	2.2 M	2.2 M	2.2 M	2.2 M	2.2 M	**21.9 M**
Induced personal bicycle trips by former LTR beneficiaries (19%)	2		0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	**7.7 M**
	3			0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	**6.8 M**
	4				0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	**6.0 M**
	5					0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	**5.1 M**
	6						0.9 M	0.9 M	0.9 M	0.9 M	0.9 M	**4.3 M**
	7							0.9 M	0.9 M	0.9 M	0.9 M	**3.4 M**
	8								0.9 M	0.9 M	0.9 M	**2.6 M**
	9									0.9 M	0.9 M	**1.7 M**
	10										0.9 M	**0.9 M**
TOTAL INDUCED TRIPS		0.0 M	0.9 M	1.7 M	2.6 M	3.4 M	4.3 M	5.1 M	6.0 M	6.8 M	7.7 M	**38.4 M**
CUMULATED TRIPS		2.2 M	3.0 M	3.9 M	4.8 M	5.6 M	6.5 M	7.3 M	8.2 M	9.0 M	9.9 M	**60.3 M**

Rounding up the number of trips generated during the rental period to 2 million, and increasing the number of beneficiaries who would continue to cycle thanks to improved cycling conditions in Brussels (39% to 50%), induced trips would be one million per year *(Figure 32)*.

Figure 32: Trips/year during LTR rental (yellow) and cumulative induced trips after rental (blue)



Social LTR, helping to improve individual quality of life

The social LTR is not intended to have a direct quantitative impact on mobility. However, its qualitative impact for beneficiaries is a clear improvement in their living environment, with an increase in self-confidence, a new mobility option and greater freedom of movement, as some testimonials attest *(Appendix 10.8)*. Cycling by women also has an impact on the representation and cycling practices of other household members.

Even with very affordable pricing and in-depth support, long-term cycling remains a complicated proposition in Brussels. In Leuven, the impact on beneficiaries' cycling habits is greater than in Brussels, as cycling is a factor of integration into local Flemish culture and cycling conditions are much better. Improving cycling conditions is essential for developing cycling among all sections of the public.

Bike share, a strong direct quantitative impact but weak compared to other modes

Even with the highest assumptions, PB would represent:

- less than 10% of all bicycle trips *(Figure 33)*. The available data does not allow robust extrapolation to estimate the long-term impact of PB. However, feedback from the UK shows that PB has an interesting impact on getting people back on the saddle over a number of years *(Appendix 10.13)*.
- the equivalent number of trips on a single bus line with high usage *(Figure 34)*.
- less than 1% of intra-regional trips are made by car and km by car. These calculations relate to direct impact only. They do not take into account demotorisation or the decline in car use over the long term.

Figure 33: Share of rented bike trips in regards with all intra-regional bike trips

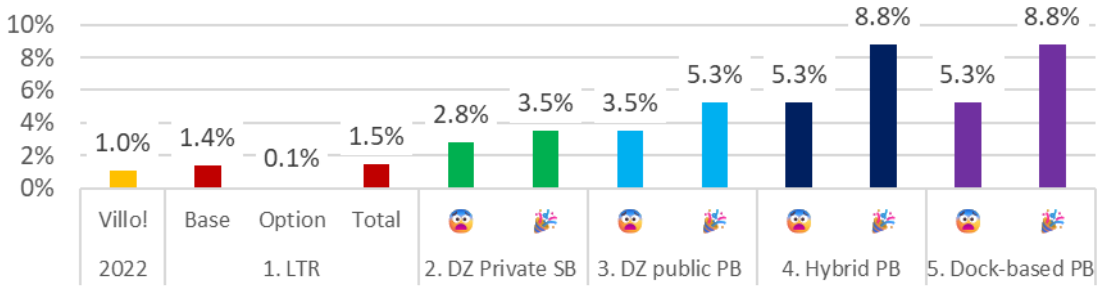


Figure 34: Comparison of daily trips volumes between public transport (STIB data) and PB

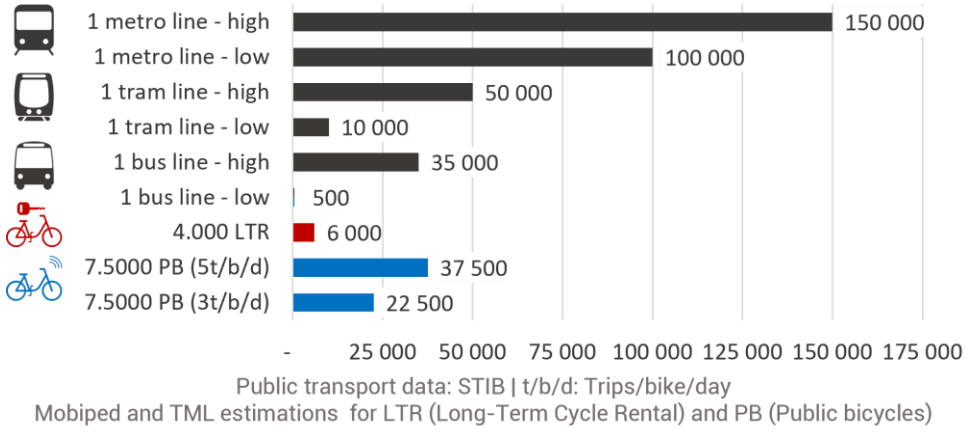


Figure 35: Main impact data for mobility scenarios

	LTR 6 months	LTR social	Bike share 100% pedelecs
IMPACTS ON MOBILITY			
% modal share all modes	0.2 %	0.01 %	0.4 ↔ 1.3 %
% of bicycle trips	1.4 %	0.09 %	2.8 ↔ 8.8 %
% STIB totals trips	0.5 %	0.03 %	0.9 ↔ 3 %
% car trips avoided	0.2 %	-	0.2 ↔ 0.9 %
% car km avoided	0.2 %	-	0.1 ↔ 0.6 %
% INTRA-BCR car trips avoided	0.2 %	0 %	0.2 ↔ 0.9 %
% STIB trips improved	0.29 %	0.03 %	1 % ↔ 3.1 %
Public transport trips improved	0.8 M	0.1 M	2.6 ↔ 8.2 M
PT km improved	2.4 M	0.2 M	6.6 ↔ 25.5 M
% PT km improved	0.2 %	-	0.4 ↔ 1.6 %

4.3.5 Financial features

The data below is considered in € excluding VAT and constant 2023, without taking inflation into account. The budgetary decision will be taken in 2024, with budgets to be allocated from 2026.

4.3.5.1 Assumptions

Basic LTR

Price €/bike/year for the community	Weighted average: €640/bike	To calculate this ratio, it is assumed that the public price of private rentals, without subsidies, covers all service costs and the operator's margin. The average is weighted according to the number of bikes *(see 4.3.2)*.
	Pedal bikes: €250 incl. VAT/year	The unsubsidised user price of a pedal bike rental is: • €240/year for Swapfiets. • €250/year for Fietsambassade in Ghent. The assumption is €250 incl. VAT/year.
	Pedelecs: €850 incl. VAT/year	In France, the remaining cost to local authorities is €490 (excl. VAT)/year/bike (*Source 17)*, but the data available does not allow a distinction to be made between the remaining cost for pedal bikes and pedelecs. Moreover, there is always some doubt as to whether the price of facilities, which may be partly owned by the local authority, is included or not The assumption used is €850 incl. VAT/year, based on the unsubsidised user price of a pedelecs rental in Belgium, which was: • Between €760 and €900 at Swapfiets at the end of 2023. While Swapfiets is not yet profitable on a group-wide scale (the main costs are caused by user negligence), it appears to be profitable in certain cities. • From €990/year for Fietsambassade in Ghent. Assuming 15% economies of scale for the thousands of LTR, the price would be €840.
Cover	**40%**	Average, according to experts.
User prices	Pedal bikes: €67 incl. VAT/6 months, i.e. €11/month Pedelecs: €227 incl. VAT/6 months, i.e. €36/month Average: €171/6 months.	The proposed prices are based on the following assumption: • of 40% revenue coverage. • that each bike is actually rented for eight months out of 12, with a maximum rental period of six months and periods of non-rental (average of €640/bike (all types)*40%*8/12= €171/bike (all types). These prices are well below those of non-subsidised services (Swapfiets, Pro Velo Brussels, Fietsambassade in Ghent excluding students) and close to those of subsidised services (Vélocité in Liège, Véligo Location in Paris, MVélo + in Grenoble, Fietsambassade for students in Ghent *(Appendix 10.14)*. At this stage, the scenario does not take into account social tariffs, training or purchase assistance.

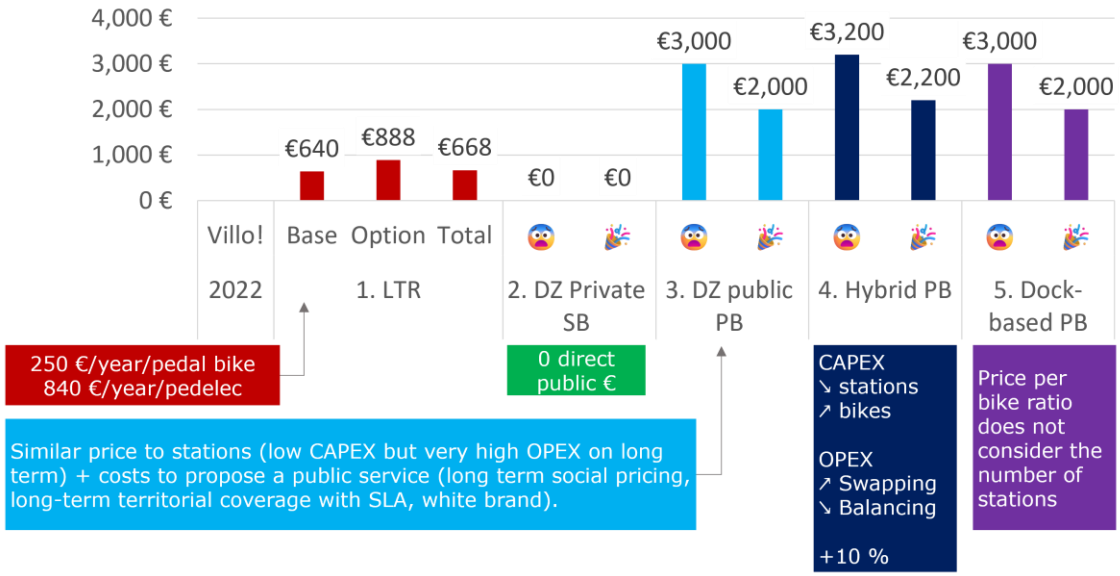
Social LTR

User prices		• Rental: €13/6 months or €2/month for a pedal bike, i.e. a social rate of 20% of the LTR rate. • Bike sale: €25 incl. VAT, as with *Vélo Solidaire* • Rental + Purchase: €38 inc. VAT.
Training	€400 incl. VAT	High assumption of €400/trained beneficiary, given that: • *Fietsschool*: €250/beneficiary (30 hrs training in groups of 20). • *Vélo Solidaire*: €105,000 budget in 2023 to train 300 people (30 hrs training in groups of 10), i.e. €350/beneficiary. The cost of training is higher because the associations cover part of the cost.
Bike value/year		€250 incl. VAT.
Bicycle residual value	€150	Estimated value after two years of use: €150 *(based on an exchange with Pro Velo)*. It would be possible to use bikes reconditioned by people on a professional reintegration programme. But information on costs is too divergent to be used.
Total cost before revenue	€888 excl. VAT	Bike price (€250 inc. VAT) + 1.5 training courses/year (€600 inc. VAT) + 1.5 bikes sold/year (€225 inc. VAT) = €1,075 inc. VAT, i.e. €888 excl. VAT/bike/year. In practice, an additional budget is needed to enable district associations to reach their target audiences.
Coverage rate	4 %	Estimate based on expert opinion, due to very low user prices.

Bike share

User prices		Non-price-elastic scenarios. The assumption made concerns only the user revenue coverage rate for PB, as it is not known for private SB.
User revenue coverage	35-50 %	• 35%: low benchmark assumption (before obtaining figures for the first year of Marseille in 2023). • 50%: high assumption close to 49% in Paris in 2022.
€ public/bike/year	From 0 to €3,200	This ratio is equal to the price invoiced to the public authorities (initial investment + operation over the contract period)/number of bicycles/number of contract years. This ratio is not very sensitive to the number of stations. Numerous exchanges with the bike sharing market players have highlighted: • price disparities of +/- 50% depending on business skills, amortisation periods, usage, governance, etc. The figures used are therefore the result of simplistic arbitration. • the costs for a public service, whether 100% with swapping (scenario 3) or 100% with charging stations, are close (scenario 5). It was decided to: • add a 10% margin to scenario 4 to take into account certain unknown factors: no feedback from experience, widely differing opinions on the optimum percentage of charging stations, increased CAPEX and OPEX costs for the station and the bicycle. • leave scenario 2 at €0, on the simplifying assumption that the occupancy fee paid for licences covers all the hidden authority supported costs and supervision costs for this type of service.
HR supervision	€90 k	Employer cost of one FTE with a Master's degree *(Source 58)*. Three FTE planned for PB. The FTE cost for private SB is diluted in the fee for the use of public space.
Contract duration (years)	5 to 10 years	• Dropzones: five years to increase the visibility of the operator(s) and better amortise the bikes. • Charging stations: ten years to amortise stations and work.

Figure 36: Price ratio assumptions € excl. tax/bike/year for public authorities, before revenues



4.3.5.2 *Impacts*

Here are a few conclusions:

- The ratio of € excl. VAT/bike/year is lower for the basic LTR and the social LTR than for bike sharing.
- Private SB is more economical than PB, but the impacts are lower *(see previous section)*.
- The remaining cost per trip is less than €1 for the LTR and for the optimistic assumptions of PB. Even with pessimistic assumptions, the remaining cost per journey for PB is lower than for STIB in 2022 *(Figure 38)*. If the trips induced by the LTR service are considered, public investment becomes increasingly profitable looking ahead.
- The remaining cost per km is less than €0.30 for the optimistic assumptions of PB and the basic LTR, and slightly less than that of STIB in 2022. However, the negative assumptions of PB are two to three times higher than those of STIB.
- The solidarity aspect of LTR has a very high cost per kilometre covered. This is understandable, since the beneficiaries start from scratch in terms of cycling skills and confidence.

Figure 37: Estimated remaining cost to public authorities (€ excl. VAT 2023/bike/year)

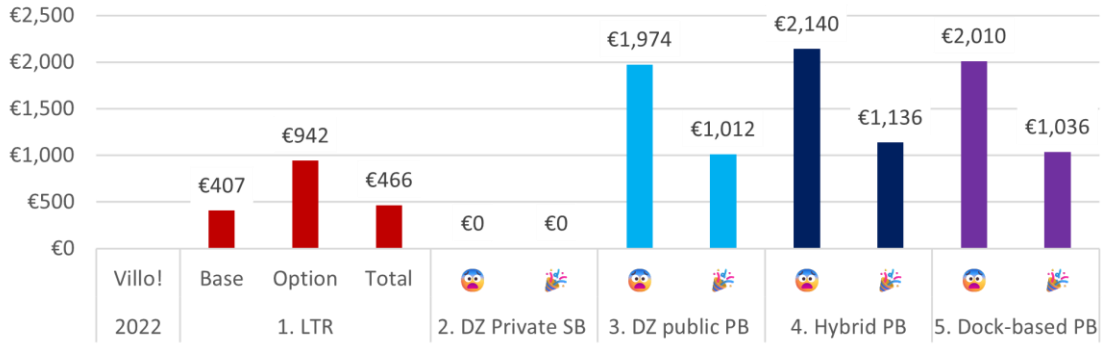


Figure 38: Estimated remaining cost per journey

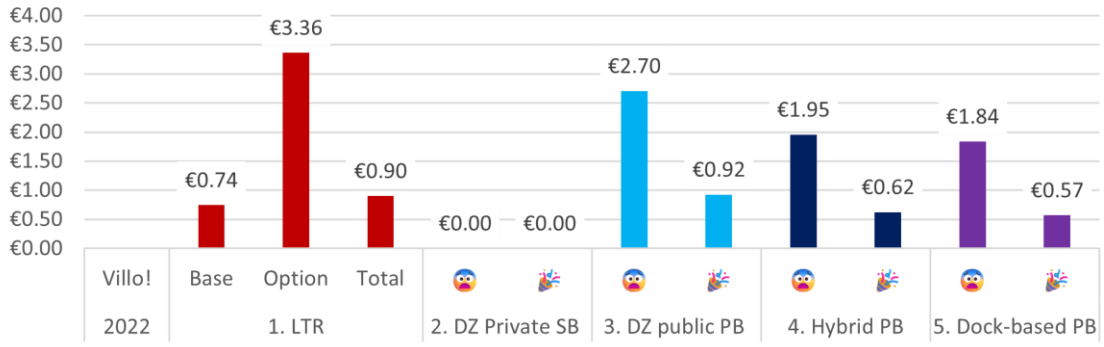


Figure 39: Estimated remaining cost per bicycle km completed

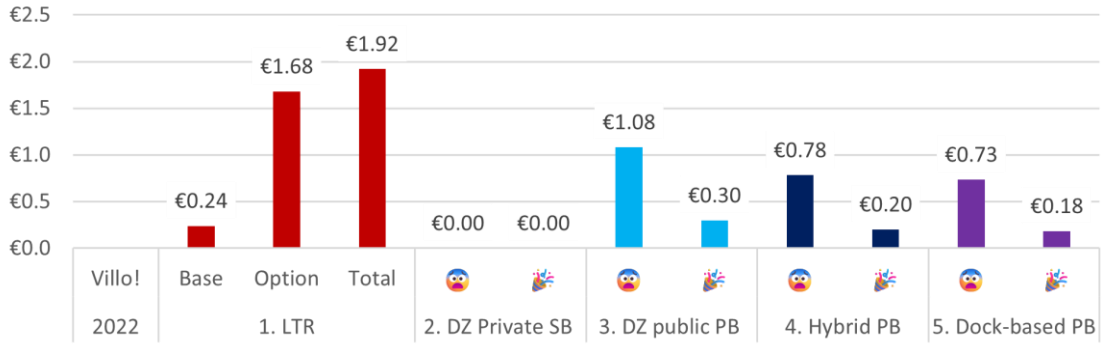


Figure 40: Main financial impacts of the scenarios

	LTR 6 months	LTR social	Bike share 100% pedelecs	PT STIB
FINANCIAL IMPACT (€ EXCL. VAT 2023)				
Ratio € excl. VAT/bike/year (CAPEX+OPEX)	€640	€888 M	€2,000 ↔ 3,200	
Price to be paid (without user revenues)	€2.7 M	€0.5 M	(€0) €15 ↔ 24 M	
Market supervision	€0.09 M	€0.05 M	€300 ↔ 500 k	
Coverage rate (CAPEX+OPEX)	40 %	4 %	35 ↔ 50 %	18 %
Annual revenue	€1 M	€0.02 M	€7.5 ↔ 8.4 M	
Remaining cost/YEAR	€1.6 M	€0.5 M	€7.6 ↔ 16 M	
Remaining cost/year/BIKE	€407	€942	€1,000 ↔ 2,150	
Remaining cost/TRIP	€0.74	€3.36	€0.57 ↔ 2.70	€2.58
Remaining cost/KM	€0.24	€1.68	€0.18 ↔ 1.08	€0.38
Remaining cost/CAR KM AVOIDED	€1.20		€1.53 ↔ 15.45	

4.3.6 Carbon footprint

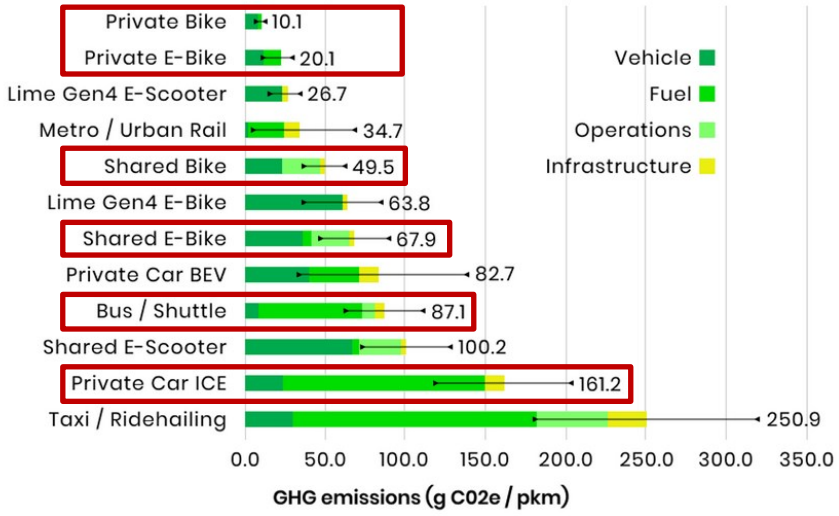
4.3.6.1 Assumptions

There is no precise data on the number of PB trips that replace car or public transport journeys. Thus, the simplifying assumption adopted is as follows: the percentage of users who declared in the survey that they would have made a trip by car or public transport is identical to the percentage of trips.

The carbon impact per km is based on the life cycle analysis of 12 modes in Stockholm, Paris, Melbourne, Berlin, Seattle and Düsseldorf, published in 2023 *(source 23, Figure 41)*.

- The modal shift generates 161 g of CO_2 per car km avoided and 87 g of CO_2 per public transport km avoided.
- Shared e-bikes emit 68g of CO_2 per km.
- LTR emit 20 g CO_2 per km for pedelecs and 10 g CO_2 for pedal bicycles.

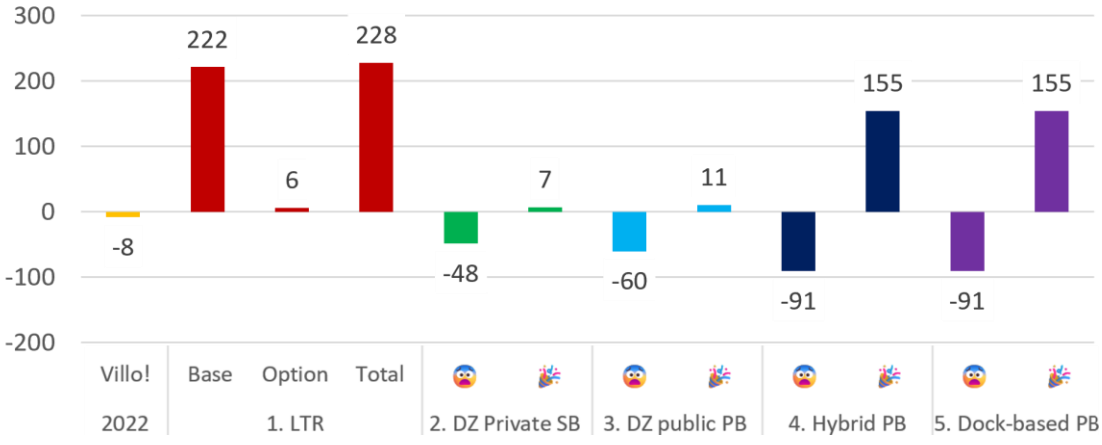
Figure 41: Life cycle assessment carbon footprint (Visual from source 72)



4.3.6.2 Impacts

The basic LTR has a favourable carbon footprint, with 222 tonnes of CO_2 avoided. The impact of social LTR is almost neutral due to low modal shift and low volumes. For bike sharing, *Villo !* is expected to have a negative carbon footprint in 2022. The carbon footprint of the scenarios is highly variable, depending on the average distance covered to replace car or public transport journeys *(Figure 42)*. The bike industries are working to improve their carbon footprint.

Figure 42: Carbon footprint of scenarios



4.3.7 Social impacts

4.3.7.1 Assumptions

The cost-benefit analysis corresponds to the external benefits (health, quality of life), minus the external costs associated with congestion, accidents, air pollution, climate change, noise and infrastructure, per kilometre travelled per mode. Assumptions are based on published results for 2022, for which figures are available for Belgium *(Figure 43)*. The societal balance is obtained by adding the price paid by public authorities and users.

Figure 43: Cost-benefit analysis of six modes in Belgium (Source 53)

	Data for Belgium (Per km travelled)					
	Pedal bike	**Pedelec**	**Speed pedelec**	**Auto**	**Bus**	**Train**
Congestion				-0.36 €	-0.07 €	
Health benefits	1.50 €	0.88 €	0.37 €			
Accidents	-0.05 €	-0.05 €	-0.07 €	-0.02 €	-0.00 €	-0.00 €
Air pollution				-0.02 €	-0.01 €	-0.00 €
Climate change				-0.02 €	-0.01 €	-0.00 €
Noise				-0.02 €	-0.01 €	-0.02 €
Infrastructure	-0.00 €	-0.00 €	-0.00 €	-0.00 €	-0.02 €	-0.03 €
Living environment	0.03 €	0.02 €	0.01 €			
Total external external	**1.48 €**	**0.85 €**	**0.31 €**	**-0.42 €**	**-0.12 €**	**-0.05 €**

Source: Van Pée, 2022, Cost-Benefit analysis of cycling in Benelux and North Rhine-Westphalia.

4.3.7.2 Impacts

All scenarios have a positive external impact balance thanks to the health benefits linked to the use of pedal or pedelecs *(Figure 44)*. For publicly funded services, performance determines the positive or negative side of the societal balance sheet. The results for private SB are overestimated because the user financial contribution is unknown *(Figure 45)*.

Figure 44: Estimated external benefits

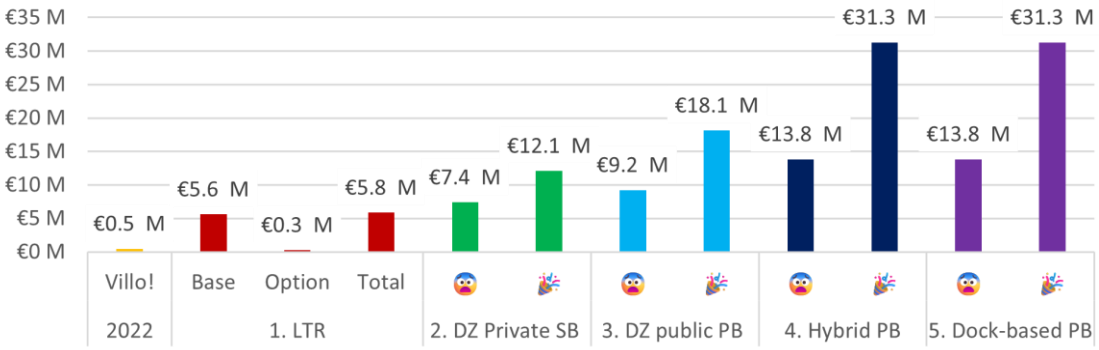
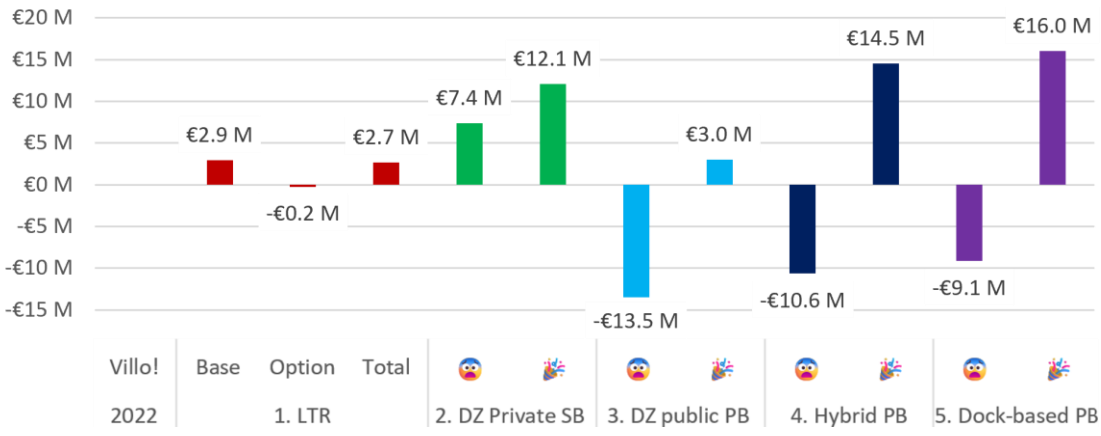


Figure 45: Estimated societal balance sheet



4.3.8 Summary table of quantitative impacts of scenarios

	LTR 6 months	LTR social	Bike share 100% pedelecs	PT STIB
SERVICE OFFER				
Number of bicycles	4,000	500	7,500	
Bikes/10,000 inhabitants	32	4	61	
Number of spaces (dropzones or stations)			3,000 ↔ 700	
USAGE				
Rentals/bike/day			1.6 ↔ 5	
Annual trips (millions)	2.2 M	0.14 M	4.4 ↔ 13.7 M	
Trips/1,000 inhabitants/day	1,776	114	3,500 ↔ 11,100	
Kilometres travelled (millions)	6.8 M	0.3 M	11 ↔ 42.4 M	
% subscribers in the population	0.5 %	0.1 %	5.6 ↔ 13.9 %	
Number of subscribers	6,000	750	68,000 ↔ 171,000	
Female subscribers	3,700	713	20,000 ↔ 68,000	
Up to secondary school maximum	2,400	750	18,000 ↔ 51,000	
IMPACTS ON MOBILITY				
% modal share all modes	0.2 %	0.01 %	0.4 ↔ 1.3 %	
% of bicycle trips	1.4 %	0.09 %	2.8 ↔ 8.8 %	
% STIB Totals	0.5 %	0.03 %	0.9 ↔ 3 %	
% car journeys avoided	0.2 %	-	0.2 ↔ 0.9 %	
% car km avoided	0.2 %	-	0.1 ↔ 0.6 %	
INTRA-BCR car trips avoided	0.2 %	0 %	0.2 ↔ 0.9 %	
% STIB trips improved	0.29 %	0.03 %	1 % ↔ 3.1 %	
Public transport trips improved	0.8 M	0.1 M	2.6 ↔ 8.2 M	
PT km improved	2.4 M	0.2 M	6.6 ↔ 25.5 M	
% PT km improved	0.2 %	-	0.4 ↔ 1.6 %	
FINANCIAL IMPACT (€ EXCL. VAT 2023)				
Ratio € excl. VAT/bike/year (CAPEX+OPEX)	€640	€888 M	€2,000 ↔ 3,200	
Price to be paid (without user revenues)	€2.7 M	€0.5 M	(€0) €15 ↔ 24 M	
Market supervision	€0.09 M	€0.05 M	€300 ↔ 500 k	
Coverage rate (CAPEX+OPEX)	40 %	4 %	35 ↔ 50 %	18 %
Annual revenue	€1 M	€0.02 M	€7.5 ↔ 8.4 M	
Remaining cost/YEAR	€1.6 M	€0.5 M	€7.6 ↔ 16 M	
Remaining cost/year/BIKE	€407	€942	€1,000 ↔ 2,150	
Remaining cost/TRIP	€0.74	€3.36	€0.57 ↔ 2.70	€2.58
Remaining cost/KM	€0.24	€1.68	€0.18 ↔ 1.08	€0.38
Remaining cost/CAR KM AVOIDED	€1.20		€1.53 ↔ 15.45	
INDIRECT IMPACTS				
Carbon footprint (Tons CO_2)	222	6	-91 ↔ 155	
External benefits (€m excl. VAT)	€5.6 M	€0.25 M	€7 ↔ 31 M	
Societal benefits (€m excl. VAT)	€2.9 M	€0.2 M	€-14 ↔ +16 M	

4.4 Qualitative analysis

4.4.1 Scenario 1 | Is a LTR advisable? Yes.

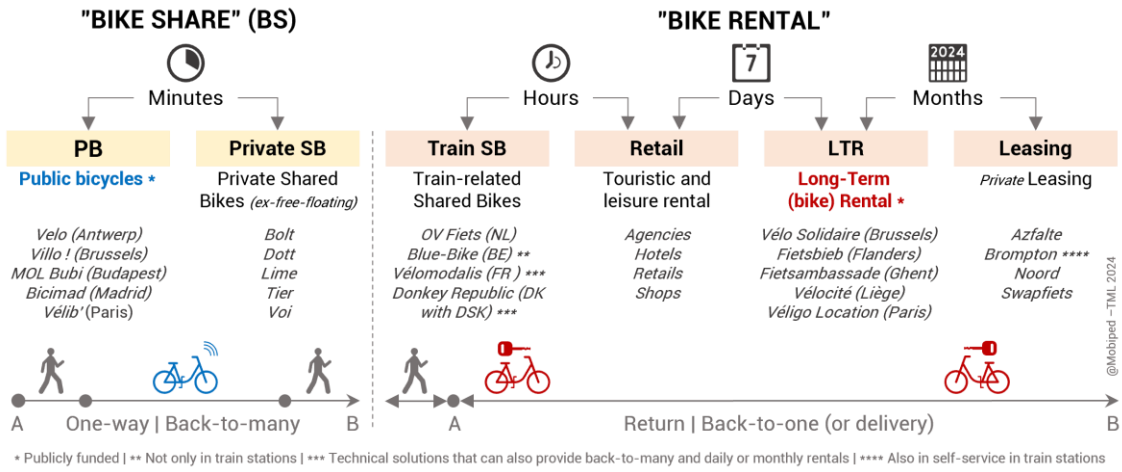
LTR and BS are two complementary services

A LTR service allows users to rent a bike and accessories (luggage rack, child seat) for several months, and benefit from services (repairs, insurance against theft). LTR removes the disincentive to buy a quality bicycle and encourages people to adopt a cycling lifestyle, before considering the purchase of a bicycle *(Figure 46)*. Compared with private LTR services (e.g. Swapfiets, Noord), a public LTR would make it possible to:

- offer a variety of bike types/sizes/models: pedal, electric, folding, cargo, adapted, children's, etc.
- invite thousands of Brussels residents to adopt a cycling lifestyle by learning how to become cyclists through a range of services and human support (with fewer commercial ulterior motives) to inform, train, test, rent, equip and advise on the purchase of a bike. *Vélo Solidaire*'s actions (training to start cycling, purchasing assistance) are perfectly in line with this approach.
- invest public money in a highly targeted way to reach vulnerable groups and avoid the need to drive kilometres, in particular by devising offers aimed at car drivers.

Bike share services (Cyclopartage in Belgium) allows people to rent a bike for the length of their trip. BS removes some of the obstacles to buying a bike, parking at home and at the destination, maintenance and the risk of theft.

Figure 46: Overview of bicycle rental services



LTR and BS, different targets and impacts

As a preamble, the term "non-cyclists" needs to be clarified between those:

- who have never cycled, for whom LTR is more suitable. Independent cycling learning through bike share seems illusory, even if it does exist in the UK *(Appendix 10.13)*.
- who know how to ride a bike but do not ride it for a several years.

PB and LTR have different targets *(*Figure 47***Erreur ! Source du renvoi introuvable.)*** and impacts. If a financial trade-off between the two is questioned, it must first be put into perspective with the overall financial trade-off concerning all modes of transport *(see section 6.5)*.

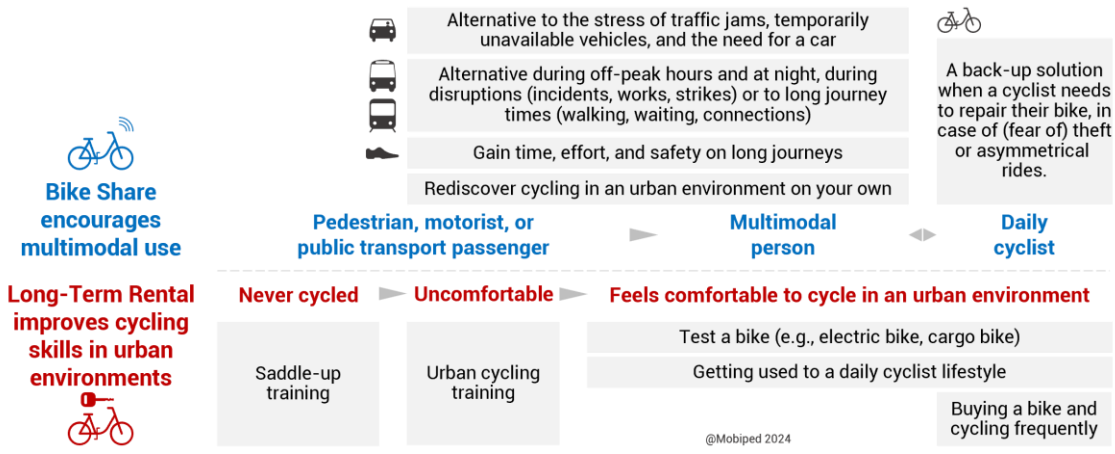
LTR enables targeted groups to try out a type of bike and the life of a cyclist, before becoming a cyclist with their own bike. It has a qualitative impact on the mastery of urban cycling by beneficiaries. Quality bikes can therefore be rented by people who:

- are new to cycling. These people need a lightweight bike and a framework of trust, such as a "Savoir rouler" training course via the social component of a LTR *(Appendix 10.8)*.
- know how to ride a bike, but need human support for urban cycling.
- are families and need special bicycles.
- have insufficient financial resources to buy a bike.
- need time and experience before considering an investment of hundreds or thousands of euros.
- stay several months: students, trainees, fixed-term contracts.

Bike share provides rapid access to bicycles from public spaces, like a mobility "insurance" and a multimodal offer option. It has a quantitative impact on the number of citizens who cycle at least once a year, including among under-represented groups. The presence of an PB service offers the possibility to:

- re-experience cycling, and even inspire people to refurbish their own bikes.
- access a bike by paying for a service, either because of a lack of knowledge and skills, a lack of budget and motivation, or a desire for comfort and simplicity.
- meet the needs of a population that does not want to adopt a cycling lifestyle with their own bike, but prefers to use bicycles on an occasional basis.

Figure 47: Uses of BS and LTR services



4.4.2 Scenarios 2 to 5 | Is a bike sharing service appropriate? Yes.

More than 1,600 cities worldwide have a bike sharing service, including some initially reluctant cities that have authorised the deployment and installation of private SB (Amsterdam, Ghent, Grenoble). So the question is no longer should bike share be deployed? but "what role should public authorities play?". To answer, it is necessary to:

- analyse the ability of private SB players to provide (or not provide) a level of public service on their own.
- set out the pros and cons of investing public money.

4.4.3 Scenario 2 | Do private SB players provide a public service on their own? No.

The presence of private SB services could lead to the conclusion that PB is useless and that private PB are self-sufficient. Private SB and PB are compared to identify each criterion that could theoretically justify local government intervention:

✓	Market failures. Private players cannot do it themselves. Need for public intervention *(Appendix 10.15.3)*.
~	Ambitions for better public service. The results of PB are not significantly different from those of private SB. But proactive public intervention could improve this parameter.
✘	Criteria for which private players perform well *(Figure 49 on next page)*.

Here are the main criteria identified to illustrate that private SB players do not meet the need for a public service, requiring significant intervention by public authorities:

- uncertainties about service continuity and sustainability. And even within the licensing framework, private SB players seem to need public money.
- evolving, uncapped pricing, particularly in the ultimate perspective of the hypergrowth model, which consists of squeezing out the competition, then raising prices to finally achieve profitability.
- exclusive use of smartphones and an app for private SB, contributing to a growing digital divide.
- lower performance on free-floating than on station *(Figure 48)*. PB stations form a network industry, generating a natural monopoly to be regulated by local public authorities *(Source 7)*.

Figure 48: Comparison of rentals/vehicle/day between PB in station, SB without station and shared e-scooters [15, 16, 30, 31]

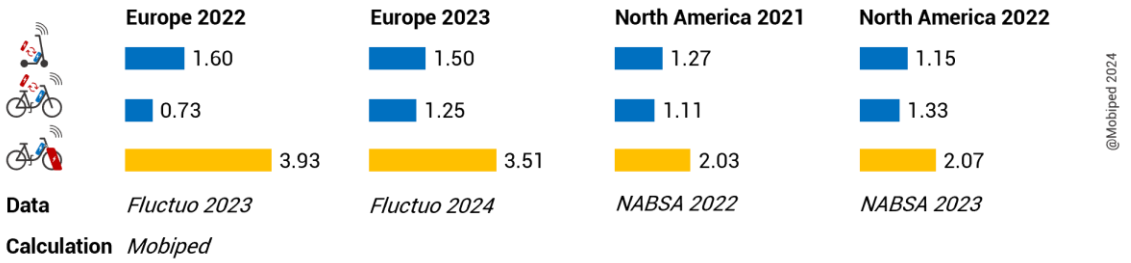


Figure 49 : Valid (✓) and invalid (✗) arguments to justify public intervention in the face of private SB

PUBLIC SERVICE GOAL (See section 5.1.4)	
Territorial equity and time availability	~ All BS are accessible 24/7. But the territorial availability of private SB is uncertain and is often too restrictive for PB.
Affordable, stable pricing	~ Price gap (usage and subscription) is narrowing between private and public BS. ✓ Private e-SB prices are not time-capped.
Payment	✗ Public and private services require a bank card.
Service continuity	✓ The hypergrowth business model of private e-SB is unstable, with bikes appearing and disappearing overnight. Tier and Pony, selected in Brussels in early 2024 for cargo bike licences, refuse to deploy them.
Equality	~ Children under 14, blinds persons and wheelchair users cannot use BS. The heavier the bikes are to handle; the more adults of smaller stature are excluded.
Under-representation of certain groups	~ Women and people with few qualifications are largely under-represented in both PB and private SB.
Digital technology	✓ Private e-SB require the use of a smartphone app, accentuating the digital divide for those with no internet access, no smartphone or limited digital skills.
Languages	✗ Private and public BS communicate in the local official languages.
Clarity of information	✗ Private and public services have little regard for the quality of access to information for visually impaired or cognitively impaired people.
Efficiency	✓ Services with stations perform better than those without.
MaaS integration	✗ All players can be integrated into Floya, the Brussels MaaS.
Public brand	✓ Only the PB makes it possible to brand the public mobility service.
GENERAL INTEREST	
Need in the general interest	✓ The promotion of an alternative means of transport to car pressure is an objective of Community interest *(Source 10)*.
Existing legal framework (Appendix 10.15)	✓ *Villo !* is defined as a SGEI (Service of General Economic Interest) by the European Commission 2012 and 2019 *(Source 10)* and as a public passenger transport service in 2010 by the Brussels-Capital Region *(source 24)*.
No offer	✗ Existence of public and private pre-offers.
ECONOMIC CRITERIA	
Economic balance and coverage of user revenues	✓ No private or public BS provider is able to cover all its investment and operating costs from user revenues. The PB benchmark shows coverage rates of between 26% and 66%.
Natural monopoly	✓ The long-term investment + operating balance is more advantageous with charging stations, which also generate more usage. A network of stations installed in public spaces is, in business jargon, a "network industry generating a natural monopoly" and requires public intervention and funding. The absence to date of a universal standard for the bike-rack-station triptych makes it impossible to subsidise the network layer of the stations, and to put only the operation of the bike fleets out to tender.
Negative externalities linked to parking	✓ GPS, cameras, photos, fall detectors, Bluetooth and penalties seem insufficient to guarantee accurate and orderly bike parking.

4.4.4 Scenarios 3 to 5 | Is it worth investing public money in PB? This is a political decision.

The intervention and investment of local public authorities in PB can be justified by the market failures mentioned above *(Figure 49)* and by the desire to increase negotiating power. However, like all public policies and mobility services, PB has its limits and benefits *(Figure 50)*. The decision is therefore a political one. The rest of the study explores the possibility of public investment.

Figure 50: Limits and benefits of investing public money in an PB

	Limits	Benefits
	Cycling is very popular in Flanders and the Netherlands, despite theft and parking constraints. The PB budget could be invested in addressing barriers to using a quality bicycle by making it easier to acquire, maintain, and store a bicycle theft-free.	PB eliminates the barriers to access a bicycle for 100,000 to 500,000 Brussels residents, like a "mobility insurance". Even with massive investments in dismantling these barriers, many citizens will continue to face them. However, PB should not be a pretext for not investing in better cycling conditions.
	PB accounts for only a small proportion of bicycle trips compared to its share of the cycling budget, with a risk of underfunding other cycling measures *(Source 61)*.	Public investment in cycling is not in line with the objectives of increasing the modal share of bicycles compared to cars (e.g., leasing company cars, tunnels). And the €/trip ratio is lower for a well-used PB than public transport *(see section 6.5)*.
	Less efficient than LTR in terms of public euros excl. tax/km travelled.	Complementary to LTR and more effective in terms of the number of citizens reached.
	Accentuated sociological gaps with under-representation of vulnerable groups for a so-called "public" service.	Although underrepresented, several thousand of vulnerable people have access to a bicycle.
	Presence of private SB at lower public cost, but need to accept that it is not a public service.	• The "bicycle" component of Brussels' public transport service, visible in public spaces and consolidating the culture of "multimodality". • Bicycle project, shared mobility, data, MaaS, parking, marketing. • Contribute to the virtuous circle of rapid demand creation to put pressure on supply development.
	Overall carbon footprint potentially negative, if low usage and few former motorists.	Overall carbon balance potentially positive, in contrast to many public financing schemes.
	Derisory direct impact on car km avoided.	• Development of multimodal practices and skills among tens of thousands of people who use bicycles even though they would not have done so without PB. • On average in France, 18% of PB subscribers forgo the purchase of a car and 7% part with their car (*Source 17*). • Transformation of a street easement dedicated to car parking into an easement for bicycles parking. • Creation of a database of tens of thousands of residents to communicate with about cycling, alternatives to the private car and cycling policy, inviting them to become individual cyclists.

4.4.5 Scenarios 3 to 5 | Comparison of the three technological solutions

The choice of dropzones (*battery swapping*), hybrid or charging stations (connected to the electrical grid) service has an impact on street easement, operating and regulation methods, the need for local government intervention, budgets and cash flow financing. Here is a summary of the comparative analysis *(Figure 51, source 2)*.

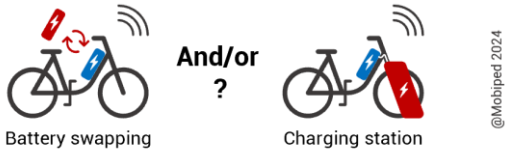


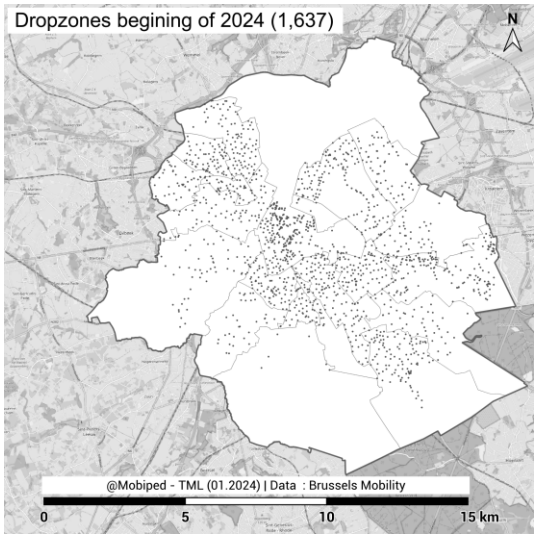
Figure 51: Thematic summary of options for a e-PB with dropzone, hybrid or in-station.

↗ risk of uncharged bike	• Swapping depends on the volume and cost of human resources. Stations increase the likelihood of charged bikes.
Battery life	• Swapping requires two batteries for each bike: one in the bike and one charging, and weakens the battery connectors.
Shared e-scooters	• Dropzone parking can be shared. In stations, there is a need for the same proprietary technology and complex dual operation.
Offer clarity	• Difficulty for users to grasp the large numbers of players and the complexity of the hybrid format.
Visibility in public spaces	• The stations are landmarks, but the furniture "suffocates" the bikes. • The colours of the bikes in dropzones are very eye-catching.
Sharing public space	• Bicycles parked outside dropzones are an obstacle to pedestrians, wheelchair users, the visually impaired and people with pushchairs.
Hidden costs	• Theft, vandalism and complaints to police are lower with stations. Dropzones has hidden costs: impounding (bikes in the way), water services (collecting bikes from the bottom of the canal) and citizens (annoyance).
Territorial deployment and access times	• Stations require works on public spaces (administrative procedures, underground networks, connection to the power grid), which means negotiating long stretches of road to replace car parking spaces and a more costly subsequent relocation. Since dropzones are smaller, their deployment is faster and more flexible, enabling very fine territorial coverage for better access times *(Figure 52)*.
Works	• Heavy works for the charging station and light works for the dropzones.
Contract duration	• Dropzone: three and five years | Heavy station: minimum eight years.
CAPEX versus OPEX	• Stations have very high CAPEX, but then lower OPEX. • Dropzones have lower CAPEX, but high OPEX (Human Resources costs for swapping), making this option less attractive over time. • This has an impact on the financing model for stations (contract duration + call for credit) and dropzones (fundraising and user revenues).
Timeframes	• Dropzones take a few months to set up and stations a few years.
Carbon footprint	• Investment: bikes and batteries for dropzones. Bicycles and street furniture with electronics for the stations. • Operations: data, servers and shuttle journeys (battery swapping for dropzones and regulation for stations).

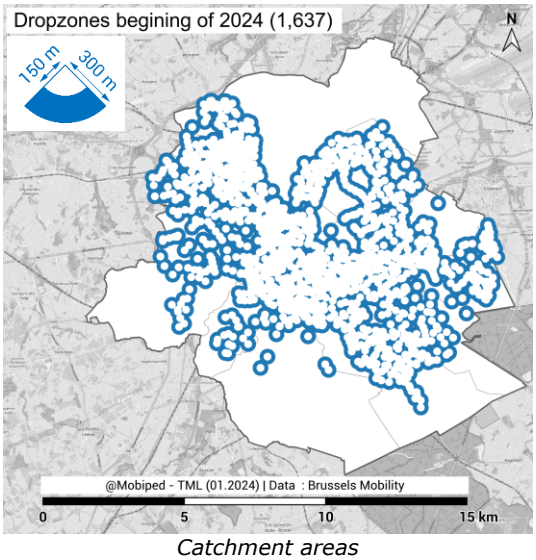
Figure 52: Maps of the dropzones and station-based scenarios

Scenarios 2 and 3: 1,637 dropzones in 2023, 3,000 estimated in 2027

18.4 dropzones/km² | 114 metres "observed" between two nearest stations (calculated for 1,637 dropzones)



Locations

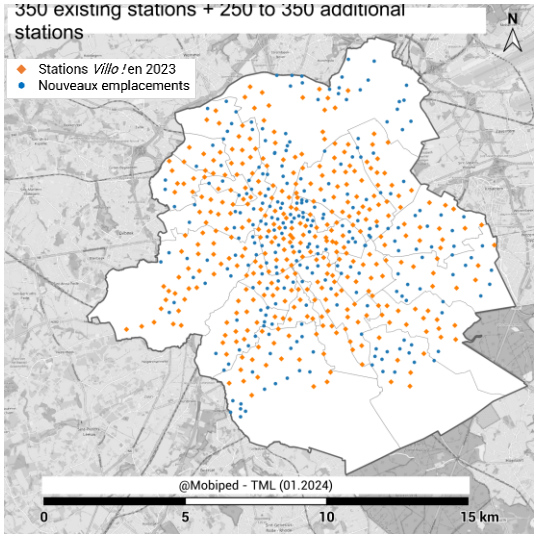


Catchment areas

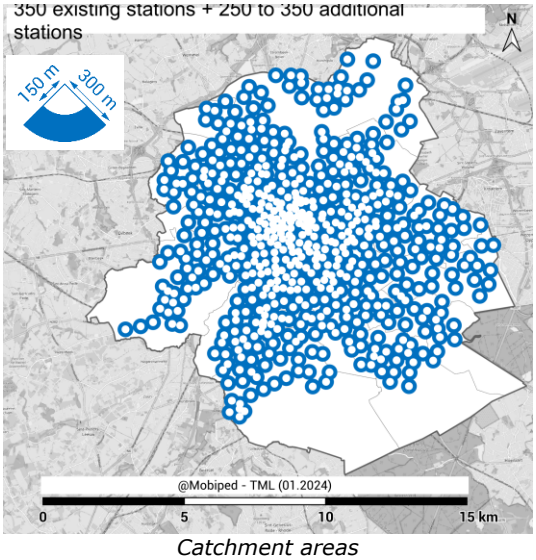
Scenario 4 - Hybrid (350 current stations + 350 batteries on dedicated racks)

Scenario 5 - Station: 700 stations by 2030

4.3 locations/km² | 322 metres "observed" between two nearest stations (Calculation for 600 locations shown below)



Locations



Catchment areas

4.4.6 Scenario 3 | What if PB were only in dropzones? Not that interesting.

A PB in free-floating would be deployed in the 3,000 dropzones envisaged *(Appendix 10.10)*, replacing *Villo !* and private licences. This scenario would enable rapid deployment, while avoiding the challenge of electrifying stations during the transition. But it also entails economic and political risks.

On the one hand, this solution offered the prospect of savings on stations. However, the total price would be close to that of an PB with a station, due to operating and battery swapping costs (duplicate batteries, human resources). The constraints of public objectives and the presence of a monopoly would improve attractiveness, thus increasing usage volumes and consequently costs.

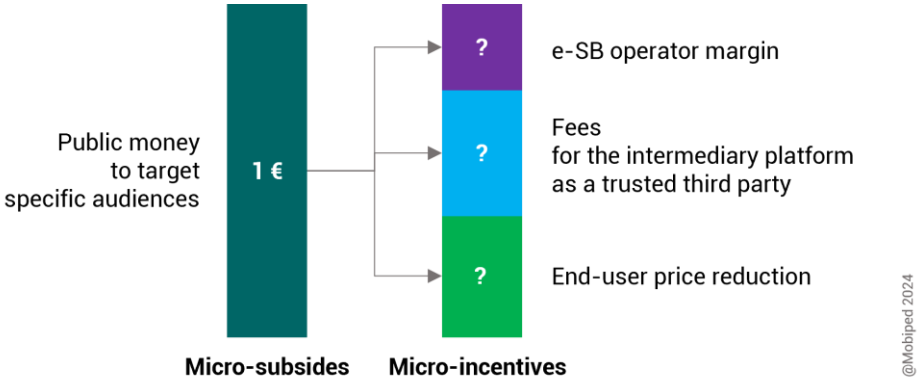
On the other hand, dropzone parking increases the risk of theft, vandalism, and bicycles lying on the ground or clogging up walkways. Technological solutions (GPS, camera, photos, fall detector) do not seem satisfactory at this stage, as they are either inaccurate, only available on a smartphone, or dependent on the operator's responsiveness. And even with penalties, parking outside dropzones persists (5% in Antwerp Region). "Already, the private and unsubsidised nature of free-floating services has not prevented municipalities from being held responsible by their constituents for the slightest fall or obstacle on the pavement" *(Source 62)*, so bicycles stamped "paid for with taxes" on the ground or parked in a disorderly manner would be difficult for citizens and elected officials to accept *(Figure 53)*.

Figure 53: Commercial visual inviting decision makers to use a charging station solution (Duckt)

In addition, micro-subsidies were not retained. The micro-subsidy per bike, as in Ghent (€125/bike/year), does not meet all the goals of the public service desired by the GBCR. The micro-subsidy per trip, tested as part of the Molière Project via reductions on Dott Bike trips in disadvantaged neighbourhoods, does not yet seem convincing enough for the following reasons:

- 3.72% increase in bicycle journeys via 70% reduction, costing €2.90/trip.
- the offer is based on the beneficiary's geolocation, not on their financial capabilities.
- the model lacks transparency on the margins of intermediaries, who will reduce the allocated amount to offer the final beneficiary a discount *(Figure 54)*.

Figure 54: The uncertain process of transforming a micro-subsidy into a micro-incentive



4.4.7 Scenario 4 | Is the best of both worlds possible? Hmmm, still too uncertain.

The mixed scenario of "charging stations + dropzones with dedicated racks" is a tempting way of limiting investment and operating costs, and ensuring orderly parking. Furthermore, the market is converging in this direction with new charging stations and connected bikes. This requires bike manufacturers to retrofit and adapt the frames and forks of their bikes.

But a number of unknowns remain:

- no player does both jobs well.
- experience feedback is scarce, and there is no consensus among service providers on the optimum percentage of stations and dropzones (ranging from 10% to 90% according to the players contacted).
- a more costly investment, since the requirements apply to both the bike (Internet of Things, resistance to impact, vandalism and theft) and the station (secure parking, charging).
- confusion for users between parking for personal bikes, PB and private SB in dropzones.
- difficulty checking that the bike is properly attached to the dedicated rack, with the possibility of PB on the ground or on paths.

4.4.8 Scenario 5 | Is station-based PB still relevant? Ultimately, yes.

With a 100% electrified fleet *(see section 4.1.2)*, the 100% charging stations option seems the most relevant and reassuring PB scenario in terms of:

- performance, with more rentals with station than with free-floating *(see section)*.
- quality of service with automated battery charging that does not depend on the cost of human resources.
- cost control, with less exposure to vandalism and theft, and no variable battery swapping costs.
- image, with orderly PB.

There are, however, some constraints to be taken into account:

- a long and risky transition, dependent on the decisions and schedule of the electricity grid operator and the planning authorities.
- long-term contract to amortise investment, so that the total cost ratio (investment + operation)/bike/year becomes relevant.
- limited flexibility to move stations, but with possible intermediate solutions: platform station, temporary station driven by human.
- limited station capacity with the cost of regulating bikes between stations.

4.5 Advantages and disadvantages of each scenario

Figure 55: Main advantages and disadvantages of each scenario

	1 | LTR + training + sales	2 | Private e-SB in dropzones	3 | e-PB in dropzones	4 | e-PB in e-stations + parking racks	5 | e-PB in e-stations
☺	• Efficient investment and trips induced over time. • Diversity and equity of user profiles with adapted bikes. • Progressive service development.	• No direct public expenditure. • Fast procedure and deployment. • Reactivity to integrate commercial offers and innovations.	• A simpler, clearer offering from a single operator. • Increased number of users. • Affordable pricing.	• CAPEX-OPEX optimisation for comprehensive service in the territory. • Attract audiences who prefer dropzones or stations. • The best of the B2C and B2G2C worlds.	• Many cities know its works. • Bikes parked, secured and tidy. • Optimised pedelecs charging.
☹	• Public intervention to be clarified with existing private offers (e.g. Pro velo and Swapfiets). • Limited number of people reached. • Success in France and Wallonia. And in Brussels?	• Hidden costs for local authorities • Fewer rentals than stations. • Unprofitable business, uncertain service continuity and future price rises in a hypergrowth business model.	• Harder to justify public intervention given existing private services. • Big risk of explosion in battery swapping costs. • Risk of uncharged bike	• No player does both well. • Combined risks of theft, vandalism and illegal parking. • Costs probably higher, with unknowns in terms of operation.	• Less innovative and "old-fashioned". • Increased investment for a denser network. • Potentially perilous transition.

4.6 Guidance from the steering committee

Based on the advantages and disadvantages *(Figure 53)*, the study's Steering Committee validates the appropriateness of scenarios 1 of LTR and 5 with e-PB in charging stations. While the introduction of a LTR service is a coherent, qualitative and efficient option, it is not explored further in this study. On the one hand, the initial study budget did not include a detailed analysis of two separate services. However, a more detailed analysis is needed, in particular to examine the legal dimension in relation to existing private LTR services, and to guide the marketing mix, especially for young people who do not cycle much *(Source 41)*. On the other hand, it was conceivable to combine the PB and LTR services in a single public contract, as in Nantes and Rennes. However, there are several reasons for separating these two contracts (*see section 8.1.4*).

The feasibility study therefore focuses on PB, exploring the political will to make public bicycles the fourth pillar of the public transport offer through:

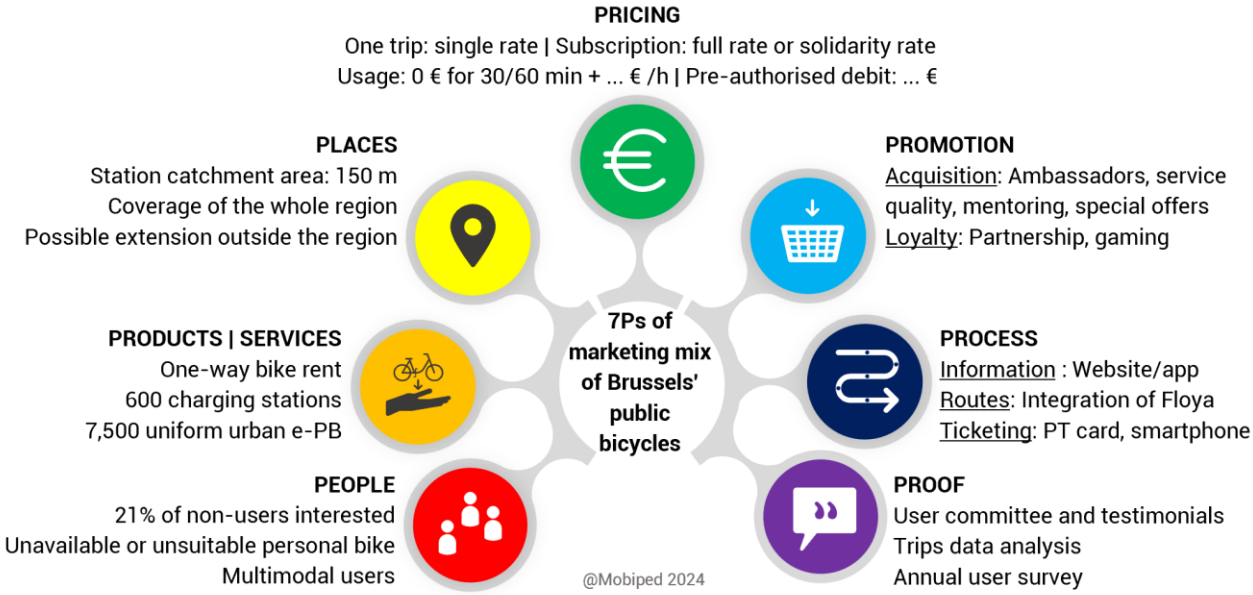
- a single, shared PB-PT user experience.
- the involvement of STIB, the BCR's urban public transport operator.

Long-term rental and public bicycles are both useful. The preferred scenario for public bicycles is with 100% charging stations. A political decision must be taken on whether or not to invest public money.

5 Marketing mix proposal

At this stage, no political or technical decisions have been taken. The proposals below are the result of an exploratory approach to the integration of PB and PT, with the aim of creating a single user experience. They are structured around the 7Ps of the marketing mix *(Figure 56)*, a basic private-sector approach to drawing up a business plan to determine the market positioning of a product or service.

Figure 56: Simplified view of the 7Ps of the user-oriented marketing mix for a future PB in Brussels



5.1 PEOPLE | Many potential beneficiaries

5.1.1 PB removes the obstacles for many Brussels residents

For hundreds of thousands of people in Brussels, PB removes the obstacles that prevent them from accessing a bicycle *(Figure 57)*. Some express an interest and may become users *(Figure 58)*.

Figure 57: Share of Brussels population in 2022 with difficulties accessing a bike.

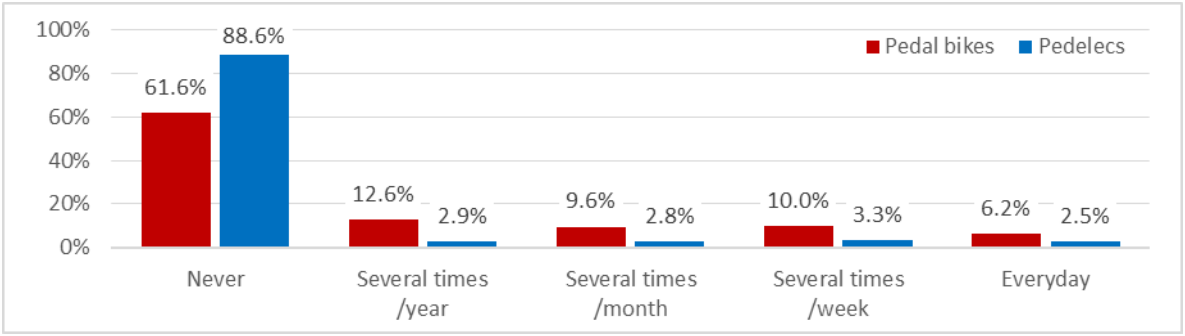
Barriers to accessing a bike	% of Brussels population	Households	Adults
"I live in the Region of Brussels"	100%: 1,220,000 inhabitants 2.17 inhabitants/household 1.38 adults/household *(Appendix 10.16)*	564,000	777,000
"I don't have a pedal bike".	53% of households have no bicycle in Brussels [41], compared with 15% in Antwerp [32] and Ghent [27]	300,000	410,000
"I don't have an electric bike".	89% of households do not have an electric bicycle [41]	500,000	690,000
"I can't buy a bike"	6% of households do not own a bicycle due to a lack of financial means [49]	34,000	47,000
"I can't park a bike"	Of the 53% of households that do not own a bike, 43% have no place to park one at or near their home. As a result, 23% of households are unable to park a bike and do not own one [41]	129,000	176,000
"I'm a cyclist, but I have parking problems"	24% of cyclists do not have a secure parking place for their bike at (close to) their home [36]		
"I'm afraid of bike theft"	29% of cyclists were robbed less than two years ago [36]		
"I'm not used to cycling"	In 2022, 60% of Brussels residents had not cycled during the previous year [41] *(Figure 59)*. 59% of people in Brussels, 58% in Wallonia (in 2010) and 24% in Flanders (in 2009)[1] had not cycled during the last year.		680,000 > 6 years
"I travel less than 5 km"	60% of intra-regional journeys 48% of car trips [41]		
"I don't have a car"	54% of households have no car [41]	305,000	420,000

5.1.2 The potential market of future users

Figure 58: Potential market and prospects for PB in Brussels

Travel practices	Potential prospects	Adults
"I already use *Villo !*"	23,000 *Villo !* subscribers and 45,000 non-subscriber rentals in 2022 [22]	
"I might be interested"	21% of non-users of *Villo !* in Brussels say they are interested in PB [44]	
"*Brupass* + PB? Ok"	9% of STIB subscribers are willing to pay €17/year more. 21% of STIB subscribers are willing to pay €3/month of their choice [51]	

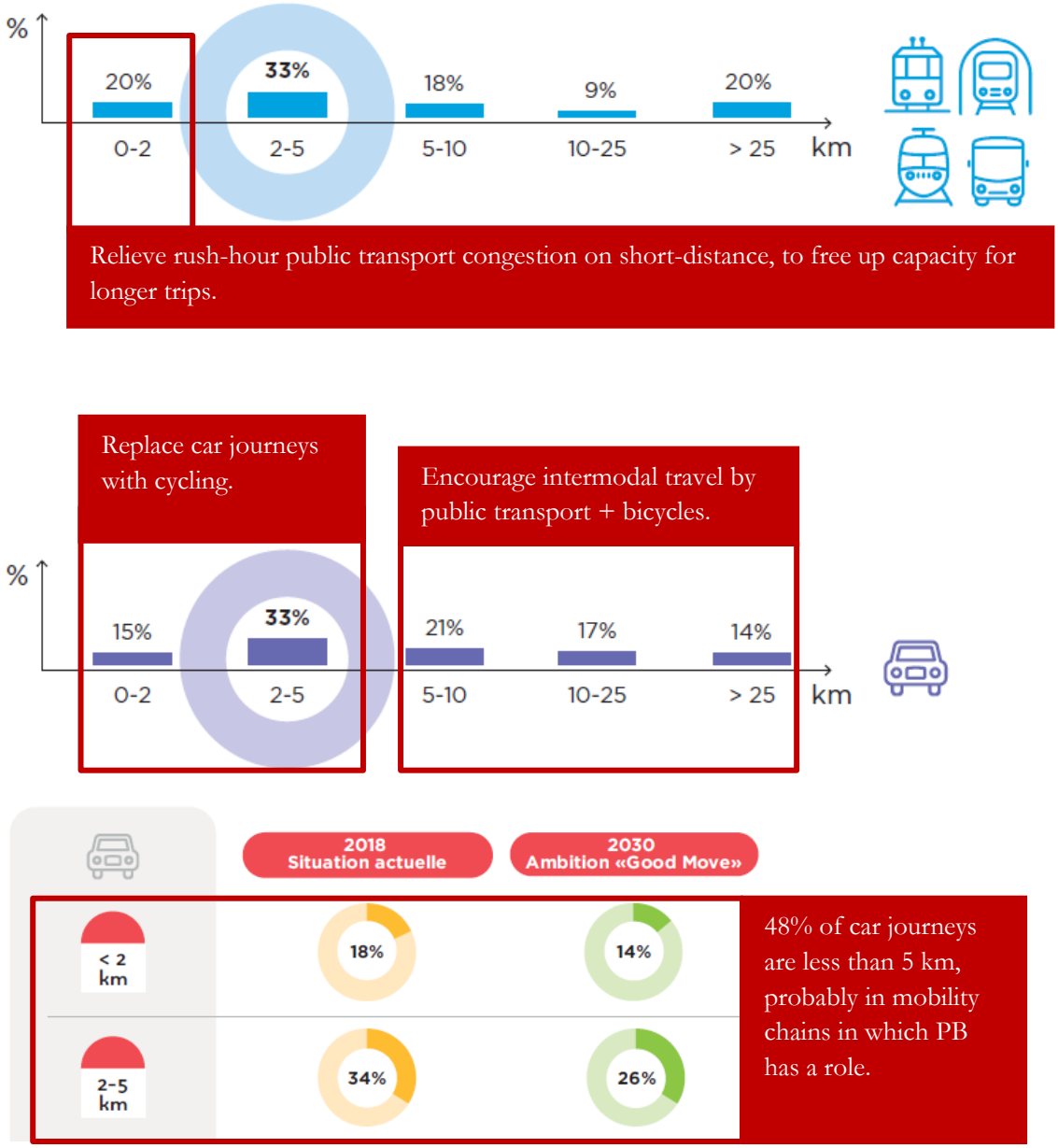
Figure 59: Frequency of bicycle use in the Brussels Region (Source data 41)



5.1.3 Target trips

While PB does not meet all mobility needs, it does have a role to play in some trips currently made by car and public transport *(Figure 60)*.

Figure 60: Contribution of PB to trips made by car or public transport (source graph 47)



5.1.4 Identifying the needs of specific audiences

To fulfil public service obligations and justify the presence of a Service of General Economic Interest *(Appendix 10.15)*, the universal design approach makes it possible to meet the needs of the most vulnerable members of the public, while improving service quality and comfort for as many people as possible. Universal design is structured in three stages *(Source 3)*.

1	Inclusive consideration of the needs of all groups in the broadest sense.
2	Correct or provide an environment that reduces disabling situations.
3	Compensate for disabilities when needs are too specific.

Women account for 51% of the Brussels population. But they are under-represented:

- In the use of PB services, where men and higher education graduates are over-represented (29% of *Villo !* subscribers are women).
- On the study's steering committee (2 women out of 9).
- Among the main contributors to the study.

The needs and recommendations of the DIAMOND project devoted to women and PB *(source 13)* are integrated across the board below to make PB as inclusive as possible. Generally speaking, women suffer more than men from these stressful situations *(Figure 61)*.

Figure 61: Inclusive PB design (1: Audiences | 2: Inclusion | 3: Compensation)

Audience (1)		Possible actions
Removed from public services	2	• Consultation in disadvantaged or remote districts. • Design workshop to produce flocking and strengthen the sense of community.
Little represented	2	• Better representation on decision-making bodies. • Inclusive communication with all profile types.
Car, the only credible solution	2	• Coverage of the entire Brussels-Capital Region, including remote areas. • Consideration to be given to extending to neighbouring municipalities.
Low revenues	2	• Solidarity prices: students, low-income earners and single-parent families.
Age	3	• > 14 years: authorised. • < 14 years: Fietsbieb-type LTR service.
Journey chains	2	• Density of PB stations close to public transport. • More than 65,000 single-parent families in Brussels *(Appendix 10.16)*.
Atypical size	2	• Open frame, adjustable saddle, manoeuvrability on the bike or for moving/pushing the bike on foot, electric bike.
Transport of persons	3	• Prefer a homogeneous fleet *(see section 5.2.2)*. Tandems, bicycles with baby/child seats, cargo bikes, cycles are available in a LTR service. • Allow multiple bikes to be rented with one account. • Sponsor new registrations. • Invite people to cycle in groups.
Transport of objects	2 3	• A basket can be used to carry a bag or even a cabin luggage. • Larger objects and goods can be transported using a shared cargo bike or a variety of LTR cargo bikes.
Far removed from employment	2	• Training and employment programme with the PB operator.
No bank account or card	3	• Possibility of paying by cash at a specialised counter, within a framework to be defined based on feedback from Chicago.

Audience (1)		Possible actions
Far removed from the digital world	2	• Allow people to identify via a non-digital ticketing device (card) and return the bike just by engaging the bike, all without a smartphone. • Signage on furniture. • Access to all information on the website without downloading the app or creating an account. • Provide a humanised welcome and on-site activities. Among Brussels residents aged 16 to 74 in 2022, 38% had low or no digital skills, i.e. around 300,000 adults *(Appendix 10.17, source 16*).
Culturally far removed from cycling	2 3	• Communicate via the PB to question social representations. • Enhance the social LTR service with specific training: 6.73% of Brussels residents over 16 have never learned to ride a bike, i.e. over 50,000 people *(Extrapolation of data from the survey on non-use of micromobility, source 44).*
Difficulty understanding	2	• Communicate in Belgium's three official languages (French, Dutch and German), English and possibly other minority languages. In 2023, 63% of Brussels residents were Belgian, 23% from a European Union country and 14% from another country *(Source 73).* In 2022, the language breakdown of *Villo !* subscribers was 82% French, 10% Dutch and 8% English *(Source 22).* • Name the service with a multilingual phoneme.
Low level of education	2	• Respect the basic principles of accessible communication and interface design (e.g. UNAPEI guide). • Among 15–64-year-olds in 2022, 46% had a higher education diploma, and 54% had no more than a secondary school diploma *(Source 56).*
Visually impaired	2	• Respect the basic principles of colour contrast and font size.
Unsighted	3	• As part of a LTR service, propose tandems with a companion.
Wheelchair users	3	• Propose adapted cycles as part of a LTR service.
Potential discomfort or danger	2	• Propose safer cycling infrastructures and less stressful routes (traffic, feeling of insecurity). • Density of stations to reduce walking distances. • Option to share an itinerary with a friend or family member. • Illuminated stations. • Quick registration and identification process to avoid long waiting times in public spaces. • Protocol for dealing with harassment.

5.2 PRODUCTS | e-public bicycles rental service

5.2.1 Rent a bike for the duration of a trip

Users over 14 years of age can rent a bike (or several bikes) 24/7, from a station in the public space, for the duration of their trip by dropping the bike off near their destination. Having a bike nearby or a parking space close to the destination is no guarantee, just as there is no guarantee of having a seat on public transport or driving a car at the maximum speed allowed during rush hour.

5.2.2 100% pedelecs

In Brussels, pedelecs is justified on the grounds of:

- hilly territory, including in the centre.
- comparison with private e-SB.
- the lack of quality of the current bikes and the image of the current service to revitalise it.
- the interests of female audiences.
- motorists' attraction to a motorised mode.

A single and homogeneous 100% pedelecs fleet *(see section 4.1.2)* is recommended, bearing in mind that LTR is better suited to offering a diversity of bike sizes and models *(Figure 62)*.

Bike with child seat option

It is possible to have an option in the contract for bikes with child seats. However, this imposes constraints on the reinforcement of the bicycle frame and twofold logistics, for an impact that seems to be limited to a communication element.

Shared cargo bike (SCB) option

Cargo bikes are very useful as part of a multimodal offer to reduce the need to own a car. However, shared cargo bikes (SCB) are quite distinct from PB *(Source 2)*:

- mainly back-to-one service.
- vehicles from the private market, but not designed for intensive self-service use.
- different players. Including SCB in an PB market risks reducing competition and diverting choice to the thousands of PB rather than the quality of the SCB.
- questions have been raised about the risk of free-floating SCB theft, given their price (Lyon), and of those with stations, which are parked in reverse on different dock to traditional PB.

Whether or not SCB are included in the contract, API integration will enable SCB to be rented from the PB app, without the need to create a second account (Lyon).

Figure 62: Distribution of bicycle types between PB and LTR services

	PB	LTR
Pedelecs with integrated battery	✓ (100 %)	✓
Bikes with portable battery	✓	
Shared Cargo bikes	Option or different contract	✓
Pedal bikes		✓
Bikes with child seat option	Possible option	✓
Tandem bikes		✓
Children's bikes		✓
Adapted bikes		✓

5.2.3 100% charging stations + occasional human-stations

The stations are connected to the power grid so that all bikes can be charged even when the station is full. The audit report on Vélib's transition difficulties in Paris pointed out that the usefulness of electrifying all the stations had not been questioned. However, electrifying all stations seems a good idea. The extra cost is low compared with the cost of the station, and remains a one-off installation. It sounds easier to make this connection when changing the furniture than later. The challenge lies more in coordination with the electricity grid operator *(see 9.2)*. As in Paris, human-presence stations would be provided for major events.

5.2.3.1 What would be done with old furniture?

Charging and secure parking are based on the triptych "Bicycle <> Lock <> Dock" whose design is interconnected. The current *Villo !* triptych is the exclusive property of JC Decaux and is protected by patents. Acquisition by the Region' would involve:

- negotiating with the outgoing candidate and signing a maintenance contract.
- keeping the bikes for an efficient bike-lock-dock furniture triptych since part of the lock is included in the frame, or retrofitting another provider bike (a costly process with no guarantee of results, given that JC Decaux's e-PB power supply is 24 V and 36 V for other bikes).

As this would give the outgoing competitor an undeniable advantage, which is unthinkable under public procurement law, the future incumbent will supply the entire bike-lock-dock triptych, with its own furniture to secure and power the bike. If JC Decaux were to bid for and win the future contract, it would retain the furniture with certain adjustments:

- the terminal: adapt the electrical switchboard.
- the dock: replacement of the electronic board, replacement of power cables, addition of a power supply, installation of a contactor.

To ensure fair competition and avoid giving an advantage to the outgoing competitor (savings on furniture and work, shorter lead times), the existing value of furniture production and installation could be added to the value of the outgoing candidate's bid.

5.2.3.2 Suggested features for automated charging stations

Basic functionalities

- One parking slot per bike to secure the bike and ensure that it remains stable.
- They are connected to the electrical grid to charge the pedelecs.
- There are a number of possible layouts for integrating into constrained public spaces (ground integration, curved configuration, historic heritage areas), or even being relocatable at lower cost (less civil engineering, rapid installation/movement/removal).
- Ownership of the stations may be transferred at the end of the contract to the local authority.
- An information medium is used to communicate on the service operation.

Other possible functionalities

- Contactless bankcard payment terminal.
- A digital interface for disseminating information, like a mobility portal.
- External electrification device waiting to be connected to the power grid.
- Temporary stations that can be deployed very quickly, with dedicated charted bicycle racks and a post integrated a Bluetooth box.

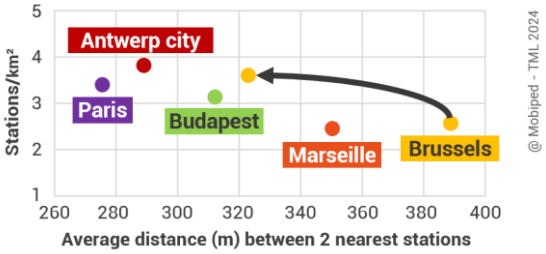
5.3 PLACES | a denser network of stations

5.3.1 Network densification

Network densification is necessary to:

- maintain the regional coverage of the current service and serve all 19 municipalities in the Region.
- reduce the average distance between 2 nearest stations, which is currently lacking, with the possibility of further densifying the network to below 300 metres *(Figure 63)*.

Figure 63: Shortened distance between two neighbouring stations of the future PB



- improve the attractiveness of the service, bearing in mind that access time is the main obstacle for non-users and the second biggest obstacle for users.
- target longer trips previously made by car, thus ensuring a positive carbon footprint for the service, in line with the cycling network.
- improve intermodality with public transport *(Figure 64 and Figure 65)*.

Figure 64: Station density comparison between current (2023) and imagined (2026) networks

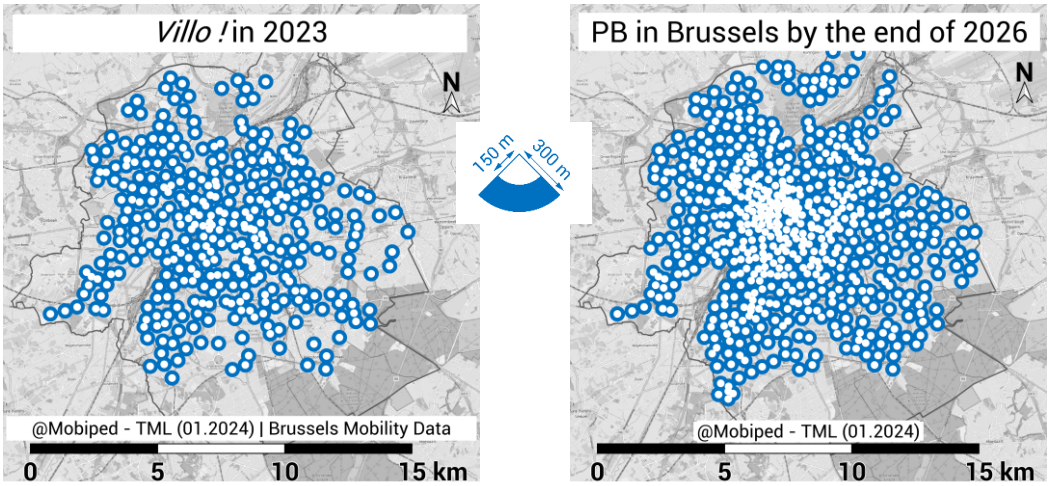
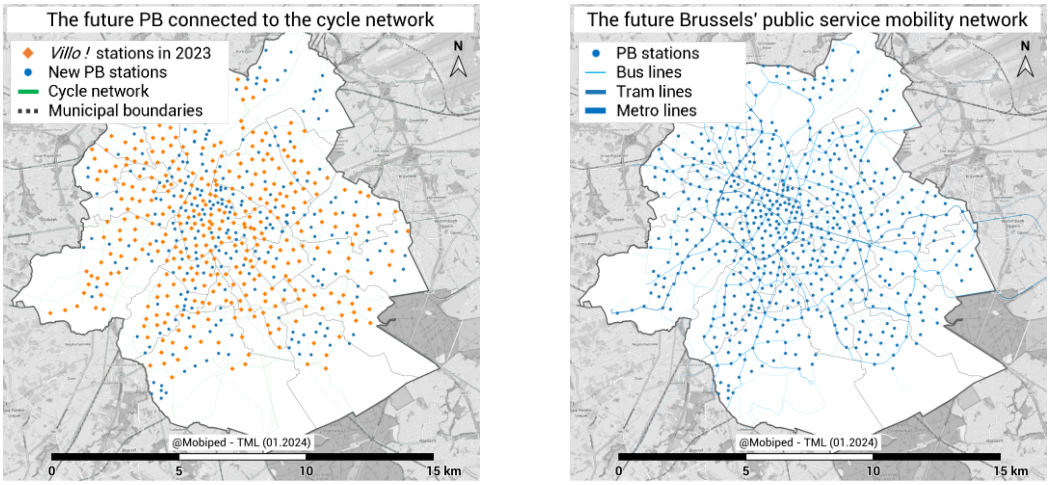


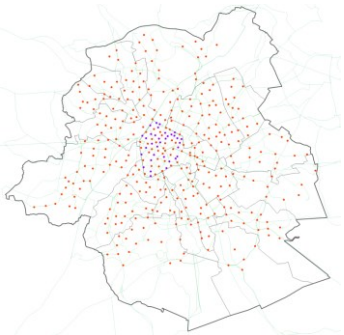
Figure 65: PB stations on cycle networks (left) and public transport (right)



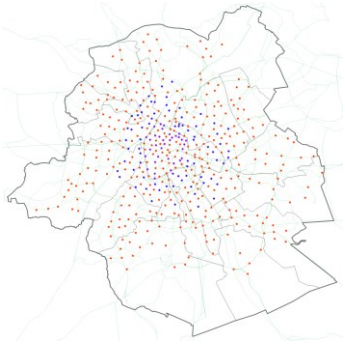
To achieve this, a minimum of 600 stations is required. The current 350 locations are retained (orange), with the addition of 30 stations in the Pentagon (purple), 70 in the inner ring (dark blue) and 150 in the outer ring (light blue) *(Figure 66)*.

Figure 66: Proposed densification and evolution of the PB stations network in Brussels

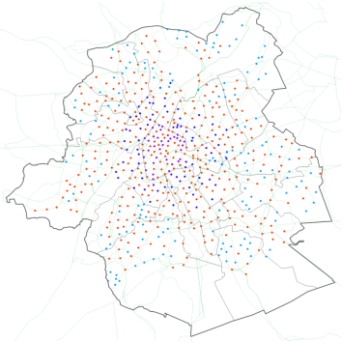
Villo ! in 2023 (350)



Densification in the Pentagon (+30)



Densification in the inner ring (+70)



Densification in the outer ring (+150)

5.3.2 Station location principles

Negotiation Lower resistance	Retain the current station locations to avoid too many negotiations, while trying to move the stations currently on pavements to existing car places.
Pedestrian access	• Located at intersections with several branches, to reduce the average pedestrian access time for as many potential users as possible. • Provide pedestrian walkways.
Road safety	• Close to the crossroads to reduce co-visibility barriers during interactions between users of the public space. • On the road to avoid legitimising cyclists on the sidewalk and contributing to pedestrian-cyclist conflict. The locations of the former sidewalk stations are transformed to benefit pedestrians: trees, flower boxes, benches and comfortable walkways.
Modal shift	• In place of car parking, the main lever for the modal shift. • On the road, as a tactical urban planning tool to redefine the traffic plan.
Group cycling	Positioned near bicycle racks to facilitate cyclists group parking (composed of private cyclists and PB users), create a visual mass effect and contribute to informal anti-theft surveillance.
Cycle network	• Ensure continuity for cyclists by reducing traffic speeds and providing cycling facilities in all directions. • Provide a setback zone for bikes, with floor markings and obstacles.
Regulation	Anticipate the need for temporary parking spaces for regulation shuttles, without penalising traffic flow for all road users.
Lighting	Station lighting for informal anti-theft surveillance and to reduce feelings of insecurity regarding possible harassment.

5.3.3 Expanding outside the BCR

5.3.3.1 To integrate as an option

Initially, it seems wise to focus solely on the administrative territory of the BCR. However, an extension to certain neighbouring municipalities (e.g. Dilbeek, Grimbergen, Linkebeek, Machelen-Diegem, Sint-Pieters-Leeuw, Vilvoorde, Wemmel, Wezembeek-Oppem, Kraainem, Zaventem) can be included as an option in the contract to:

- avoid the development of two no seamless services (e.g. Vélib' 1/Vélo Plaine Commune or Bicing/Ambici in Barcelona).
- give these communities access to this type of service (under pre-established conditions that are identical for all), as they are unlikely to be able to develop and finance it themselves.

5.3.3.2 Conduct an opportunity study

Beforehand, an opportunity study will be required to identify:

- dialogue and governance framework with neighbouring municipalities and the Flanders Region, based on the Paris example *(Figure 67)*.
- needs, distances and journey practices.
- the cycling culture of the inhabitants of these Flemish cities (practice, bicycle ownership), compared with the use of an PB to and from Brussels centre (parking issues at destination).
- the deployment of structural cycling infrastructures to reach the BCR.
- the deployment of Hoppin-Punten, Flemish mobility hubs.
- the relevance of a LTR service branch with pedelecs.
- the compatibility of electricity distribution networks.
- the operating costs and additional travel time between stations and warehouses.
- the provisional test possibilities based on temporary stations before considering the installation of charging stations.
- The legal framework differences.

Figure 67: Extension of Vélib' beyond the administrative boundaries of the City of Paris

Vélib' 1	The City of Paris financed the installation of the stations and the related operator costs within a 1.5 km perimeter beyond the territorial limits of the City of Paris. This limit was mainly due to the constraints of the outdoor advertising legal framework.
Vélib' 2	Creation of the Syndicat Mixte Autolib' Vélib', to which each commune belongs. The cost of installing a station is estimated at €20,000 excl. VAT/year, co-financed 50% by the Paris Metropolis and each commune. Advertising on the bikes was firstly considered, but the different local legal framework did not allow it.

5.4 PRICES | Multimodal pricing

5.4.1 Towards fully integrated multimodal pricing?

Ideally, a single ticket would enable both PT and PB to be used. But to charge for the rental period and reduce the risk of theft, the user must be identified, or at least a solvent account must be provided. Moreover, single paper tickets and *Mobib basic* are anonymous Contactless payment is possible, but it would require double payment for each. However, STIB subscribers are already identified in the digitalised pass or on the *Mobib Personnelle* card. To activate the PB option, the customer must authorise prepayment and accept the Terms and Conditions (T&C) during an update or proactively. There are a number of challenges involved in converging and harmonising PT and PB into a single offering *(Figure 68)*.

Figure 68: Challenges in converging STIB public transport and PB into a single-fare experience

	PT (STIB)	PB (market)	Convergence challenges
COMMON (Single journeys or subscriptions)			
Accept the Terms and Conditions (T&C)	In situ (no signature) | App (checkbox)	Checkbox	Common Terms and Conditions, including PB and PT
Identification of a solvent account	Ticket: No Subscription: Yes	Indispensable for reducing theft and charging by usage	
Deposit, security deposit, post-payment according to end-of-trip length of use	None	• Debit pre-authorisation (reserve frozen during rental period) • €150 deposit for *Villo !*	• Low-level direct debit pre-authorisation (Marseille: €15 on account) • €50 max deposit to consider open-payment option • High price range
Age declaration		✓	
TICKET			
Journey time (ticket)	60 min + transfer	30 to 45 min + ...€/minute	Harmonisation at 60 min
Number of journeys	One ticket or discount for 10 tickets	One trip, return trip or several trips possible by the day	Harmonise the number of journeys
Open payment	€7.5 maximum cumulative over 24 hours	In its infancy (Freebike, Ecovélo)	Legislation limiting the maximum amount per operation to €50
SUBSCRIPTION			
Duration/number of journeys (Subscription)	Unlimited	30 to 45 min. + … €/min	Need to limit the number of PB trips to avoid overuse by meal delivery cyclists
Age limits	6, 12, 18, 42, 65 years	14 years	Harmonise or add an intermediate class.
Regular debit	SEPA request	SEPA request	SEPA request
Identity card	✓		Also to be requested for PB to identify the user in case of non-return of the bike?
Passport photo	✓		

5.4.2 Pricing: a sensitive trade-off

Bike sharing fare structures can be very complex *(Source 2)* and difficult to compare between PB and private SB services in the same city. They include the notions of unlocking, journey, duration, type of bike, PT subscription, promo code, social prices, one-off discount, advance purchase of credit or parking locations.

Ideally, pricing is attractive, simple, supportive, an incentive to return the bike, restrictive to avoid abuse (e.g. over-use by meal delivery staff), adapted to encourage multimodality and balanced to finance the service. Rather than prohibiting certain uses, it would make more sense to offer premium subscriptions at a higher cost *(Figure 69)*.

Figure 69: Simulation of a potential simplified PB pricing structure (Author: Mobiped)

	Subscription	Unlocking	Usage
1 trip	€0	€2.10	1st hour free + €5/additional hour limited till 12 h *(Figure 70)*
10 trips		€16.80	
24 h		€8.40	
Basic subscription	PT subscribers: €0 or €50/year? Solidarity: same as PT? Student: same as PT? No discount: €100/year?	2 releases: €0 +2 releases: €3 per release	
Premium subscription	€400/year	4 releases: €0 +4 releases: €3 per release	

5.4.3 Pay-per-use

With a view to simplification and clarity, pay-per-use is:

- identical for all users. Benefits for certain groups are provided with subscriptions.
- the first hour is free (rather than 30 or 45 minutes). This makes it possible to match the length of time spent using public transport, to make long journeys without the stress of switching to the paying part, and to increase the likelihood of influencing journeys previously made by car over medium or long distances (with a view to a positive overall ecological balance).
- round numbers per hour started as a mnemonic.
- lower than private e-SB to justify public intervention
- dissuasive to encourage people to return their bikes.
- less than €50 (including release fee), to set up open payment. The bike would de facto be remotely locked after a certain rental period: 6 hrs, 12 hrs, 24 hrs depending on the chosen rate. This could avoid the need for a deposit or guarantee, which are disincentives to use *(Figure 70)*.

Figure 70: Usage-based pricing ideas

Rental	€ / additional rental hour			
lenght	€2	€3	€5	€10
1h	€0	€0	€0	€0
2h	€2	€3	€5	€10
3h	€4	€6	€10	€20
4h	€6	€9	€15	€30
5h	€8	€12	€20	€40
6h	€10	€15	€25	€50
7h	€12	€18	€30	
8h	€14	€21	€35	
9h	€16	€24	€40	
10h	€18	€27	€45	
11h	€20	€30	€50	
12h	€22	€33		
13h	€24	€36		
14h	€26	€39		
15h	€28	€42		
16h	€30	€45		
17h	€32	€48		
18h	€34			
19h	€36			
20h	€38			
21h	€40			
22h	€42			
23h	€44			
24h	€46			

5.4.4 Pricing and financing of the service

PB can be included in an offer directly combined with PT or can be separated. If PB is included in the basic public transport subscription at the current price, no user revenue will contribute to financing the service. Moreover, tariff variation cannot be used to regulate usage. If it is included with an increase justified by improving the public mobility service offer, then all subscribers will contribute to financing the service *(Figure 71 and Figure 72)*. In February 2016, a survey of stated preferences gave indications of a pedelecs subscription *(Figure 73)*. In May 2022, 30% of STIB users expressed a potential interest in using the current *Villo !* system via an annual or monthly subscription with very attractive pricing offers (*Figure 74)*. New surveys based on the value proposition proposed from this study would allow the testing of willingness to pay.

Figure 71: Tariff integration and service financing scenarios

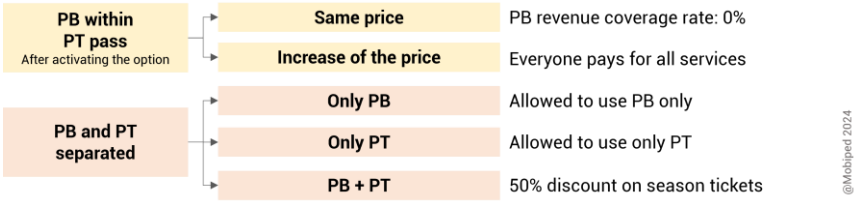


Figure 72: Exploratory visualisation of PB and PT fare integration (Author: Mobiped)

	STIB	BRUPASS	BRUPASS XL	SNCB + STIB	BIM	Bike
	B+M+T+PB	B+M+T+Train+PB	B+M+T+Train+PB	B+M+T+Train+PB	B+M+T+PB	PB
Tickets						
Open paiement	€2.10					€2.10
Brupass 1 travel		€2.40				€2.40
Brupass 2 travels						€4.00
Brupass 10 travels		€16.80				€16.80
Brupass 1 day		€8.40				€8.40
75 travels		€105.00				€105.00
Seperated membership, with reduction						
STIB normal price	€549/y (+ €50) €54/month (+€5)	€650/y (+ €50) €65/month (+€5)	€890/y (+ €50) €89/month (+€5)	€549/y (+ €50) €54/month (+€5)		€100/y €10/month
Discount price					€95/y (+10) €9/month (+1)	€36/y €3/month
18-24 years old price	€15 /y €1,2 /month (+ €0,25)					
PB and PT fully included in the same pricing						
STIB normal price	€499/y €49/month	€600/y €60/month	€840/y €84/month	€499/y €49/month		
Discount price					€85/y €8,1/month	
18-24 years old price	€12/y €1/month					

Figure 73: Stated preferences for an annual pedelecs subscription (2016, 169 responses)

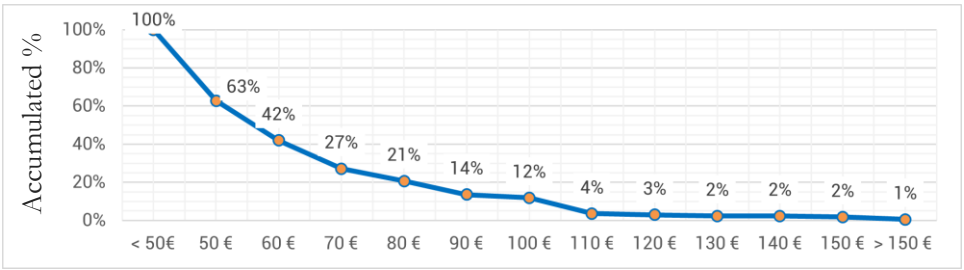
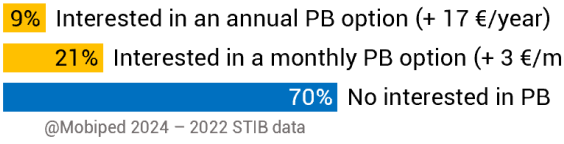


Figure 74: Interest of STIB subscribers in paying for an PB option in addition to their PT subscription [21]



5.5 PROMOTION | Willingness to attract users

The multi-channel strategy should attract car customers, build their loyalty and convert them into occasional or regular cyclists.

5.5.1 Acquisition of new users

Attract	• Make bicycles visible and identifiable from a distance, day and night. • Save time: proximity, availability and ease of use. • Good value for money. • Attractive design.
Communicate	Multi-channel strategy with headline ambassadors (music stars, influencers, local personalities) for each target group.
Identify	• Public brand: purchase the current brand name *Villo !* to the current incumbent *(Source 65)*? Derivation from STIB? Other? • If naming, loss of public service spirit.
Favour	• Special commercial offers (first 30 minutes free). • Card offered by default to newcomers on proof of change of address, to be activated with a few free journeys (Opt-out approach). • Cross-partnership offers for beneficiaries of other membership cards (e.g. cinema, PT, cycling or car-sharing association members).
Get people back in the saddle	Human support in the appropriation of the service (bike, price, digital interfaces) for people who know how to ride a bike.
Disseminate	Floya widget to enable journey generators to share multimodal infomobility in their "practical information" and "access map" pages *(Appendix 10.18)*.
Unite	Allow multiple bikes to be rented with one subscription. Receive sponsorship or a gift card.

5.5.2 User and cyclist loyalty

Convert	Invite people to subscribe after the test.
Maintain	Useful accessories for urban cyclists *(Figure 75)*. News and practical advice.
Stimulate	• Gaming, challenges and individual statistics at the end of the trip. • Bring people together around events.
Listen	Users' Committee.
Promote	Invite people to ride their own bikes.
Reward	• Loyalty programme with benefits on other services. • Partner benefits (e.g. reduced PT subscriptions).
Sponsor	Discount on subscription for referrals.

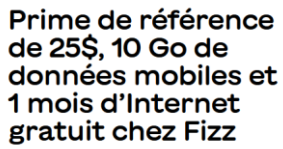
5.5.3 Convert

Transform	If more than 50 trips/month, invite to shift to long-term rental or increase the subscription price.
Relay	Communicate about services for getting around with another rented bike (e.g. LTR) or private bike (repairs, purchase assistance, etc.).

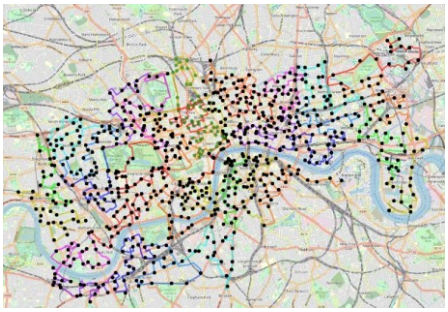
Figure 75: International inspiration

Gift Card (Rouen)

Folding jacket (Los Angeles)

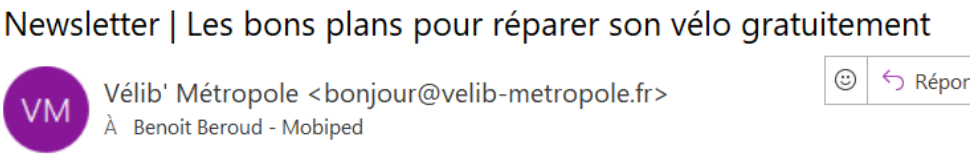


Partner benefit (Montreal)



All the Docks Challenge (London) [74]

42 km challenge (Barcelona) [63]



Encouraging people to use their own bicycles (Paris)

5.6 PROCESS | An optimised user experience

5.6.1 Global vision

In line with the universal design approach *(see section 5.1.4)*, each link in the travel chain is treated with care, at the risk of a single blockage preventing the experiment from being completed *(Figure 76)*. Access with a Bancontact card, which is widely used in Belgium, does not yet appear to be very smooth in terms of user experience *(Figure 77)*.

Figure 76: Stages of an PB journey

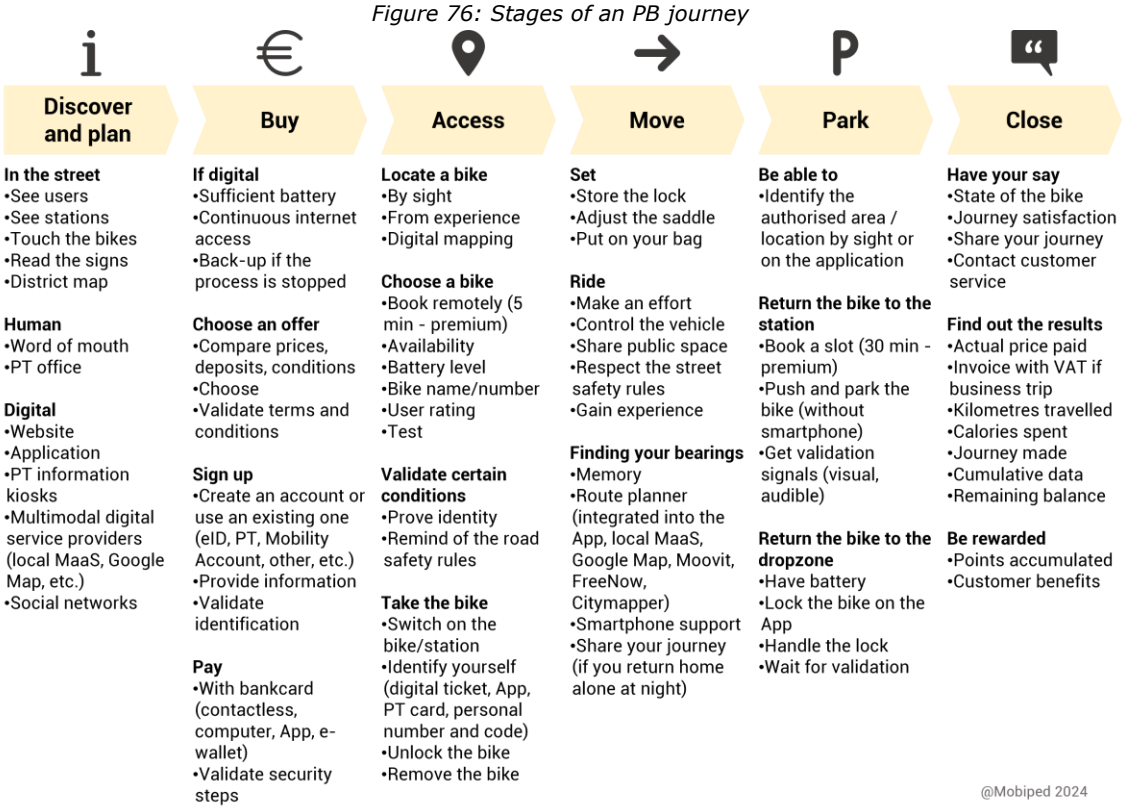
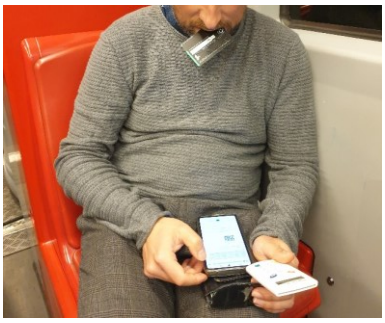
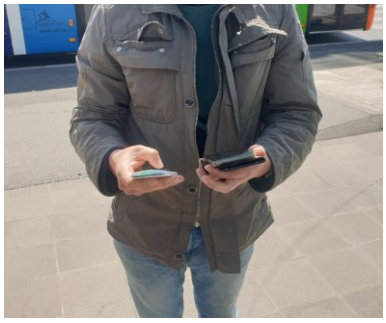


Figure 77: Bancontact payment with a card machine in public transport (left) or on the street (right)





5.6.2 Exploring the integration of PB into PT communication media

To open up imaginations and avoid the cultural bias observed in several European cities *(Source 2)* and to look ahead to the equitable integration of PB and PT in Brussels, an indicative prospective approach is proposed involving:

- a possible evolution of the STIB website homepage *(Figure 78)*.
- disturbed situations, inspired by Wiener Linien in Vienna *(Figure 79)*.
- network presentation, name, map, real-time information and Google search results *(Appendix 10.18)*.

Figure 78: Proposed evolution of the STIB website homepage banner if PB is integrated, from travel to move or rent

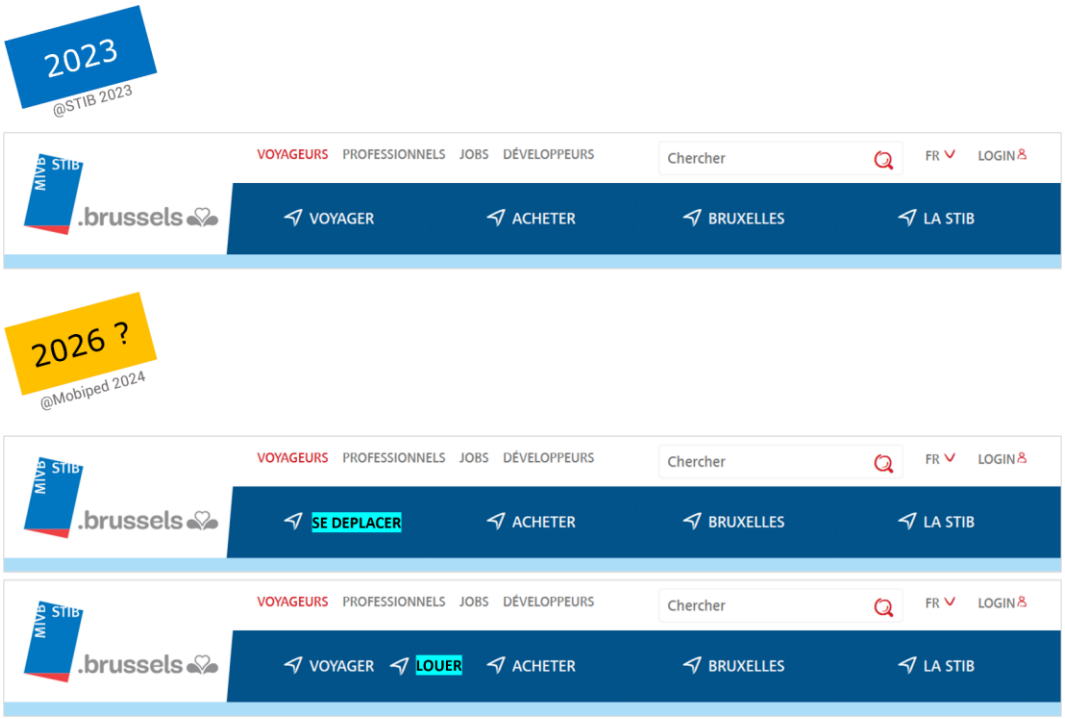
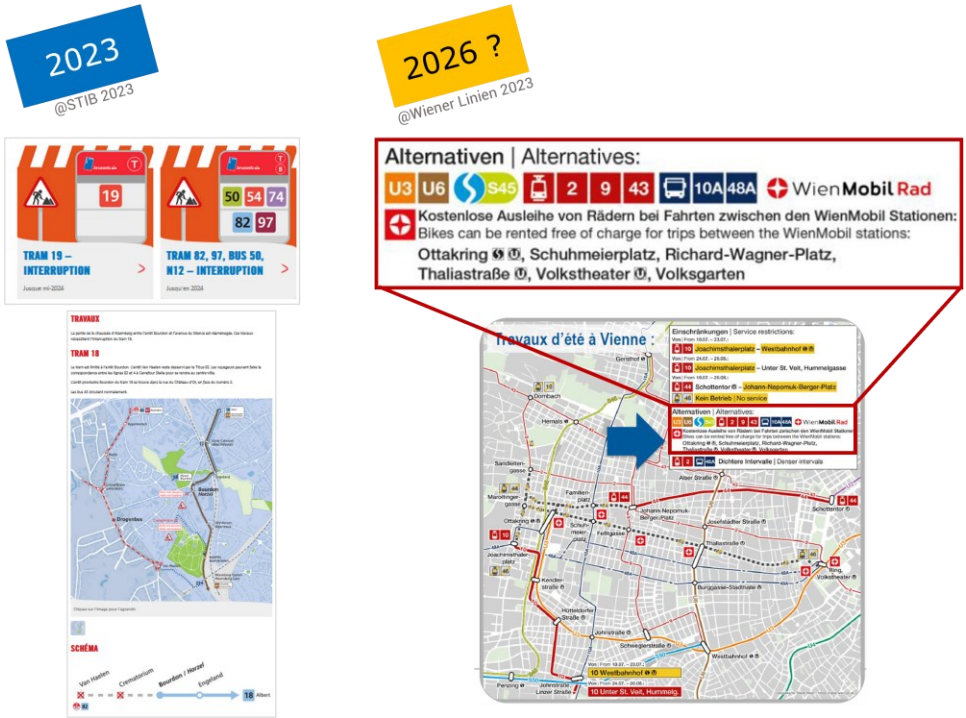


Figure 79: Cycling option proposed during road work on PT lines



5.7 PROOF | Usage evaluation

To improve the service and evaluate public policy in relation to the initial objectives, it is essential to understand and know usage patterns. This can be done via:

- a users' committee that meets regularly.
- putting PB on the agenda for meetings with associations.
- an annual user survey.
- a single owner of the PT and PB customer databases to analyse the reality of inter- and multimodal practices.
- big data analysis, making data available and sharing results *(Figure 80)*.

Figure 80: Public statistics

Annual statistics (Lyon)

Daily statistics made public (Budapest)

There is a potential demand and the possibility of offering a suitable PB service.

6 Suggested size

6.1 600 stations minimum and 7,500 e-PBs

Generally speaking, the size of an PB service is based on the number of bicycles. Three perspectives were initially identified:

- Perspective I - A steady stream of 5,000 e-PBs, like the current number of *Villo !*
- Perspective II - Proactive with 7,500 e-PBs to improve and boost the service.
- Perspective III - Very ambitious with 10,000 e-PBs.

But the government's desire to maintain good regional coverage and the low density of the current network *(see section 5.3)* mean that the number of stations should be the first consideration. This means that a minimum of 600 stations would be needed to supplement and densify the network.

To maintain a good balance of bikes per station (10 to 14 in the benchmark), 7,500 e-PBs would be envisaged *(Figure 81)*, i.e. one PB for every 165 inhabitants of Brussels and 12.5 bikes per station. To increase the probability of finding a parking space, the rate of expansion would be increased from 1.7 to 2.5, a figure now planned for *Vélib'* in Paris *(Figure 82)*.

Figure 81: Proposed evolution of the PB offer in Brussels between the two contracts

	***Villo !* in 2023**		**Future Brussels PB**
Stations	360	→	600
Bikes	5,000	→	7,500
Parking slots	8,435	→	18,750

Figure 82: Key service offer performance ratios

Offer performance ratio	**Benchmark**	***Villo !* in 2023**		**Future Brussels PB**
Contractual bikes/Station	10 - 14	14	→	12.5
Parking slots/bike	1.7 – 2.7	2	→	2.5
Parking slots/Station	20 - 32	24	→	31
Contractual bikes/km² (System area)	4 - 50	31	→	46
Inhabitants/Contractual bikes	114 - 500	245	→	164
Stations/km² (System area)	2.4 – 5.2	2.7	→	3.7
Average distance between two neighbouring stations	277 - 387	387	→	322

6.2 Envisaged impacts

Based on a simplified socio-economic analysis, the carbon and societal footprints will only be positive with high usage rates, a modal shift from the car and a high average distance travelled *(Figure 83)*.

Figure 83: External impact of 7,500 e-PBs and 600 stations

	Villo ! 2022	Pessimistic PB 😨	Optimistic PB 😀
SERVICE			
Number of bikes	5,000	7.500	7,500
Bikes/10,000 inhabitants	41	61	61
Number of stations	350	600	600
Rentals/bike/day	0.55	2	5
Annual trips (millions)	1 M	5.5 M	13.7 M
Trips/1,000 inhabitants/day	816	4,441	11,103
Average trip distance (km)	1.9	2.5	3.1
Kilometres travelled (millions)	1.9 M	13.7 M	42.4 M
% of subscriber population	1.5 %	5.6 %	13.9 %
Number of subscribers	20,000	68,000	171,000
Female subscribers	5,500	24,000	86,000
Maximum secondary school graduates	5,000	18,000	51,000
MOBILITY			
% modal share all modes	0.1 %	0.53 %	1.31 %
% of bicycle trips	1.04 %	3.50 %	8.76 %
% STIB totals	0.30 %	1.19 %	2.98 %
% car trips avoided	7 %	7 %	12 %
% car km avoided	0.03 %	0.2 %	0.86 %
% INTRA-BCR car trips avoided	0.01 %	0.11 %	0.56 %
% STIB trips improved	60 %	60 %	60 %
Public transport trips improved	0.6 M	3.3 M	8.2 M
PT km improved	0.13 M	0.96 M	5.09 M
% PT km improved	0.01 %	0.11 %	0.56 %
FINANCIAL IMPACT (€ EXCL. VAT 2023)			
Ratio € excl. VAT/bike/year (CAPEX+OPEX)	Unknown	€2,400	€1,800
Price to be paid (without user revenues)	Unknown	18.5 M	13.8 M
Contract supervision	Unknown	€0.45 M	€0.27 M
Coverage rate (CAPEX+OPEX)	Unknown	25 %	50 %
Annual revenue	Unknown	€4.50 M	€6.75 M
Remaining cost/YEAR	Unknown	€14 M	€7 M
Remaining cost/year/BIKE	Unknown	€1,860	€936
Remaining cost/TRIP	Unknown	€2.55	€0.51
Remaining cost/KM	Unknown	€1.02	€0.17
Remaining cost/CAR KM AVOIDED	Unknown	€14.56	€1.38
OTHER IMPACTS			
Carbon footprint (Tons CO_2)/year	- 8	- 60	155
External benefits (€M excl. VAT)/year	Unknown	€9.2 M	€31.2 M
Societal benefits (€M excl. VAT)/year	Unknown	-€9.2 M	€17.5 M

6.3 How much public money invested in PB and LTR services?

The following data are constant 2023-euro figures, with no inflation assumption. The € excl. tax/bike/year ratio includes the initial investment and operating expenses over the duration of the contract.

With no other source of financing, the BCR would pay:

- €16 M excl. VAT/year (+ or - 15%) for the 7,500 PBs.
- €3 M/year for the 4,500 LTRs *(Figure 84)*.

Figure 84: simplified estimates of PB and LTR in Brussels from 2026

	7,500 PB			4,500 LTR
	😲	😐	😊	
Per bike (€ excl. VAT/bike/year)				
Public budget*	2,400	2,100	1,800	530
User revenue coverage	25 %	38 %	50 %	33 %
Net expenditure**	1,800	1,350	900	
Per year (millions of euros excl. VAT/year)				
Public budget*	18.5	16	13.8	3
User revenue	4.5	5.7	6.8	1
Net expenditure **	14	10.5	7	2
Over 10 years (millions of euros excl. VAT)				
Public budget*	185	161.5	138	30
User revenue coverage	45	56.5	68	
Net expenditure **	140	105	70	

**If public procurement contract and revenue collection, and with an investment and operating assumption of 10 years.*
*** Without European funding, naming or other source of revenue.*

6.4 High cost in relation to the bicycle trips volume generated

The budget for public bicycles and LTR would be added to the 16 million euros annual regional budget dedicated to cycling (including facilities). Before deducting revenues, the average estimated costs of these services would then represent around half of the total cycling budget and around 5% of cycling trips *(Figure 85)*. But acquiring a new customer would cost five to ten times more than building loyalty. These public investments are therefore more coherent if they generate new cycling practices.

Figure 85: Cycling regional budget (PB and LTR before deduction of revenue) versus cycling trips

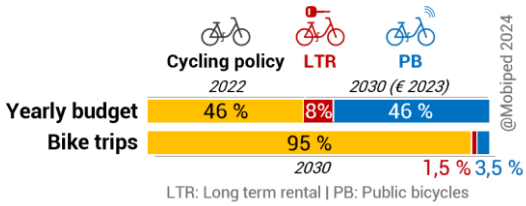
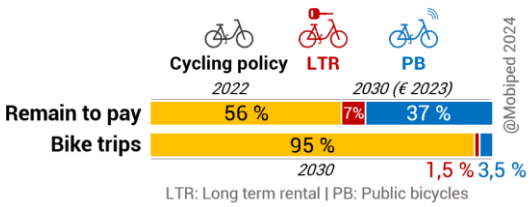


Figure 86: Remaining cost (cycling regional budget for PB and LTR) versus cycling trips



6.5 But a cycling budget that falls short of mobility objectives

The share of PB in the cycling budget seems high. But in reality, it is the budget for cycling that is low compared to other modes *(Figure 87, Figure 88, Figure 91)* and modal share targets *(Figure 90)*.

Figure 87: BCR regional modal budget in 2022

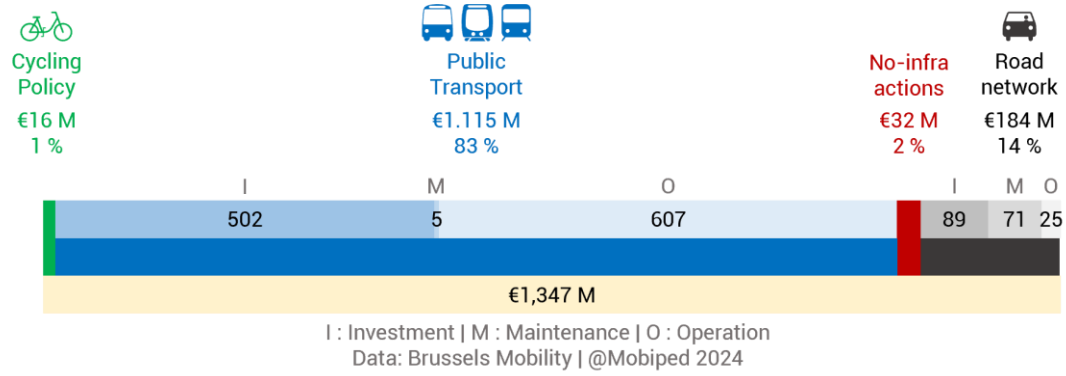


Figure 88: Breakdown of regional mobility budget, before user revenues for PB and LTR

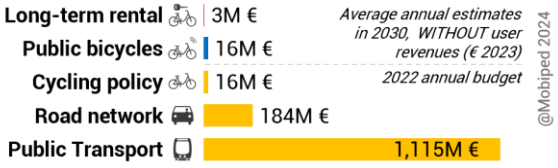


Figure 89: Breakdown of regional mobility budget, remaining costs for PB and LTR

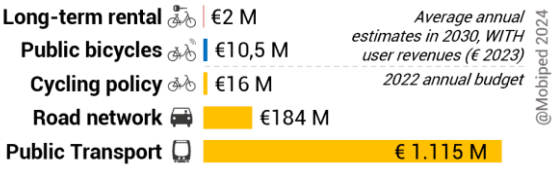
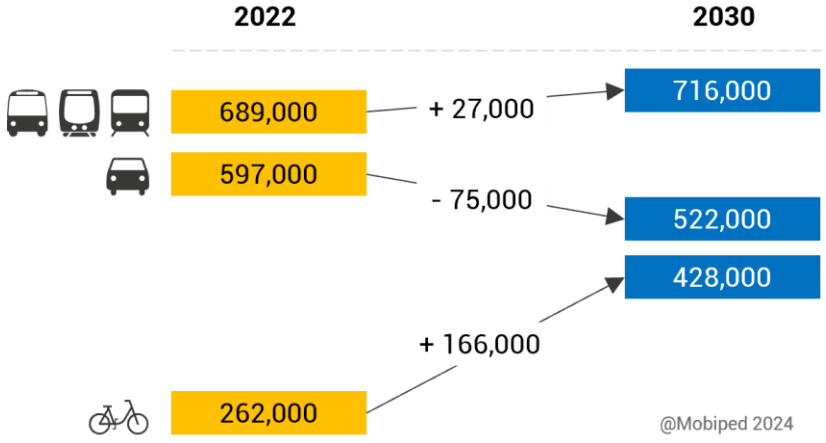


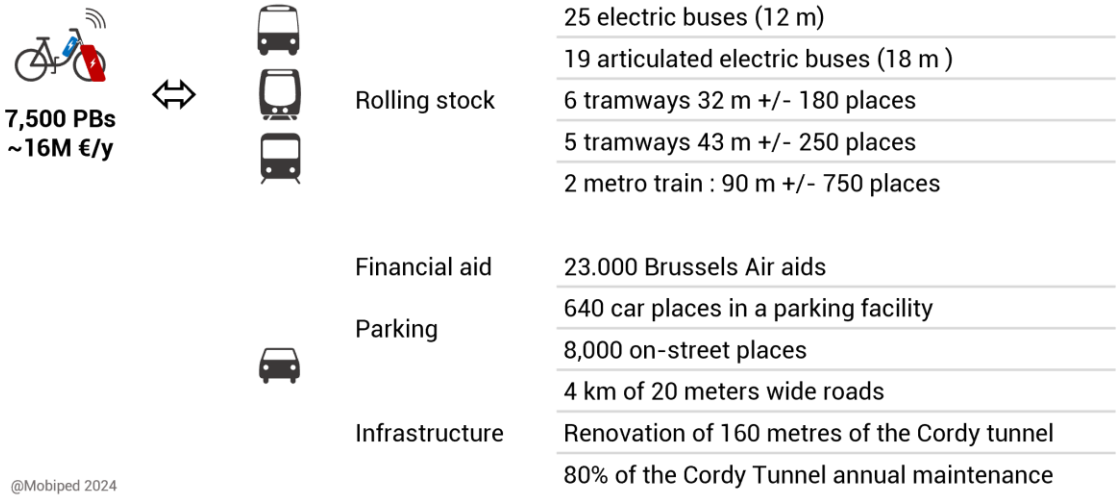
Figure 90: Good Move objectives for 2030 translated into number of INTRA Regional trips



This imbalance in modal budgets is also illustrated below:

- the 16 billion in reductions at the pump in Europe between February and May 2022 could have financed 5.3 billion public bicycle journeys, assuming a very high cost of €3/trip *(Source 70)*.
- in France, €30/year/inhabitant is invested in cycling, compared with €271 for cars and €473 for public transport *(Source 19)*.
- "In Germany, cities spend €6 on bicycle infrastructure, €38 on pedestrians, €128 on motorists and €148 on public transport. And then we are surprised that there are not more cyclists" *(LinkedIn post by Marco Te Brömmelstroet)*.

Figure 91: Order of magnitude of investments (before revenue) for a budget equivalent to 7,500 e-PBs (BM and STIB data)



Infrastructure	40 km of cycle tracks
	107,000 bike racks
Parking	29 to 64,000 shared secured parking
	6,400 bike places in a parking facility
Communication	16 yearly communication budget
Rolling stock	25 electric buses (12 m)
	19 articulated electric buses (18 m)
	6 tramways 32 m +/- 180 places
	5 tramways 43 m +/- 250 places
	2 metro train : 90 m +/- 750 places
Financial aid	23.000 Brussels Air aids
Parking	640 car places in a parking facility
	8,000 on-street places
	4 km of 20 meters wide roads
Infrastructure	Renovation of 160 metres of the Cordy tunnel
	80% of the Cordy Tunnel annual maintenance

Overall, the total budget allocated to the development of cycling is insufficient to meet the Good Move objectives.

6.6 Potential financing sources

As with PT, the financing of PB relies first and foremost on local government funding, with the potential support of European funds. Users then pay part of the service cost, sometimes with the help of their employer via the mobility budget. Lastly, private funding can be sought through *naming* (oil company MOL Bubi in Budapest or banks Santander Cycles in London and Citibank/bike in New York), advertising on bicycles (airline in Milan) or the financing of stations (Antwerp Region) *(Figure 92)*.

Figure 92: Possible sources of financing

	Description/Example	Brussels context
User revenues	Coverage rate estimated at between 26 and 66% in the benchmark.	This coverage rate should be treated with caution. Employers could pay for PB subscriptions as part of mobility budgets.
Local, regional and federal taxes	Contribution of 34% to 74% in the benchmark.	BCR budget and Budget of the public administration in charge of health expenditure, a beneficiary of the societal gain *(part 4.3.7)*.
Naming	The name of the service is a trade name (Santander Cycles in London, Citibank in New York, MOL Bubi in Budapest).	As the capital of Europe, the Brussels market has obvious market value. The question is how to reconcile this with the values to stand for, particularly from the point of view of the offer included in STIB.
Carbon credits or energy saving certificates	Sale of carbon credits (price per tonne fluctuates) or polluter-pays compensation.	Need to replace car trips to have a positive carbon footprint.
European subsidies	Budapest and Madrid (+€40 m), and many Spanish cities have acquired their CAPEX via European funds, such as the Next Generation Fund [59].	PB could be eligible for the CEF (Connecting Europe Facility) programme. The European Declaration on Cycling, signed on 3 April 2024, is likely to open up new funding opportunities, with Articles 22, 29 and 31 mentioning bike sharing *(Source 11)*.
Cross-subsidisation	Car parking revenues are earmarked for PB (Barcelona).	
European taxonomy [67, 68]	Classification system for economic activities that have a positive effect on the environment, adopted by the European Union in 2020, to encourage financial players to prioritise the allocation of financing to projects linked to the energy and ecological transition.	PB seems to be one of these. The service provider may be asked to qualify for this taxonomy to benefit from a lower cost of borrowing.
VAT	To bring VAT down to 6%, Antwerp gives a subsidy per subscriber.	This system can probably be adapted to the Brussels context.
Advertising on bicycles	Advertising on bicycles, parking slots and terminals, but revenues seem low in relation to the efforts made.	• Ensure that the same rules apply to the 19 towns and to neighbouring towns in the event of an extension. • Respect the charter of virtuous advertisers.

7 Possible governance structures

7.1 The Brussels players

One of the main challenges of an PB service is striking a balance between the often-conflicting needs of the three main players involved in an PB service:

- **citizens**: regular or occasional users, observers and those who do not like SB.
- **the mobility authority**: the mobility authority department of Brussels Mobility is the administrative entity of the Brussels-Capital Region that defines the public mobility policy.
- **PB provider(s)**: company or group of companies holding the PB contract *(Figure 93)*.

Figure 93: Challenges and interactions between the main players in an PB service

Among the many players concerned by PB, the following Brussels players will have a direct impact on the success of PB *(Figure 94)*. The coordination procedures should be defined before or in parallel with the drafting of the call for tenders.

Figure 94: Role of premium partners

STIB	The Brussels Inter-Municipal Transport Company (STIB) is the public-law association responsible for operating the urban public transport service in the Brussels-Capital Region. Its level of involvement in PB governance is explored in the following pages.
SIBELGA	SIBELGA, the electricity grid manager, will connect each station to the grid, opening a dedicated meter with sufficient power to charge the bicycles.
URBAN DEVELOPMENT	A department of the regional administration, the urban planning department issues building permits for every removal and installation of furniture.
POLICE	In charge of public order, the police receive regular complaints from the operator in the event of obvious system components deterioration or theft.
MUNICIPALITIES	Interface with local populations, to unite them around the service.

7.2 Which relationship between Brussels Mobility and STIB on PB?

7.2.1 Organising authority for mobility, Brussels Mobility has the initiative

As the mobility organising authority supporting the Government of the Brussels-Capital Region, Brussels Mobility:

- initiates the PB project and consolidates funding for the service.
- defines public service obligations: prices, coverage, ticketing, accessibility, MaaS, etc.
- participates in project evaluation and development, in line with cycling and mobility policy actions.

7.2.2 Role of STIB, a level of involvement to be defined

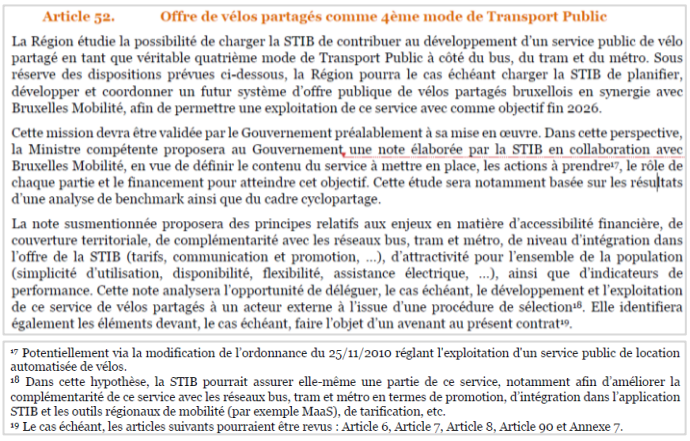
Specific features of the Brussels context

The benchmark illustrates governance specific to the local context, with no particular more or less effective model, and sometimes with the involvement of the public transport operator.

STIB has invested energy in the present study, to gain a better understanding of the possible interactions between PT and PB, and to identify possible implications. In particular, it has:

- taken part in the steering committees and bi-weekly follow-up meetings.
- participated in all benchmark visits.
- hosted partner cities on its premises for benchmark feedback.
- organised and led an Innov@atelier workshop, a design sprint on PB *(Appendix 10.20)*.
- commented on reports.
- co-drafted the content of an article in the Management Contract at the end of 2023 *(Figure 95)*.

Figure 95: Public Service Contract 2024-2028 between the BCR and STIB (14 December 2023)



Article 52. Offre de vélos partagés comme 4ème mode de Transport Public

La Région étudie la possibilité de charger la STIB de contribuer au développement d'un service public de vélo partagé en tant que véritable quatrième mode de Transport Public à côté du bus, du tram et du métro. Sous réserve des dispositions prévues ci-dessous, la Région pourra le cas échéant charger la STIB de planifier, développer et coordonner un futur système d'offre publique de vélos partagés bruxellois en synergie avec Bruxelles Mobilité, afin de permettre une exploitation de ce service avec comme objectif fin 2026.

Cette mission devra être validée par le Gouvernement préalablement à sa mise en œuvre. Dans cette perspective, la Ministre compétente proposera au Gouvernement une note élaborée par la STIB en collaboration avec Bruxelles Mobilité, en vue de définir le contenu du service à mettre en place, les actions à prendre[17], le rôle de chaque partie et le financement pour atteindre cet objectif. Cette étude sera notamment basée sur les résultats d'une analyse de benchmark ainsi que du cadre cyclopartage.

La note susmentionnée proposera des principes relatifs aux enjeux en matière d'accessibilité financière, de couverture territoriale, de complémentarité avec les réseaux bus, tram et métro, de niveau d'intégration dans l'offre de la STIB (tarifs, communication et promotion, ...), d'attractivité pour l'ensemble de la population (simplicité d'utilisation, disponibilité, flexibilité, assistance électrique, ...), ainsi que d'indicateurs de performance. Cette note analysera l'opportunité de déléguer, le cas échéant, le développement et l'exploitation de ce service de vélos partagés à un acteur externe à l'issue d'une procédure de sélection[18]. Elle identifiera également les éléments devant, le cas échéant, faire l'objet d'un avenant au présent contrat[19].

[17] Potentiellement via la modification de l'ordonnance du 25/11/2010 réglant l'exploitation d'un service public de location automatisée de vélos.
[18] Dans cette hypothèse, la STIB pourrait assurer elle-même une partie de ce service, notamment afin d'améliorer la complémentarité de ce service avec les réseaux bus, tram et métro en termes de promotion, d'intégration dans l'application STIB et les outils régionaux de mobilité (par exemple MaaS), de tarification, etc.
[19] Le cas échéant, les articles suivants pourraient être revus : Article 6, Article 7, Article 8, Article 90 et Annexe 7.

Opportunities

With the political ambition of integrating PB into the PT service in Brussels, and aiming for the smoothest possible user experience, STIB is the ideal partner because it:

- knows the area and has experience of operating a mobility service.
- implemented a similar approach to deploy the Floya MaaS, launched at the end of 2023.
- is gradually initiating a cultural shift from passenger transport to mobility services, and observing the development of new shared mobilities.
- has a very positive image among the people of Brussels and a high penetration rate (70% of residents over 6 years old have a STIB subscription) to reach people who are far from cycling.
- is entrusted by micro-mobility users, who are in favour of STIB bicycles, joint communication and commercial offers, integration into STIB fares, and a joint mobile app for route calculation *(see section 2.4.2)*.
- could take advantage of PB to speed up certain topics (e.g. account-based ticketing).

7.3 Four possible governance options

Four governance options with different roles for Brussels Mobility (BM), STIB and PB providers are identified in terms of consultation, supervision and customer relations *(Figure 96)*.

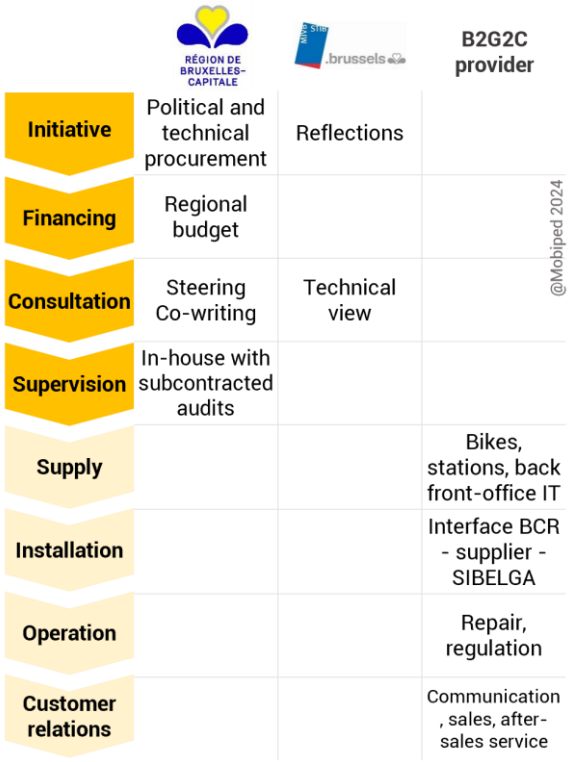
Figure 96: Four governance options for the future PB with progressive involvement of STIB

	1 | BM pilot	2 | STIB coordinates	3 | STIB in contact with customers	4 | In-house public management
Inspirations	Paris, Marseille, Antwerp		Vienna, Cologne, Bordeaux, Lille	Madrid
Initiative	BM			
Financing	BM + Users			
Consultation	BM	STIB (BM support)		
Supervision	BM	STIB (BM support)		
Supply	PB service provider			
Installation	PB service provider			
Operation	PB service provider			STIB
Customer relations	PB service provider	STIB (communication and customer relations level 1)		

7.3.1 Option 1 | Managed by Brussels Mobility + partnership with STIB

As with *Villo !* and many other PB services in Europe, Brussels Mobility would issue the call for tenders and supervise directly the service as the mobility authority *(Figure 97)*. However, the outlook within the Brussels administration means that another way should be found of ensuring that the human resources required to carry out this work are available. In addition, STIB is proving to be a preferred partner with a view to integrating PB into the public transport service in Brussels, drawing on the experience of Floya MaaS.

Figure 97: Governance 1 - Managed by Brussels Mobility



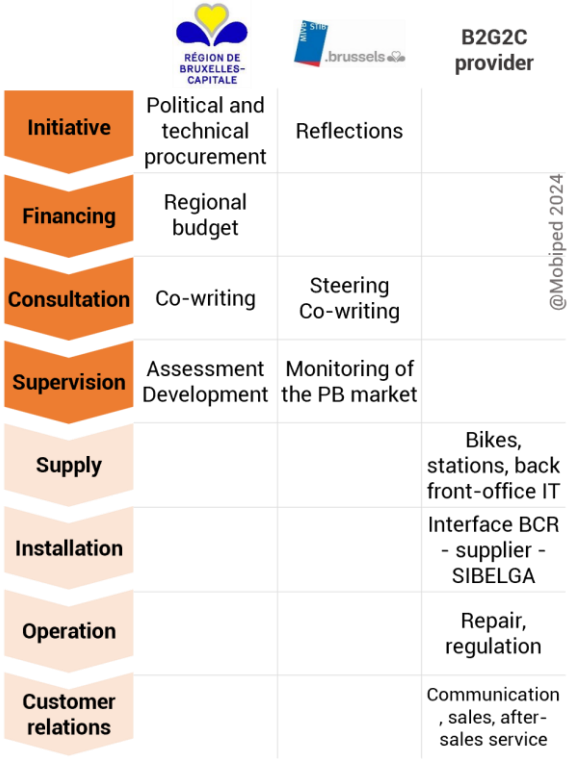
7.3.2 Option 2 | STIB as technical coordinator

STIB's role would be that of an intermediary, one of the tasks performed by KVB in Cologne (Germany) and Wiener Linien in Vienna (Austria). It would only be in charge of:

- consultation by contributing its technical experience to the selection process.
- supervision of the contract on behalf of Brussels Mobility, with regular exchanges between STIB and Brussels Mobility on the evaluation of the service (offer, usage, performance of the service provider) and its improvement (prices, consistency with the evolution of regional mobility policies).

The operation of the PB service would be entirely entrusted to a private provider *(Figure 98)*. In all cases, STIB could be an ideal partner for pooling ticketing media (e.g. *personal Mobib* card with *Villo !)* and offering cross-subscription discounts for PB subscribers.

Figure 98: Governance 2 - STIB as technical coordinator



7.3.3 Option 3 | STIB in contact with PB customers

In addition to drawing up the specifications and overseeing as in option 2, Brussels Mobility would ask STIB to act as the commercial intermediary, integrating PB into its interfaces (website, app, passenger information, etc.) with a brand based on that of STIB *(Figure 99)*. In this way, STIB could become partly involved in operations *(Figure 100)*.

Figure 99: Governance 3 - STIB in contact with PB customers

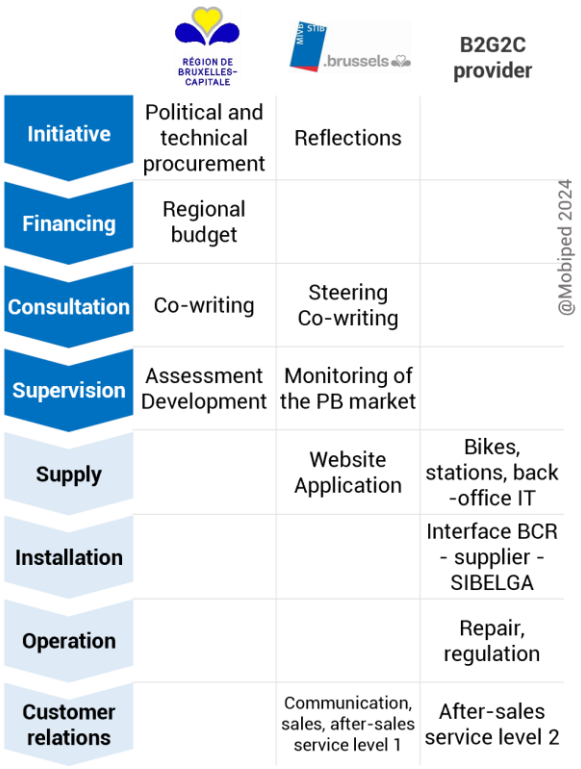


Figure 100: Potential actions by STIB if it becomes involved in operations

Themes	Possible actions
Locations	Station locations linked to the PT network, potentially on STIB land property.
Information	Mention of PB stations on all STIB network maps (internet and paper), real-time availability of PB on the STIB website and app.
Communication	Possible use of the STIB brand, PB advertising campaigns and integration of PB into STIB social networking topics.
Pricing	Integration of PB pricing into the STIB fare structure, and creation of transport tickets (subscriptions) combining PT and PB.
Sale	Use of STIB sales and customer care channels for PB in the same way as for PT.
Ticketing	Use of the *Mobib* card to access PB, and use of the STIB/Floya app to access PB.
Proof	• Inter- and multimodal journey tracking with communicating databases to better understand travel practices. • Use of data to improve STIB services and integration of PB in the satisfaction barometer.
Resources	Provision of personal, material and infrastructure resources by STIB for the PB provider.
T&C	Common Terms and Conditions to streamline the customer experience.

7.3.4 Option 4 | STIB operates in-house

This is a model used for PB on very rare occasions (Buenos Aires, Hangzhou, La Rochelle, Madrid). Even with a public service, the provision of a robust system, and in particular the bike-lock-dock triptych, is acquired from private market players.

In terms of operations, the benchmark showed that there are few synergies between PT and PB, particularly in terms of repair and regulation. The operator of an PB service requires more flexibility than for PT *(Source 2)*. Furthermore, STIB would prefer to use a specialised white-label service provider with more experience.

7.4 The steering committee favours option 3

7.4.1 Distribution of roles

To offer as many opportunities as possible for a seamless experience between PB, bus, tram and metro, option 3 is favoured, with strong involvement from STIB:

- Brussels Mobility defines public service obligations (e.g. prices, accessibility, MaaS).
- The Regional Government consolidates funding.
- STIB coordinates the selection process and contracts with the PB provider.
- STIB supervises the contract and Brussels Mobility participates in evaluation and development.
- The PB provider supplies, installs, repairs and redistributes the bikes.
- STIB interacts with users (website, app, level 1 customer relations, communication, sales) for a unique public Bike + Bus + Tram + Metro experience.

7.4.2 Legal notices

Awarding these tasks to STIB without going to tender would have legal and accounting implications that would need to be anticipated and legally validated *(Figure 101 and Appendix 10.15)*.

Figure 101: Potential actions by STIB if it becomes involved in operations

Actions	Legal status of the assignment	Legal and accounting implications
STIB organises the consultation and supervises the contract (in options 2 and 3)	Non-economic	• STIB's costs for this mission could be 100% offset by the BCR. • The compensation paid to the private operator may be paid directly by the Region or pass neutrally through STIB without constituting State aid. • The choice of contract (public procurement or concession), the type of procedure (open with competitive dialogue or restricted with negotiated procedure), the nature of the delegated mission and its non-economic nature would not be affected.
STIB in contact with PB customers (in option 3)	Economic	• By intervening, even partially, STIB would be considered as co-operator. • By awarding this contract without competitive tendering in accordance with Altmark case law, the public funding which STIB would receive for its tasks can be qualified as State aid unless four conditions are met *(Appendix 10.15)*.

7.4.3 Points to watch

The benchmark does not demonstrate that the involvement of the public transport operator is a guarantee of high performance (Cologne, Milan, Munich, Vienna). To avoid certain pitfalls, here are some key success factors to consider *(Figure 102)*.

Figure 102: Key success factors for involving the PT operator into PB

Key success factors	Comments
Enhance the value of PT operations	Offer current and future public transport customers an alternative during off-peak hours and at night, during disruptive situations (incidents, roadworks, strikes) or long journeys (walking, waiting, transfers).
Dedicate a budget	The authority defines a dedicated budget for PB, independent of that for PT, to avoid using PB as a negotiating point, at the risk of repeating the PB pitfall within the advertising market.
Treat all modes equally	• PB has direct, one-click access above the waterline on the website and app. • Consider the quality of cycling facilities when planning public spaces.
Take ownership of the specific features of the bicycle.	PB does not just serve public transport (image, line extensions/replacements, pricing structure). Like PT, PB supports Good Move. Together, they help each other and improve the multimodal offer. Without being systematically dependent on PT, the PB service can adapt its needs, audiences, services, maintenance and warehouses (no synergies identified in operations).
Be involved	Given the low weight of PB in relation to the PT network (around 1% of journeys, 1% of human resources and 1% of the annual budget), the risk of disinterest is high. A team devoted 100% to PB has dedicated resources and time, particularly for becoming involved in supervision without blindly trusting the chosen service provider(s). The involvement of the PT operator can be increased by setting contractual indicators to align the efforts of PT and PB operators.
Respect each party's roles	Adding the PT operator as an intermediary generates risks of short-circuiting, loss of information, duplication of meetings and disconnection between the authority and the reality of operations. A RACI (Responsible, Accountable, Consulted, Informed) matrix is then put in place to clarify relations and decision-making between the authority, the PT operator, the PB operator, the media and politicians (since PB are highly exposed to the media).
Weight changes	Total integration, for each level of the marketing mix *(Source 2)*, could generate very high costs (e.g. adjustment of an already complex IT system) compared with the benefits for each player.
Ensure the relevance of involvement	The direct involvement of the PT operator in the operation of the PB service is only relevant if it goes beyond the partnership approaches possible without strong involvement (discount for public transport subscribers, use of public transport ticketing support).

STIB in contact with PB customers is the preferred governance option to move towards one experience which includes bike, bus, tram and metro.

8 Reflections on public procurement

8.1 A contract dedicated to PB

8.1.1 Possible contract title

The public procurement contract would cover only "the provision, installation and B2G2C operation of a public bicycles rental one-way service".

8.1.2 Disconnect PB and advertising space in public areas

Historically, the *Villo !* market has been linked to the contract for advertising space in public areas. For a number of reasons, these two subjects should now be kept completely separate.

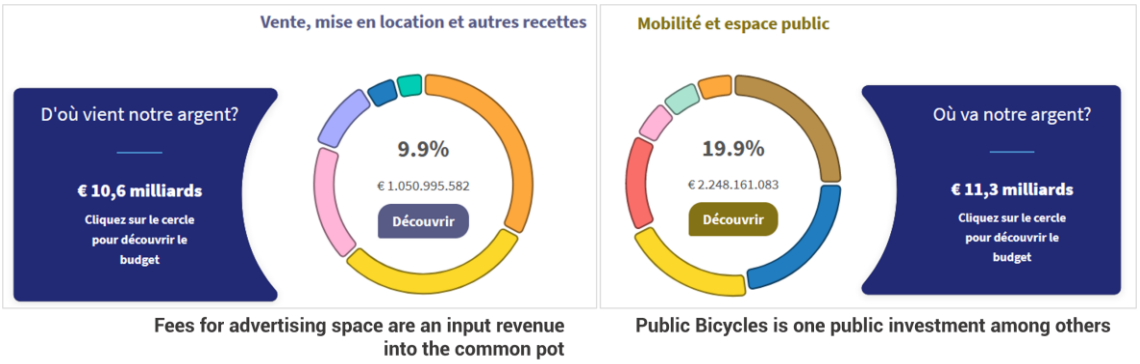
Firstly, it is important to distinguish between the contractual model, the source of financing, advertising support and naming *(Figure 103)*.

Secondly, linking PB and outdoor advertising space has been rare for many years. PB contracts focus mainly on PB only (Antwerp, Budapest, Marseille, Paris). In some cases, PB can be linked to the PT public service delegation (Bordeaux, Lille) or included in a package of bicycle services: PB, LTR, bike centre, parking (Nantes, Rennes).

Figure 103: Four different approach about advertising and bike share

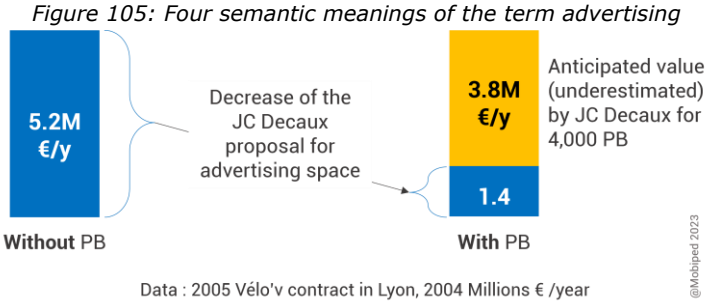
Thirdly, saying that "advertising finances PB" is an abuse of language. While combining the two contracts avoids the need for cash advances to pay for the PB service and the corresponding VAT, directing a revenue towards an expense is not sufficient to say that it finances the service. Including them in the same contract gives the impression of a direct link, whereas in fact they are diluted in the local authority's accounts. The fee for advertising space is to be considered as a revenue paid into the common pot, among many other revenues. And PB is one of many public investments *(Figure 104)*.

Figure 104: Public revenue and expenditure in Brussels in 2022 (Data 75)



Fourthly, to say that "PB is free for the city" is also a misuse of language. In 2004, JC Decaux offered Greater Lyon €5.2 million a year to operate outdoor advertising space. Including PB, the proposal dropped to €1.4 m/year. This €3.8 m/year shortfall, invisible in public accounts, is the price of the service for the public authorities *(Source 7, Figure 105)*.

Figure 105: Four semantic meanings of the term advertising



Fifth, advertising revenues depend on the economic context (e.g. Covid-19), the evolution of digital media and the structure of the local market. A monopoly on all local outdoor advertising increases negotiating power with advertisers, potentially leading to higher fees for the use of public space.

Sixth, experience in Brussels shows that to improve the PB service, prior negotiations on outdoor advertising are often imposed. Moreover, advertising is not one of Brussels Mobility's core competencies.

Seventh, the design of the service is oriented towards the advertising public and not towards the PB user, with a visibility mask *(Figure 106)*.

Figure 106: Orientation of advertising street furniture to catch the eye of motorists and cyclists

8.1.3 Disconnect with shared e-scooters

The rise of players and shared solutions between PB and shared e-scooters opened up the prospect of linking the two contracts. In the end, this is less relevant because:

- Shared e-scooter is potentially a profitable service, with less justification for government intervention.
- there is no political order in Brussels for a public scooter service.
- the battery models are actually different. E-scooters needs a 48 V battery and PBs a 36 V battery, or even 24 V for JC Decaux bikes. To generate economies of scale, some PB are equipped with 48V batteries, generating unnecessary overcapacity and extra weight for the PB.
- mixed operation/regulation, where PB and shared e-scooters are parked and charged at the same stations, becomes very complex (Chicago).

8.1.4 Disconnection from other bike services

In some French cities, PB are included in a more global contract for bicycle services, with rental, parking, training, etc. *(Figure 107)*. But it seems advisable to separate the contracts because:

- very few players have mastered the operation of both services, while there is a great deal of competition in the bike sharing market.
- the prospect of a PT service in Brussels and governance with STIB concerns the one-way PB service bike rental service, not LTR.
- on the scale of services involving several thousand bicycles, economies of scale are reduced.
- the priority is the prospect of a PB, given that the *Villo !* concession is due to expire on 16 September 2026, and the timetable is already tight *(see section 2.1)*.
- PB services with several thousand bikes are complex enough to handle.
- synergies between LTR and other services (Grenoble) seem to be more relevant.

While this study has validated the desirability and interest of a LTR, it is a subject that still needs to mature and be the subject of a more detailed feasibility study. PB has a time constraint with the end of the *Villo !* concession, while there is no urgency for LTR.

Figure 107: Content of five French public procurement contracts for bicycle services

Title	Vélib'	Véligo	Nantes	Rennes	Grenoble
PB	✓		✓	✓	
LTR		✓	✓	✓	✓
Consignment parking			✓		✓
Secure parking					
Event					✓
Bicycle centre		✓		✓	✓
Building management		✓			✓
Loan of equipment to communities					✓
Purchase assistance management					
Abandoned bike management					

8.1.5 Advantages of a dedicated PB contract

A market dedicated to PB makes it possible to:

- focus the energy of the authority and the provider on the quality of the PB service.
- stimulate competition between B2G2C players and historically B2C consortia of charging station suppliers + operators.
- know the real price (Paris) and enable the evaluation of public policy.
- reduce the level of litigation on subjects other than PB.

8.1.6 Why not separate charging stations and bikes into two contracts?

In many public network sectors (gas, electricity, rail, etc.), infrastructure is a public monopoly, while operations are increasingly subject to competition. It would then be conceivable to separate into two contracts: charging stations (1) and bicycle operation (2). But securing and charging the bike depend enormously on the bike (frame or fork) <> lock <> dock, with a very strong impact on operating costs. The absence of a sufficiently mature standard does not, in the current timing of the Brussels PB, suggest that the two contracts should be strictly separated. However, it is advisable to distinguish between the two components in the public procurement contract in order to:

- enable consortia to respond.
- distinguish between investments when applying for European funding.
- maintain the possibility of the local authority retaining ownership of the infrastructure at the end of the contract.

8.2 An 8- to 10-year contract

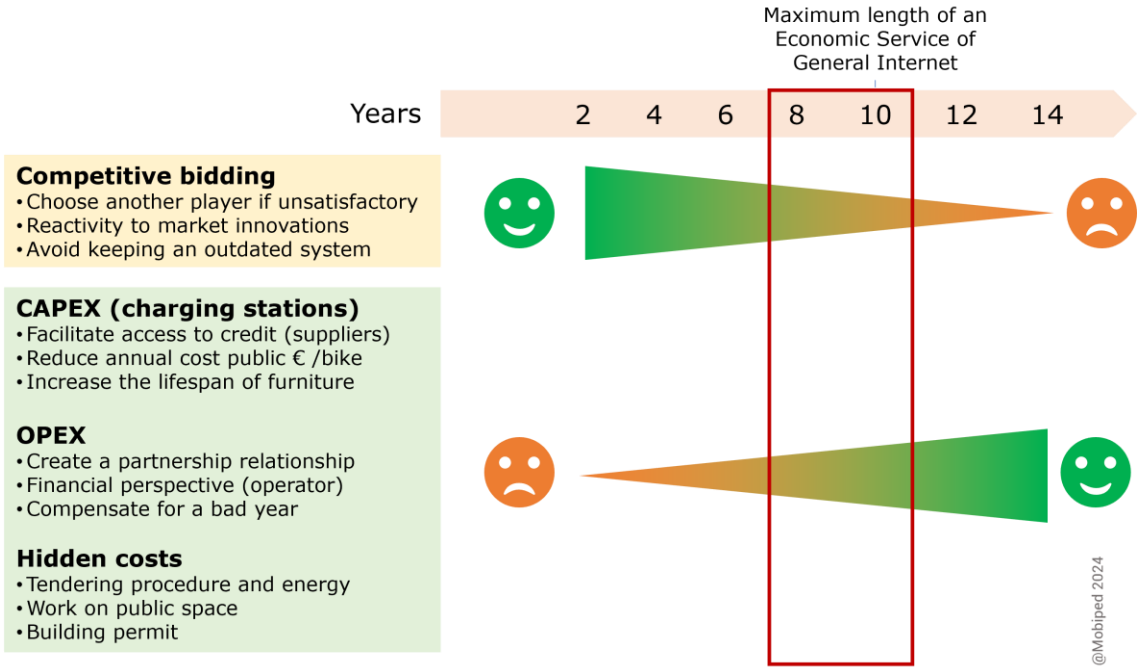
The current *Villo !* contract was signed in 2008, for launch in 2009. Initially for a 15-year term, a three-year amendment extended the contract to 16 September 2026, i.e. 18 years after signature. The duration of PB contracts varies widely in France *(Figure 108)*. Since 2012, the maximum duration for a Service of General Economic Interest (SGEI) has been ten years *(Source 64)*.

Figure 108: Duration of PB contacts in France (2015 data, Source 9)

Type de contrat	Marché public de fourniture et de service		DSP		Régie
	Couplé au mobilier urbain	Indépendant	Intégrée à la DSP transport	Indépendante	
Durée moyenne	13,5 ans	8,5 ans	5,5 ans	9 ans	non définie
Durée minimale	10 ans	2 ans	3 ans	8 ans	non définie
Durée maximale	15 ans	15 ans	7 ans	10 ans	non définie

Contract duration is a trade-off between a number of parameters *(Figure 109)*. Having charging stations involves a significant initial investment to be amortised, as well as indirect costs associated with the work. A contract of eight to ten years would enable the investment in stations and bicycles to be amortised. It is possible to include a firm tranche and an option to extend the service.

Figure 109: Parameters involved in choosing the duration of the PB contract



The diversity of the data collected during the benchmark highlights the need to be very precise when it comes to the semantics of dates and durations, of which the following are some distinctions.

Dates	Contract signature, Official start of contract (after final appeal), Installation of first station, Installation of last station, Delivery of service, Launch, End of contract, Removal of first station, Removal of last station, Clean-up of public space at last station, Removal of reservations, Contract closure
Durations	Contractual duration, Communicated duration, Duration of presence of equipment in public space, Duration of operation, Duration of opening to the public, Duration for public cost calculations, etc.

8.3 Concession or public procurement contract?

Assuming commercial risk guides the choice of contractual relationship.

- Either revenue is kept by the public authorities, in which case the service provider is paid 100% by the public authorities under a lump-sum public procurement contract (Marseille, Paris). This is possible in governance options 1, 2 and 3 as mentioned in the previous section. The 2010 ordinance will have to be amended, as it refers to a public utility concession.
- Or the operator collects and keeps the revenues, then a concession is signed in which it receives a fixed financial contribution that does not cover all costs. It then tries to maximise its user revenues (Antwerp). Concession is possible in options 1 and 2. It seems less likely in option 3, as the PB provider has no influence on prices and communication, which would be the responsibility of STIB. Some PB players do not offer concessions.

8.4 Competitive bidding format

Several competitive bidding formats are possible *(Figure 110)*. Given the complexity of PB, many cities (Madrid, Marseille, Paris, Vienna) have opted for competitive dialogue. This process involves shortlisting candidates, submitting specifications, discussing every aspect of the contract with each of them in confidence, and then adapting the final version of the specifications. This procedure makes it possible to:

- create a space for dialogue, so that each party can express their needs, and compare the ideals of public authorities with the field experience of candidates, in order to anticipate, avoid or reduce many of the technical and financial pitfalls.
- balance the budget and service levels.
- lay the foundations for future authority-supplier-operator relations.
- give the authorities time to appropriate, adapt and deepen their understanding of all technical subjects.
- give suppliers (a little) time to fine-tune their technological solution, without having to completely overhaul their entire R&D process.

This procedure is quite cumbersome in terms of timing and confidentiality, both internally and externally with all the players involved. A priori, competitive dialogue is a procedure that has never yet been implemented in Belgium.

Figure 110: Possible competitive bidding formats (ComoUK)

	Strengths	Weaknesses
Competitive dialogue	Hones the final service and contract. The multiple rounds enable stronger understanding of the authorities' needs, operators' services and increases likelihood of aligning objectives.	Time consuming
Requests for Proposals	Similar to competitive dialogue with less formal structure so simpler and faster to implement	This initial round typically leads to tender or MOU
Traditional tender process	Route most authorities are used to and provides strong contractual framework	Can be too rigid and slow which can mean delays and lost opportunities
Memorandum of Understanding	Fast to implement and allows maximum flexibility	Lacks teeth to enforce any KPIs No binding contract durations of service so operator can leave any time
Concession contract (possible outcome of a concession contract via a competitive dialogue)	Provides a contractual agreement for contracts without funding	Limited scenarios

8.5 Reflections for the specifications

8.5.1 State of mind

Consistency	Make reasonable, coherent and stimulating requests.
Requirements	Think in terms of expected functionalities, rather than asking for technical specifications (e.g. battery watts, bike weight, number of gears) that cannot always be met, since R&D cycles and return on investment extend over several years.
Flexibility	• Foresee options, scenarios, extensions, framework agreements and future addendums to integrate new technologies, adjust the network and install new stations. • Distinguish the launch year and its specific features.
Documentation	Provide precise documentation to enable candidates to better understand the specificities of the local context *(Appendix 10.20)*, and the risks and thus propose the most appropriate technical and financial offers and reduce surprises in the medium term.
Semantics	Define a common dictionary to ensure the same definitions for different uses (accounting, communication, contractual, operations) and guarantee a sound basis for short- and long-term dialogue with all stakeholders concerning: • bikes: bike available and usable, bike available, bike on the ground (attached but not available), bike in service, lost in the park (stolen, damaged bike), bike in maintenance, bike removed, bike on hire, lost bike, bike in station, etc. • stations: post, terminal, totem, stand set, stands, dock, parking slot, virtual, etc. • rental: identification of use, authorisation to release, releasing the bike, rental of more than two minutes, regulation, trip, travel, etc. • turnover rates: rentals (see above), total rentals/theoretical bike/less than three min/regulation, six or 12 months, spread turnover rate, daily turnover rate, peak turnover rate, turnover rate per bike, turnover rate per station, etc. Furthermore, the vocabulary of private operators quickly takes over in discussions, focusing on the industrial vision of the service. A translation of the terms into public logic is proposed to facilitate understanding between the two worlds *(Figure 111)*.

Figure 111: Correspondence between private and public sector vocabulary

Contact vision		Vision of the public authorities
CAPEX	↔	Depreciable public investment
OPEX	↔	Operation of a public service
Conversion rates	↔	Modal shift
Customer acquisition	↔	Change in behaviour/new users
Consumption habits	↔	Travel practices
KPI Key Performance Indicator.	↔	Quality criteria
SLA (Service Level Agreement)	↔	Public service obligation
Technology	↔	PB supplier/system
Slack ratio	↔	Expansion rate
Turnover rate	↔	Rentals/bike/year

8.5.2 In the drafting process

Deadline	• Allow at least one year between the final signature of the contract (after the last legal recourse) and the launch, to enable equipment to be ordered, produced and delivered in a calmer environment. Some Shimano parts, with no equivalent in the market, sometimes have lead times in excess of 24 months. • Consider a gradual increase in service.
Interactions with private players	Create a forum for open dialogue with market players, providing an exchange framework for players and candidates wanting to communicate their solutions. This could be an information meeting (Budapest) on Brussels' intentions, or an invitation to respond to the study on points of disagreement.
Interactions with private players	Design a Beta version of the technical specifications and submit it to public players such as the benchmark partner territories for feedback.
Technical skills	PB is a multidisciplinary subject *(Source 3)*. PB is a good pretext for bringing together skills within BM and/or STIB on a range of technical subjects and thus uniting parties around a cycling topic.

8.5.3 Selection criteria

In view of the broken promises or failures of certain e-PB systems, the reliability of candidates could be assessed by:

- including a clause regarding experience of projects of similar size to guarantee product reliability.
- asking for field evidence of marketing promises and arguments, and providing contacts in referral cities.
- experimenting with bikes on a multi-context, real-life trips.
- acquiring a sample parking furniture and bike to challenge weak points.
- challenging the short-, medium- and long-term risk management strategy.

8.5.4 Financial details

Revenue collection	Enable third-party players to collect revenues to diversify sales channels (e.g. Paris for the Olympics, MaaS application), while anticipating remuneration mechanisms.
Payment schedule	The presence of a charging station requires a very substantial initial investment, which raises questions about the CAPEX financing arrangements and how the risk is to be compensated: partial coverage by the local authority, partial advance payment, long contract duration so that the PB provider can finance its initial investments through borrowing.
Price	• Systematically specify whether prices are € excl. tax, € incl. tax and the VAT rate to avoid confusion, calculate financial ratios and enable international comparisons. • Request unit price lists (bicycles, stands, terminal, station relocation) with a distinction between the remaining years of the contract, which will have an impact on the amortisation period. In accounting terms, a station deployed during the course of a contract is more expensive than one deployed at the beginning. • Clarify market price indexation and forecast its repercussions on the range of tariffs and prices paid.

8.5.5 Content

Bikes	Rather than asking for technical specifications (weight, power, number of gears), request that the bikes be: • easy to handle while seated on the saddle and on foot to push or pull the bike, for an optimised experience for every human being in their diversity (size, weight, bike handling in urban environments) or employees who repeat these gestures. • robust and resistant to several years' exposure to weather conditions, over-use, misuse, wear and tear, vandalism and theft, to reduce maintenance costs and time on the contract, reduce the risk of theft and maintain a high level of service. Standards ISO 4210-2 and EN 15194 including mountain bikes are reassuring proof of the frame's robustness.
Station furniture	• Easy to identify from afar, day or night. • Avoid giving the outgoing competitor the advantage of having an already installed and reusable infrastructure. To this end, it is suggested that a neutral appraiser be called in to estimate the price of the stations (including the concrete slabs) to enable each competitor, including the outgoing one, to buy them back and thus avoid saying that the outgoing operator was favoured.
End of contract	• Negotiate the transition amendment with the incumbent in advance, so that it can be communicated to all candidates, who will have identical knowledge of the transition conditions. • Plan contract closure scenarios with early contract closure (Madrid, Stockholm) or conditions for transferring the furniture and brand.
Provider organisation	• Provide a mechanism for taking over teams from the outgoing operator. • Require the creation of a local company or subsidiary to ensure financial transparency, with publication of annual accounts and an activity report (to be published no later than 31 March of the following year for rapid adjustment), with an operations manager dedicated 100% to the Brussels PB service.
Environmental balance sheet	Challenge candidates on the overall life-cycle analysis of: • production: where spare parts are produced and assembled. • usage: travel distances, car journeys avoided. • operation: control vehicles, energy and electricity types. • end-of-life: processing of batteries, bicycles, dock, furniture, etc.
Information system	• Ask for details of the technological (hard) and IT (soft) architecture that enables communication between the bike, the station, the user and the operator. • Demand a high level of service continuity. • Demand a copy of the data to conduct an in-house analyses (Paris).
User Interface (design)	Specific thought is needed to take into account the diversity of users and potential users, to be organised as much as possible in a universal design approach (colour contrast, simple text, ergonomics, right to make mistakes, etc.).
Identification	Avoid any waiting time with an identification device (nearby) for each bike.
Contractualisation	Include a draft contract to be completed in the call for tenders, to reduce the time needed to sign the contract.
Exposure in public spaces	Furniture, docks, bicycles and electronics are designed to withstand humidity, rain, hail, floods, cold, sun, UV rays, heat waves, shocks, scratches and cleaning products. A protocol for preventing corrosion and blistering is provided.
Activity	Presentations to employer establishments.

8.6 Contractual and quality monitoring procedures

Reporting	Public dissemination of real-time usage data (e.g. Rouen, Barcelona, Brussels, Budapest, Munich, Paris, Montreal)
Follow-up	• Have a monthly/quarterly committee meeting to improve service quality. • Carry out joint station audits/mystery users (as outsourced in Lyon).
Positive incentives	Offer a remuneration package that is higher than the increasing marginal cost of an additional rental, and which therefore evolves according to the number of rentals or the turnover rate, with levels to be defined (e.g. 1, 3, 5 and 7 rentals/bike/day).
Bike availability penalties	Rather than obligations to achieve results in terms of availability rates per station or group of stations (which are often impossible for the operator to achieve, with questionable results, and for which penalties are often provisioned), obligations to provide means and resources could be envisaged. For example, it could be a number of bikes moved per week, to be corroborated on the basis of rotation rates, day/peak hour usage, duration, congestion/night and week/weekend per station/cluster of stations/priority replenishment zone and on territorial equity criteria considered as part of the public service.
Usage and operations data	• Request a real-time duplicate of all operating data, as well as customisable, exportable and usable dashboards. • Require real-time availability of the most recent version of the General Bike Share Feed Specification (GBFS) format managed by MobilityData and the Mobility Data Specification (MDS) format, with no authentication required, exportable in .xsl/.csv and compatible or convertible with other formats used in particular for MaaS, such as NeTex, Siri, OCPI, Datex II, TOMP (Transport Operator MaaS Provider). • A global data management strategy must answer the following questions: What information for what uses? How is it collected, stored, managed, analysed and made available? What is the quality, accuracy, format and frequency (real time, precise moment), duration of availability (history), security and aggregation for statistics? How is the GDPR being respected? What user guides are there? What is the role of each player? Who owns the data? What APIs and standards are needed to communicate between services? How can data veracity (trust, certification) and interpretation be guaranteed?
KPI	• Distinguish between KPIs for public policy objectives, contractual KPIs and PIs used to assess service quality and communicate. • Require the licensee to report any significant deviations within a given timeframe.

A dedicated PB contract for eight to ten years.

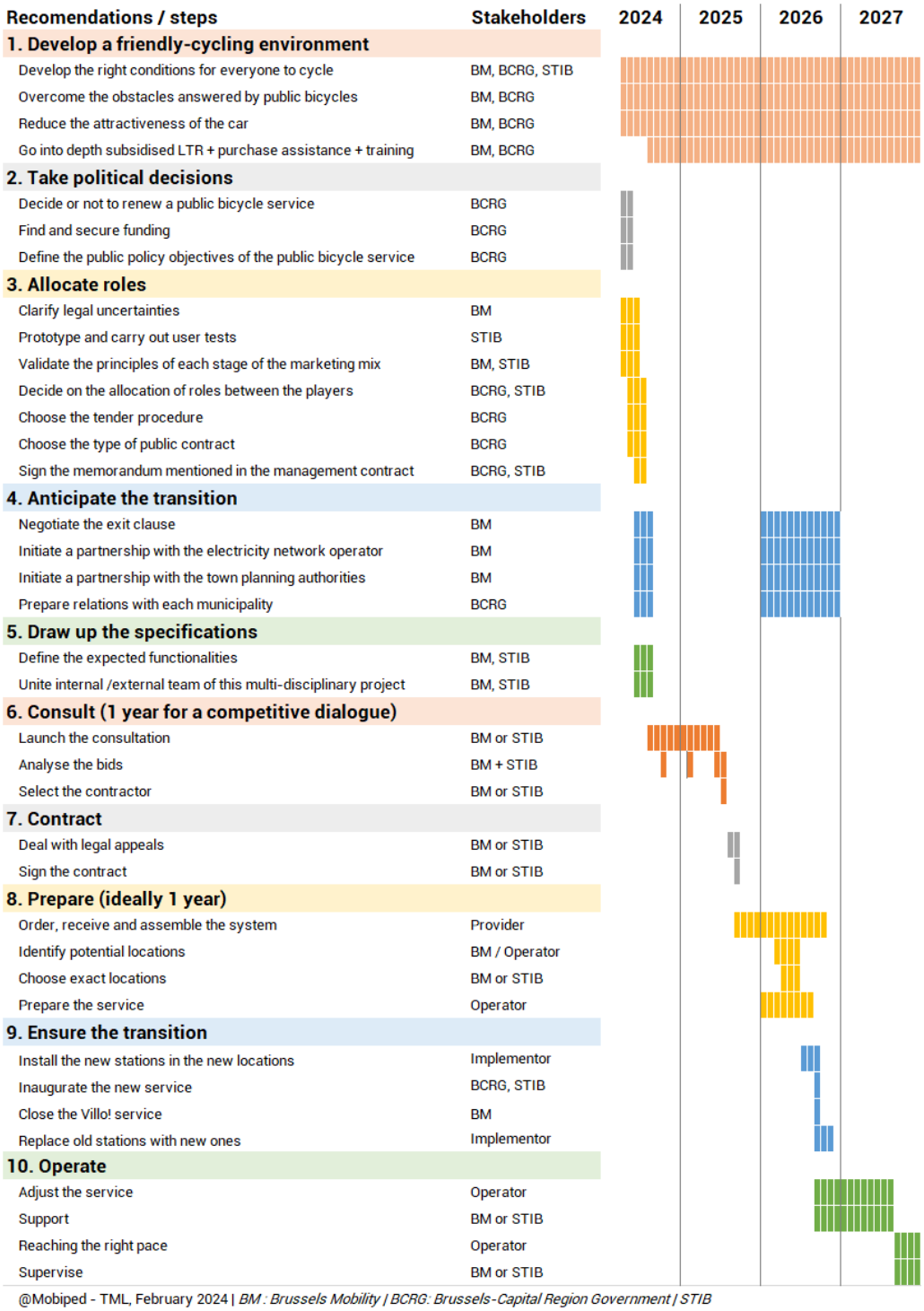
9 A fairly tight schedule

9.1 Global vision

To guarantee continuity of service in 2026 and ensure a smooth transition if the government decides to develop a new PB, several actions need to be launched quickly *(Figure 112)* in view of planning constraints:

- selection of candidates.
- awarding, after possible legal appeals: three months.
- order, production, delivery and installation: one year.
- launch: from September 2026.

Figure 112: Indicative schedule for a possible future PB service following the current concession



9.2 Focus on transition

The transition between two systems is often highly complex, involving industrial, commercial and political risks. A specific action plan is essential to avoid:

- stopping the service for five months (Budapest).
- being impacted by the electoral calendar (Madrid).
- only having 30% of bikes delivered one year after launch (Marseille).
- losing 80% of rentals in one year and waiting six years for service delivery (Paris).

9.2.1 Preparing for the end of the current concession

Brussels Mobility needs to clarify the following elements and schedule with the outgoing holder:

- operation end date and contract closure.
- date of removal of the first and last stations.
- station, slab and power supply specifications.
- negotiation possibilities with the next incumbent. If the outgoing candidate is unsuccessful, it will be required to remove the furniture and normally return the flooring to its original condition. The new service provider will then install the new stations. Ideally, the two parties enter into negotiations to facilitate the coordination of worksites, coordinate schedules and share the same contractors for civil engineering work to avoid having to clean up the public space and then start new excavations.
- the transfer of customer databases, while complying with the GDPR.
- the structure of the operator's PB team and salary conditions.
- how to close the contract.
- terms and conditions for discontinuing advertising and removing the corresponding furniture.

9.2.2 Station electrification

To electrify each station, it may be necessary to dig a trench for the connection and open a new electricity meter. It seems that the need for electrical power is proportional to the number of parking slots and that the batteries used by bike suppliers have different amperages and voltages. The deployment of the stations depends on the schedule of the electricity grid operator. A dedicated protocol is essential, ideally with dedicated human resources on SIBELGA's side to ensure responsiveness in closing/opening meters. The division of technical (RACI Matrix), administrative and legal responsibilities between players (network manager, administration, PB supplier/installer/operator) and intervention times needs to be clarified. To compensate for possible delays in the electrification of stations, and avoid penalising the launch of the service, the applicant may be asked to be able to charge the station with trucks or batteries integrated into the station, or to swap batteries on bicycles.

9.2.3 Building permit

A demolition permit and a building permit are required each time a piece of furniture is removed to install a new one, even in the same location. Since administrative procedures can take six months to a year, a specific protocol is essential to plan and facilitate this process.

9.2.4 Transition date

A service transition on 16 September 2026, in the middle of the September back-to-school period, is questionable given the legal complexity (amendment, negotiations on PB and advertising space, extension of planning permission for advertising space) of shortening the contract to 31 July 2026 or postponing it to 31 December 2026. The presence of private SB services could also temporarily compensate for a service transition with a presumed total shutdown.

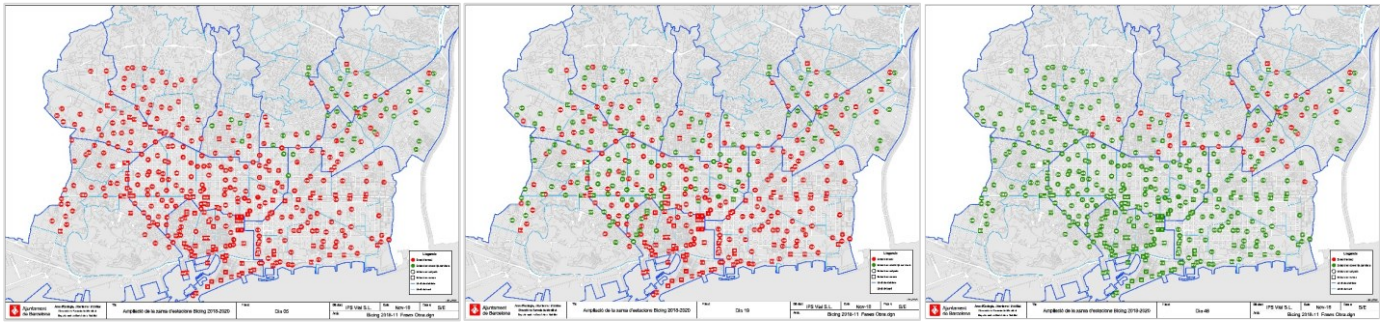
9.2.5 Transition programme

For the transition, one of Brussels' opportunities will be the densification of the network, enabling all new stations to be installed ahead of the closure of the previous service, to ensure continuity of service even if provision remains downgraded *(Figure 113)*. The timetable depends on the technological solution chosen.

Figure 113: Ideas on a transition programme from the old to the new service

	Villo !	**New service**
Two months before		Installation of the stations that will supplement the network and those that have been "moved" from the pavement to a car parking area.
One month before	Gradual closure of half the stations in one district, then in the next district, until the whole area is covered. Then proceed in reverse order *(Figure 114)*.	Replacement of old stations with new ones, for a gradual presence throughout the territory.
D-Day	*Villo !* service stopped.	Launch of the new service.
Two months later	All the old *Villo !* stations have been removed.	All the new stations are now in service.

Figure 114: Snail-like transition in Barcelona with 500 stations for 7,000 bicycles (Source: BSM)



Day 5 *Day 21* *Day 48*

(Red Bicing 1 with Clear Channel stations - Green Bicing 2 with PBSC stations)

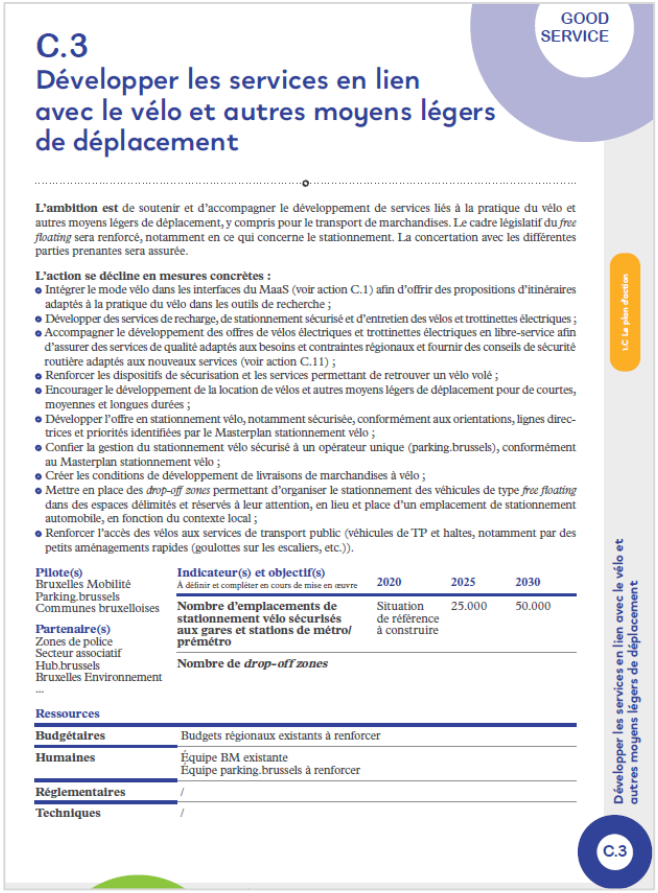
Preparing for a smooth transition starts now, based on political validation.

10 Appendices

10.1 Strengths, Weaknesses, Opportunities, Threats of cycling in Brussels

Strengths	Weaknesses
• A proactive policy, with an ambitious strategy and planning via Good Move (traffic calming zones, motorised traffic-free zones, cyclist visibility). • Increase in modal share from 3.4% in 2010 *(Source 1)* to 8.6 % in 2022, and 9.3% for internal travels (*Source 41*). • Increase in the number of cyclists counted (+43.7% in rush hour between 2021 and 2022) (*Source 37*). • Improved infrastructure. • Reduced car pressure. 	• **"Chaotic" and frightening motorized traffic**. There is still a feeling of insecurity, particularly among the most vulnerable groups (no children on bikes), and habits based on car use are entrenched. • **Bicycles** are under-valued in less affluent population. Bicycles tend to be a middle-class means of transport. • **Conflicts between users**: incitement to a hatred of cyclists with car driver/cyclist opposition. Sometimes fatal tram/bike collisions. • **Gender**: under-representation of women, who account for 40% of the cyclists counted (*Source 36, 37*). • **Governance**: lack of cycling reflex in administrations and bodies (*Source 38*) and insufficient respect for the STOP principle. The associations are calling for active modes to be represented on the Road Work Coordination Committee (*Source 38*). Deployment of on-street bicycle parking spread across a wide range of players. • **Other disincentives**: 19% of cyclists have had at least one bike stolen in the last two years. Bicycle theft and a lack of secure parking are the problems most frequently cited by those who have already cycled (2016, *source 52).* And bicycle ownership rates in Brussels of 48% in 2016 (*source 5)* and 47% in 2022 (*Source 41*). There were around 0.31 bicycles per inhabitant in 2020 *(Source 49).* • Undulating territory.
Opportunities	**Threats**
• 2024, the European Year of Cycling and the Belgian presidency of the EU. • Gradual implementation of Good Move, making car use less attractive and cycling more competitive. • Progressive change in the positive image of cycling. • New BYPAD audit scheduled. • Development of pedelecs and micromobility (objectives, constraints and nearby infrastructures). • Infrastructures that will continue to expand.	• Increasing polarisation of society around mobility, between cyclists and non-cyclists, among others, following Good Move implementation. • Still a lack of secure bike parking. • Public transport heavily subsidised, especially for 18-24 year-olds at €12/year. • Development of personal e-scooters. • Urban sprawl.

10.2 The three Good Move actions that directly concern PB



GOOD SERVICE

C.3
Développer les services en lien avec le vélo et autres moyens légers de déplacement

L'ambition est de soutenir et d'accompagner le développement de services liés à la pratique du vélo et autres moyens légers de déplacement, y compris pour le transport de marchandises. Le cadre législatif du *free floating* sera renforcé, notamment en ce qui concerne le stationnement. La concertation avec les différentes parties prenantes sera assurée.

L'action se décline en mesures concrètes :

- Intégrer le mode vélo dans les interfaces du MaaS (voir action C.1) afin d'offrir des propositions d'itinéraires adaptés à la pratique du vélo dans les outils de recherche ;
- Développer des services de recharge, de stationnement sécurisé et d'entretien des vélos et trottinettes électriques ;
- Accompagner le développement des offres de vélos électriques et trottinettes électriques en libre-service afin d'assurer des services de qualité adaptés aux besoins et contraintes régionaux et fournir des conseils de sécurité routière adaptés aux nouveaux services (voir action C.11) ;
- Renforcer les dispositifs de sécurisation et les services permettant de retrouver un vélo volé ;
- Encourager le développement de la location de vélos et autres moyens légers de déplacement pour de courtes, moyennes et longues durées ;
- Développer l'offre en stationnement vélo, notamment sécurisée, conformément aux orientations, lignes directrices et priorités identifiées par le Masterplan stationnement vélo ;
- Confier la gestion du stationnement vélo sécurisé à un opérateur unique (parking.brussels), conformément au Masterplan stationnement vélo ;
- Créer les conditions de développement de livraisons de marchandises à vélo ;
- Mettre en place des *drop-off zones* permettant d'organiser le stationnement des véhicules de type *free floating* dans des espaces délimités et réservés à leur attention, en lieu et place d'un emplacement de stationnement automobile, en fonction du contexte local ;
- Renforcer l'accès des vélos aux services de transport public (véhicules de TP et haltes, notamment par des petits aménagements rapides (goulottes sur les escaliers, etc.)).

Pilote(s)
Bruxelles Mobilité
Parking.brussels
Communes bruxelloises

Partenaire(s)
Zones de police
Secteur associatif
Hub.brussels
Bruxelles Environnement
...

Indicateur(s) et objectif(s) (À définir et compléter en cours de mise en œuvre)	2020	2025	2030
Nombre d'emplacements de stationnement vélo sécurisés aux gares et stations de métro/ prémétro	Situation de référence à construire	25.000	50.000
Nombre de *drop-off zones*			

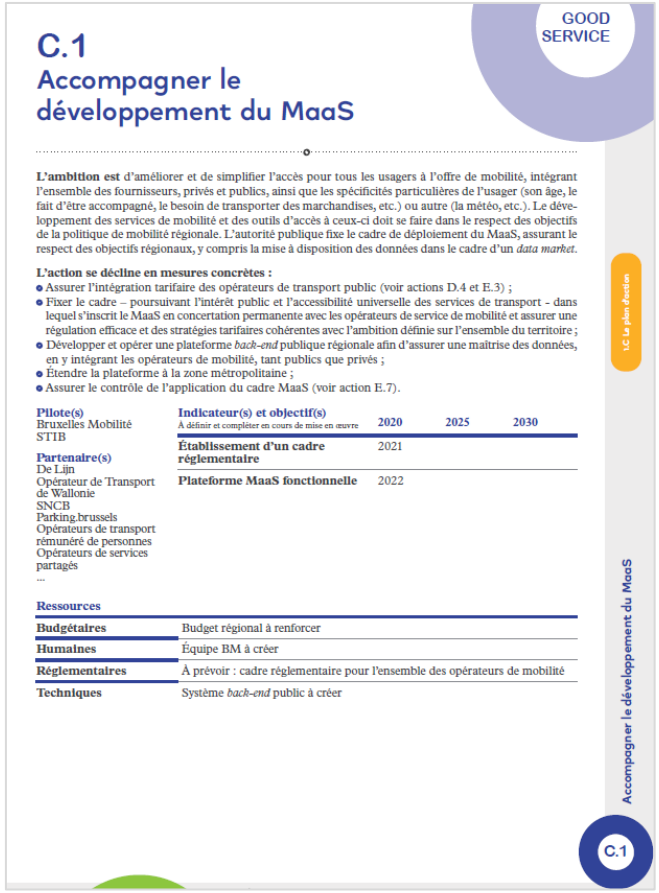
Ressources

Budgétaires	Budgets régionaux existants à renforcer
Humaines	Équipe BM existante Équipe parking.brussels à renforcer
Réglementaires	/
Techniques	/

1.C Le plan d'action

Développer les services en lien avec le vélo et autres moyens légers de déplacement

C.3



GOOD SERVICE

C.1
Accompagner le développement du MaaS

L'ambition est d'améliorer et de simplifier l'accès pour tous les usagers à l'offre de mobilité, intégrant l'ensemble des fournisseurs, privés et publics, ainsi que les spécificités particulières de l'usager (son âge, le fait d'être accompagné, le besoin de transporter des marchandises, etc.) ou autre (la météo, etc.). Le développement des services de mobilité et des outils d'accès à ceux-ci doit se faire dans le respect des objectifs de la politique de mobilité régionale. L'autorité publique fixe le cadre de déploiement du MaaS, assurant le respect des objectifs régionaux, y compris la mise à disposition des données dans le cadre d'un *data market*.

L'action se décline en mesures concrètes :

- Assurer l'intégration tarifaire des opérateurs de transport public (voir actions D.4 et E.3) ;
- Fixer le cadre – poursuivant l'intérêt public et l'accessibilité universelle des services de transport - dans lequel s'inscrit le MaaS en concertation permanente avec les opérateurs de service de mobilité et assurer une régulation efficace et des stratégies tarifaires cohérentes avec l'ambition définie sur l'ensemble du territoire ;
- Développer et opérer une plateforme *back-end* publique régionale afin d'assurer une maîtrise des données, en y intégrant les opérateurs de mobilité, tant publics que privés ;
- Étendre la plateforme à la zone métropolitaine ;
- Assurer le contrôle de l'application du cadre MaaS (voir action E.7).

Pilote(s)
Bruxelles Mobilité
STIB

Partenaire(s)
De Lijn
Opérateur de Transport de Wallonie
SNCB
Parking.brussels
Opérateurs de transport rémunéré de personnes
Opérateurs de services partagés
...

Indicateur(s) et objectif(s) (À définir et compléter en cours de mise en œuvre)	2020	2025	2030
Établissement d'un cadre réglementaire	2021		
Plateforme MaaS fonctionnelle	2022		

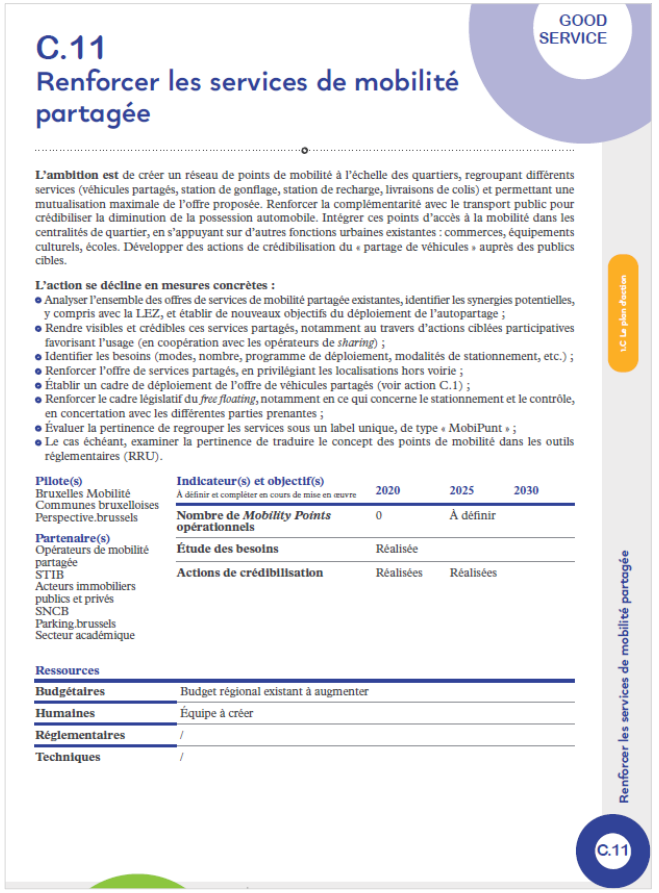
Ressources

Budgétaires	Budget régional à renforcer
Humaines	Équipe BM à créer
Réglementaires	À prévoir : cadre réglementaire pour l'ensemble des opérateurs de mobilité
Techniques	Système *back-end* public à créer

1.C Le plan d'action

Accompagner le développement du MaaS

C.1



GOOD SERVICE

C.11
Renforcer les services de mobilité partagée

L'ambition est de créer un réseau de points de mobilité à l'échelle des quartiers, regroupant différents services (véhicules partagés, station de gonflage, station de recharge, livraisons de colis) et permettant une mutualisation maximale de l'offre proposée. Renforcer la complémentarité avec le transport public pour crédibiliser la diminution de la possession automobile. Intégrer ces points d'accès à la mobilité dans les centralités de quartier, en s'appuyant sur d'autres fonctions urbaines existantes : commerces, équipements culturels, écoles. Développer des actions de crédibilisation du « partage de véhicules » auprès des publics cibles.

L'action se décline en mesures concrètes :

- Analyser l'ensemble des offres de services de mobilité partagée existantes, identifier les synergies potentielles, y compris avec la LEZ, et établir de nouveaux objectifs du déploiement de l'autopartage ;
- Rendre visibles et crédibles ces services partagés, notamment au travers d'actions ciblées participatives favorisant l'usage (en coopération avec les opérateurs de *sharing*) ;
- Identifier les besoins (modes, nombre, programme de déploiement, modalités de stationnement, etc.) ;
- Renforcer l'offre de services partagés, en privilégiant les localisations hors voirie ;
- Établir un cadre de déploiement de l'offre de véhicules partagés (voir action C.1) ;
- Renforcer le cadre législatif du *free floating*, notamment en ce qui concerne le stationnement et le contrôle, en concertation avec les différentes parties prenantes ;
- Évaluer la pertinence de regrouper les services sous un label unique, de type « MobiPunt » ;
- Le cas échéant, examiner la pertinence de traduire le concept des points de mobilité dans les outils réglementaires (RRU).

Pilote(s)
Bruxelles Mobilité
Communes bruxelloises
Perspective.brussels

Partenaire(s)
Opérateurs de mobilité partagée
STIB
Acteurs immobiliers publics et privés
SNCB
Parking.brussels
Secteur académique

Indicateur(s) et objectif(s) (À définir et compléter en cours de mise en œuvre)	2020	2025	2030
Nombre de *Mobility Points* opérationnels	0	À définir	
Étude des besoins	Réalisée		
Actions de crédibilisation	Réalisées	Réalisées	

Ressources

Budgétaires	Budget régional existant à augmenter
Humaines	Équipe à créer
Réglementaires	/
Techniques	/

1.C Le plan d'action

Renforcer les services de mobilité partagée

C.11

Source 47

10.3 List of performance indicators

Theme	Sub-themes
Availability	• Stations and terminals • Bicycles: by zone or by group of stations, rather than by station (e.g. Barcelona), classifying stations by priority level (e.g. Paris) with a time-based concept • Parking slots available (per station or group of stations/hour) • IT back office • IT front office • Customer service
Quality of service	• User journey times (first-time, regular users) with distinction at each stage
Performance	• Number of annual rentals • Annual rentals of more than 2 min/theoretical bike/365 days • Km cycled • Average journey distance • Journey distance avoided by car • Number of subscribers • Number of different users, % of residents who used PB once in the year • Travel reasons • Pick-up, Drop-off, Pick-up/Drop-off by station
User satisfaction	• User satisfaction • Public image • % of Brussels residents who consider cycling an integral part of the STIB offer
Resident coverage rate	• % of population (14-18 years of age) or > 18 • % of women • % of users with secondary school diploma maximum • % of commuters who now use their own bikes
Mobility impact	• Modal shift per journey or per user
Preventive maintenance	• Bicycle | Station | IT
Cleanliness	• Station cleaning • Bike cleaning
Reactivity	• Removal time for a damaged bike
New customers	• Acquisition rate
Road safety	• Minor injuries, serious injuries, deaths at 30 days (Number and per km travelled) • Proportion in relation to private bicycles and all modes of transport • Respecting the traffic rules • Feeling of safety • Average and incremental speed
Accessibility	• Travel purpose • Transport connections, service connections, work connections • Journey time • Mode share • Frequency of use • Access to work and necessities • Location of vehicle for public transport, jobs, other necessities • Carrying/lifting • Average vehicle density

Economy	• Number of local jobs • % of jobs in the bicycle sector • Service turnover, compared with turnover for all bicycle activities in the region
Environment	• Air quality • Impact per kilometre travelled per vehicle: service use, redistribution • Carbon footprint of regulation vehicles • Lifespan of regulation vehicles, bicycles and batteries • Reuse and recycling of bikes and batteries • Data volume • Life cycle analysis: production, import, services, recycling
Public health	• Personal healthcare costs avoided • Health service expenditure avoided
Public finance	• Remaining cost per trip • Remaining cost per km • Remaining cost per car km avoided • User revenue coverage rate
Operation and maintenance	• Mean time to failure • Wear and tear • User complaints - response time • Vehicle condition • User experience of employees
Equity	• User demographics - income bracket, age, gender, capacity • Vehicle distribution • Pricing structure - connection to use • Community involvement (number of events, participation, street team, etc.)
Territorial coverage	• Total area served • Rebalancing needs • Stagnant bikes
GOOD MOVE *(Source 47 page 140)*	
Motorisation rates and behaviour	• Motorisation rate of BCR residents • Percentage of the population (15+) who walk or cycle to get from one place to another for at least 30 minutes on a typical day • Modal share of secondary school students • Modal share of employees
Main traffic and flow measurements	• Average number of cyclists per hour per Bike Observatory counting point • Number of journeys made on the STIB public transport network (metro, tram, bus) over one year
Perception of mobility and road safety	• Level of satisfaction with the mobility offer • Overall level of user satisfaction with STIB public transport (Barometer)
Air quality	• Volume and percentages of CO_2 equivalent emissions within the BCR perimeter • Number of days on which the daily average concentration of PM10 and PM2 is exceeded • Energy consumption of the transport sector within the BCR perimeter

Table 2. New Mobility performance indicators in five policy areas

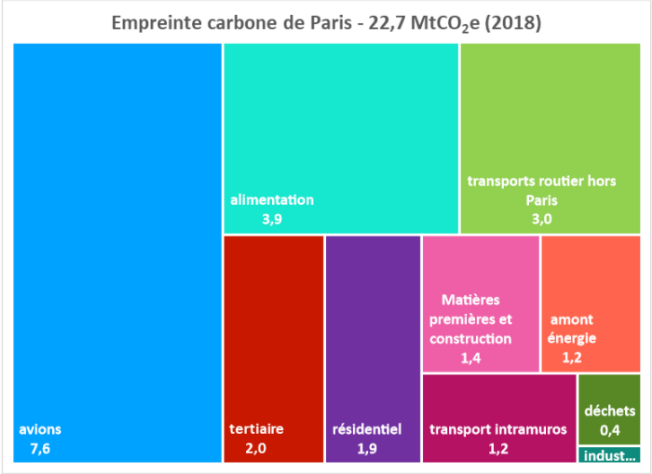
Policy area	Indicator
Sustainability	1.1 Vehicle-kilometres and passenger-kilometres travelled 1.2 Average vehicle lifespan 1.3 Alternative mode replaced and trip generation effects 1.4 Operational CO_2 emissions
Safety	2.1 Injury rate 2.2 Crash rate 2.3 Share of passenger-kilometres travelled on low-stress routes
Utilisation	3.1 Vehicle utilisation rate 3.2 Trip distance (or trip duration for round-trip services) 3.3 Total users
Accessibility	4.1 Access latency 4.2 Number of trips starting or ending near essential services and opportunities 4.3 Vehicles or trips available by area (spatially aggregated) 4.4 Trip purpose
Equity	5.1 Vehicle and trip availability in targeted service areas 5.2 Number of trips starting or ending in targeted service areas 5.3 Vehicle and trip availability for users with physical disabilities

Source 21

10.4 Some PB challenges regarding pedelecs

Installation	Choose between charging station and/or swapping. Avoid novice suppliers who have gone bankrupt (Copenhagen, Stockholm). Dependent on the electricity grid operator.
Operation	↗ acquisition, maintenance and operating costs, with the challenge of finding a skilled workforce, which is generally very male-dominated. ↗ risks: fire, theft. ↗ failures: connectors, oxidation, high temperatures.
Social appropriation	Willingness to pay of certain groups. Some users prefer pedal bikes so they can continue to make a physical effort, have a lower deposit and prices, and a reduced environmental footprint. Contribution to the SUVisation of cycling.

10.5 The City of Paris' carbon footprint in 2018



Source 54

10.6 Reflections based on the regional mobility plan

10.6.1 City Vision extended to PB

City Vision	Application to PB
Green	Life cycle of stations, batteries and bicycles Impact of operating trips Modal shift avoided
Social	Accessible to under-represented groups: low-income earners, women, those with few qualifications Solidarity pricing Consideration of the digital divide
Pleasant	Attractive user experience Respectful sharing of public space Acceptance by non-users
Healthy	Encouraging physical activity Improvement of air quality
Effective	Large number of rentals Set an example for other European cities
Efficient	Public money well invested Setting SMART objectives Long-term service
Safe	Compliance with safety standards Bikes in good condition Road safety

10.6.2 Good Move actions to which PB indirectly contributes

Focus	Application to PB
A. Good neighbourhood	Territorial coverage Living environment with lowered speeds (A1, A2) Integration into renovation projects (A6)
B. Good Network	Hyper-dense network in the hypercentre and continuous outwards Consistency with the cycling network (B1, B4) and PT network (B5) PB network operation (B8, B9)
C. Good Service	Customer-oriented - User-friendly (C5) Quality, scalable (C3, C11) and hierarchical service (C6) Integrated into the public mobility offer (Floya, STIB) (C1, C2)
D. Good Choice	Alternative for current and future motorists (D3, D6, D7) Adapt pricing (D4) Develop multimodal skills, enhance personal cycling
E. Good Partners	Public cooperative initiative (E1, E2, E3) Involvement of STIB (E4) Call for private-sector expertise, with follow-up (E7)
F. Good Knowledge	Transparency in the use of public funds (F1, F6) Data collected, analysed and regularly published (F2, F3)

10.7 Data table for the quantitative assessment of scenarios

N°	2022	1. LTR			2. DZ Private SB		3. DZ public PB		4. Hybrid PB		5. Dock-based PB	
	Villo!	Base	Option	Total								
SERVICE												
Supply												
Stations locations	345	-	-	-	3,000	3,000	3,000	3,000	700	700	700	700
Specific urban furniture	*345*	-	-		-	-	-	-	*350*	*350*	*700*	*700*
Dropzones	-	-	-		*3,000*	*3,000*	*3,000*	*3,000*	*350*	*350*	*0*	*0*
nb of stations/ km²	2.1				18.4	18.4	18.4	18.4	4.3	4.3	4.3	4.3
Bicycles	4,103	4,000	500	4,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Pedal	*2,303*	*1,400*	*500*	*1,900*	-	-	-	-	-	-	-	-
Pedelecs	*1,800*	*2,600*		*2,600*	*7,500*	*7,500*	*7,500*	*7,500*	*7,500*	*7,500*	*7,500*	*7,500*
Bikes/ 10.000 inhabitants	33.6	32.4	4.1	36.5	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8
Bikes/ station	11.9				2.5	2.5	2.5	2.5	10.7	10.7	10.7	10.7
Mobility practise												
VLS Rentals/bike/day	0.67	-	-	-	1.6	2.0	2.0	3.0	3.0	5.0	3.0	5.0
Rentals or trips/year	997,826	2,190,000	140,250	2,330,250	4,380,000	5,475,000	5,475,000	8,212,500	8,212,500	13,687,500	8,212,500	13,687,500
Rentals or trips/year (Million)	1.0 M	2.2 M	0.1 M	2.3 M	4.4 M	5.5 M	5.5 M	8.2 M	8.2 M	13.7 M	8.2 M	13.7 M
Trips/1,000 inhabitants/day	816	1,776	114	1,890	3,553	4,441	4,441	6,662	6,662	11,103	6,662	11,103
Trips/inhabitant/year	0.82	1.8	0.1	1.9	3.6	4.4	4.4	6.7	6.7	11.1	6.7	11.1
Distance/rental (km)	1.9	3.1	2.0	-	2.5	3.1	2.5	3.1	2.5	3.1	2.5	3.1
Annual km cycled	1,865,935	6,789,000	280,500	7,069,500	10,950,000	16,972,500	13,687,500	25,458,750	20,531,250	42,431,250	20,531,250	42,431,250
Annual km cycled (Millions)	1.9 M	6.8 M	0.3 M	7.1 M	11.0 M	17.0 M	13.7 M	25.5 M	20.5 M	42.4 M	20.5 M	42.4 M
Subscribers												
SB yearly rentals/yearly members	53	-	-	-	50	50	80	80	80	80	80	80
LTR trips/beneficiary/year	-	365	187	-	-	-	-	-	-	-	-	-
LTRbeneficiaries/year/bike		1.5	1.5	2								
Number of annual subscribers	18,861	6,000	750	6,750	87,600	109,500	68,438	102,656	102,656	171,094	102,656	171,094
Subscribers/inhabitants (%)	1.5%	0.5%	0.1%	0.5%	7.1%	8.9%	5.6%	8.3%	8.3%	13.9%	8.3%	13.9%
% of female users	29%	62%	95%	-	30%	34%	30%	34%	35%	40%	35%	40%
Female users	5,470	3,720	713	4,433	26,280	37,230	20,531	34,903	35,930	68,438	35,930	68,438
% maximum secondary education	26%	40%	100%		26%	30%	26%	30%	26%	30%	26%	30%
Users up to secondary degree maximum	4,904	2,400	750	3,150	22,776	32,850	17,794	30,797	26,691	51,328	26,691	51,328

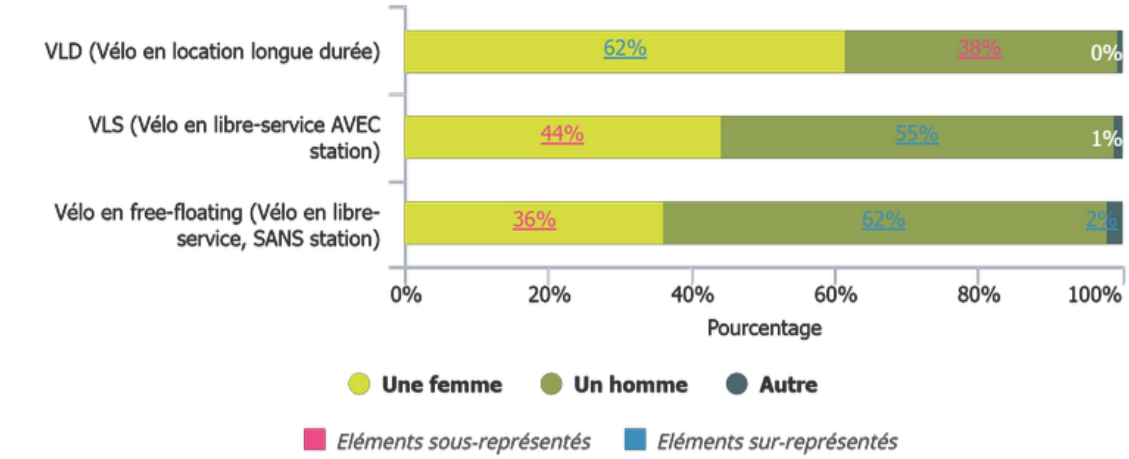
N°	2022	1. LTR			2. DZ Private SB		3. DZ public PB		4. Hybrid PB		5. Dock-based PB	
	Villo!	Base	Option	Total								
Mobility Impacts												
Comparison of volumes												
Bike rentals/Alle trips in BRC (%)	0.10%	0.21%	0.01%	0.22%	0.42%	0.53%	0.53%	0.79%	0.79%	1.31%	0.79%	1.31%
Bike rentals/Cycle trips in BCR (%)	1.04%	1.40%	0.09%	1.49%	2.80%	3.50%	3.50%	5.26%	5.26%	8.76%	5.26%	8.76%
Bike rentals/PT journeys in BCR (%)	0.39%	0.82%	0.05%	0.87%	1.64%	2.05%	2.05%	3.08%	3.08%	5.13%	3.08%	5.13%
Bike rentals/STIB journeys in BCR (%)	0.40%	0.84%	0.05%	0.89%	1.68%	2.09%	2.09%	3.14%	3.14%	5.23%	3.14%	5.23%
Bike rentals/STIB journeys(%)	0.30%	0.48%	0.03%	0.51%	0.95%	1.19%	1.19%	1.79%	1.79%	2.98%	1.79%	2.98%
Car modal shift												
% car journeys avoided	7%	20%	0%	-	7%	10%	7%	10%	7%	12%	7%	12%
Car - journeys avoided /year	0.07 M	0.44 M	0.00 M	0.44 M	0.31 M	0.55 M	0.38 M	0.82 M	0.57 M	1.64 M	0.57 M	1.64 M
Car - % journeys avoided /year	0.03%	0.23%	0.00%	0.23%	0.16%	0.29%	0.20%	0.43%	0.30%	0.86%	0.30%	0.86%
Car - km avoided /year	0.13 M	1.36 M	0.00 M	0.00 M	0.77 M	1.70 M	0.96 M	2.55 M	1.44 M	5.09 M	1.44 M	5.09 M
Car - % of km avoided	0.01%	0.15%	0.00%	0.00%	0.08%	0.19%	0.11%	0.28%	0.16%	0.56%	0.16%	0.56%
Imrpovment of PT travels												
% of PT journeys improved	60%	35%	60%	-	60%	60%	60%	60%	60%	60%	60%	60%
PT - Journeys improved/year	0.60 M	0.77 M	0.08 M	0.85 M	2.63 M	3.29 M	3.29 M	4.93 M	4.93 M	8.21 M	4.93 M	8.21 M
PT - % of journeys improved	0.63%	0.29%	0.03%	0.32%	0.98%	1.23%	1.23%	1.85%	1.85%	3.08%	1.85%	3.08%
PT - % of STIB journeys improved	0.24%	0.29%	0.03%	0.33%	1.01%	1.26%	1.26%	1.88%	1.88%	3.14%	1.88%	3.14%
PT - km improved/year	1.12 M	2.38 M	0.17 M	2.54 M	6.57 M	10.18 M	8.21 M	15.28 M	12.32 M	25.46 M	12.32 M	25.46 M
PT - % of km improved	0.07%	0.15%	0.01%	0.16%	0.42%	0.65%	0.53%	0.98%	0.79%	1.64%	0.79%	1.64%

N°	2022	1. LTR			2. DZ Private SB		3. DZ public PB		4. Hybrid PB		5. Dock-based PB	
	Villo!	Base	Option	Total								
Financial impacts (€ excl. VAT)												
Public expenditure assumptions (€ excl. VAT)												
Ratio of price paid		€640	€888	€668	€0	€0	€3,000	€2,000	€3,200	€2,200	€3,000	€2,000
FTE for supervision	1	1	0.5	1.5	0	0	2	1	5	3	5	3
Public authorities budget (€ excl. VAT)												
Total paid by public authorities	€0.09 M	€2.65 M	€0.49 M	€3.14 M	€0.00 M	€0.00 M	€22.68 M	€15.09 M	€24.45 M	€16.77 M	€22.95 M	€15.27 M
Price invoiced to public authorities	€0.00 M	€2.56 M	€0.44 M	€3.00 M	€0.00 M	€0.00 M	€22.50 M	€15.00 M	€24.00 M	€16.50 M	€22.50 M	€15.00 M
Cost of supervision	€0.09 M	€0.09 M	€0.05 M	€0.14 M	€0.00 M	€0.00 M	€0.18 M	€0.09 M	€0.45 M	€0.27 M	€0.45 M	€0.27 M
User revenue (€ excl. VAT)												
User revenue coverage rate		40%	4%		-	-	35%	50%	35%	50%	35%	50%
User revenue		€1.02 M	€0.02 M	€1.04 M	€0.00 M	€0.00 M	€7.88 M	€7.50 M	€8.40 M	€8.25 M	€7.88 M	€7.50 M
Residual public cost (€ excl. VAT)												
Residual cost: € public / year		€1.63 M	€0.47 M	€2.10 M	€0.00 M	€0.00 M	€14.81 M	€7.59 M	€16.05 M	€8.52 M	€15.08 M	€7.77 M
Residual cost: € public / bike		€407	€942	€466	€0	€0	€1,974	€1,012	€2,140	€1,136	€2,010	€1,036
Residual cost: € public / trip by bike		€0.74	€3.36	€0.90	€0.00	€0.00	€2.70	€0.92	€1.95	€0.62	€1.84	€0.57
Residual cost: € public / km by bike		€0.24	€1.68	€1.92	€0.00	€0.00	€1.08	€0.30	€0.78	€0.20	€0.73	€0.18
Residual cost: € public / car km avoided		€1.20		€1.20	€0.00	€0.00	€15.45	€2.98	€11.17	€1.67	€10.49	€1.53
Residual cost: € public / Tonne avoided		€7,327	€75,676	€9,192	€0	€0	-€244,937	€709,832	-€177,023	€55,103	-€166,270	€50,252
Other impacts												
Carbon footprint (CO^2 tons avoided)												
Emitted/year (life cycle)	127	204	8	212	744	1,152	929	1,729	1,394	2,881	1,394	2,881
Avoided/year (Modal shift from car and PT)	118	426	15	440	695	1,160	869	1,739	1,303	3,036	1,303	3,036
Carbon footprint (CO^2 tons avoided)	-8	222	6	228	-48	7	-60	11	-91	155	-91	155
External impact (€ excl. VAT)												
Benefits from car kilometres avoided/replaced	€0.25 M	€2.03 M	€0.00 M	€2.03 M	€0.98 M	€2.17 M	€1.22 M	€3.25 M	€1.83 M	€6.50 M	€1.83 M	€6.50 M
Benefits from PT kilometres avoided/replaced	€0.21 M	€3.56 M	€0.25 M	€3.81 M	€6.39 M	€9.91 M	€7.99 M	€14.87 M	€11.99 M	€24.78 M	€11.99 M	€24.78 M
Benefits of external impacts	€0.46 M	€5.59 M	€0.25 M	€5.84 M	€7.37 M	€12.08 M	€9.21 M	€18.11 M	€13.82 M	€31.27 M	€13.82 M	€31.27 M
Societal balance (€ excl. VAT)												
External benefits - € users - € public		€2.94 M	-€0.24 M	€2.70 M	€7.37 M	€12.08 M	-€13.47 M	€3.02 M	-€10.63 M	€14.50 M	-€9.13 M	€16.00 M
Social benefits / cycle trip		€1.34	-€1.69	-€0.35	€1.68	€2.21	-€2.46	€0.37	-€1.29	€1.06	-€1.11	€1.17
Social benefits / km cycled		€0.43	-€0.85	-€0.41	€0.67	€0.71	-€0.98	€0.12	-€0.52	€0.34	-€0.44	€0.38
Social benefits / km of car avoided		€2.16		€2.16	€9.62	€7.12	-€14.05	€1.19	-€7.39	€2.85	-€6.35	€3.14

10.8 French study data on bike share and long-term rental

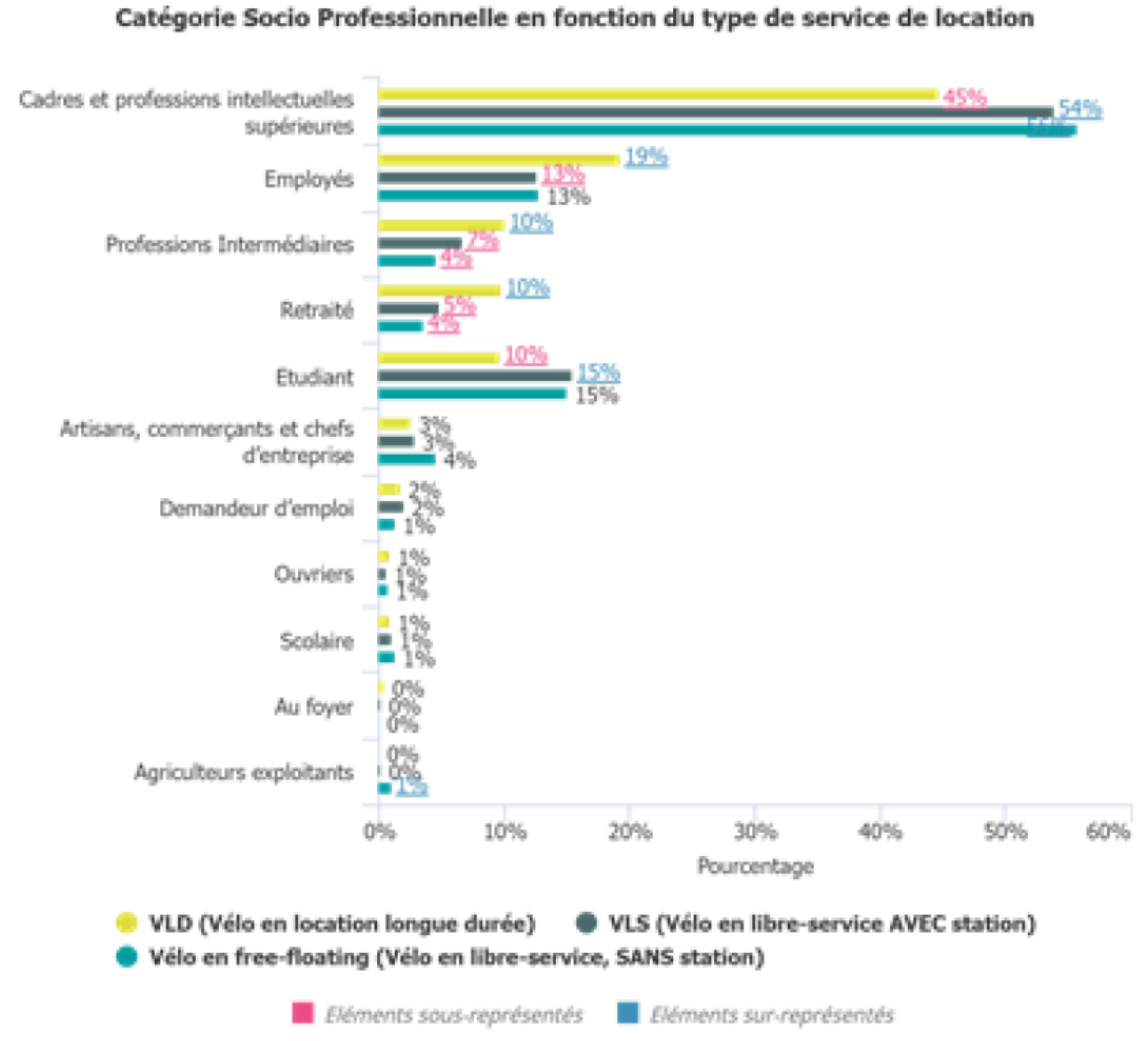
10.8.1 The respondents

Gender of respondents by type of service



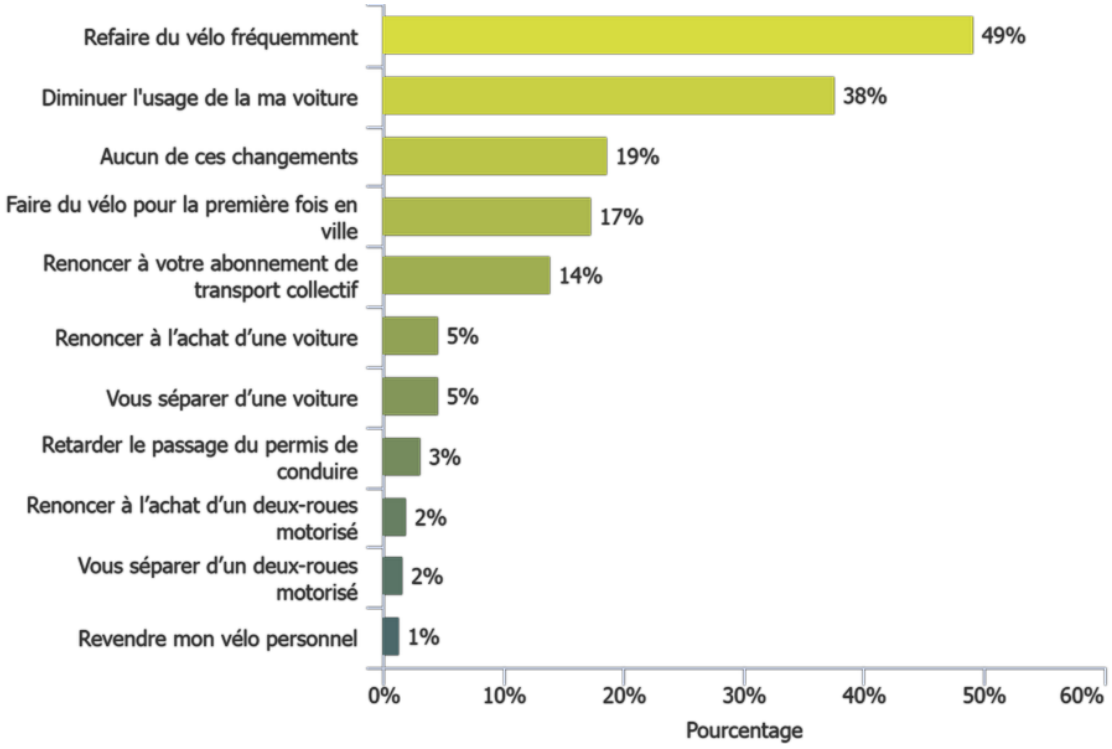
La relation est très significative. p-value = < 0,01 ; Khi2 = 148,8 ; ddl = 4.

Socio-professional category by type of rental service

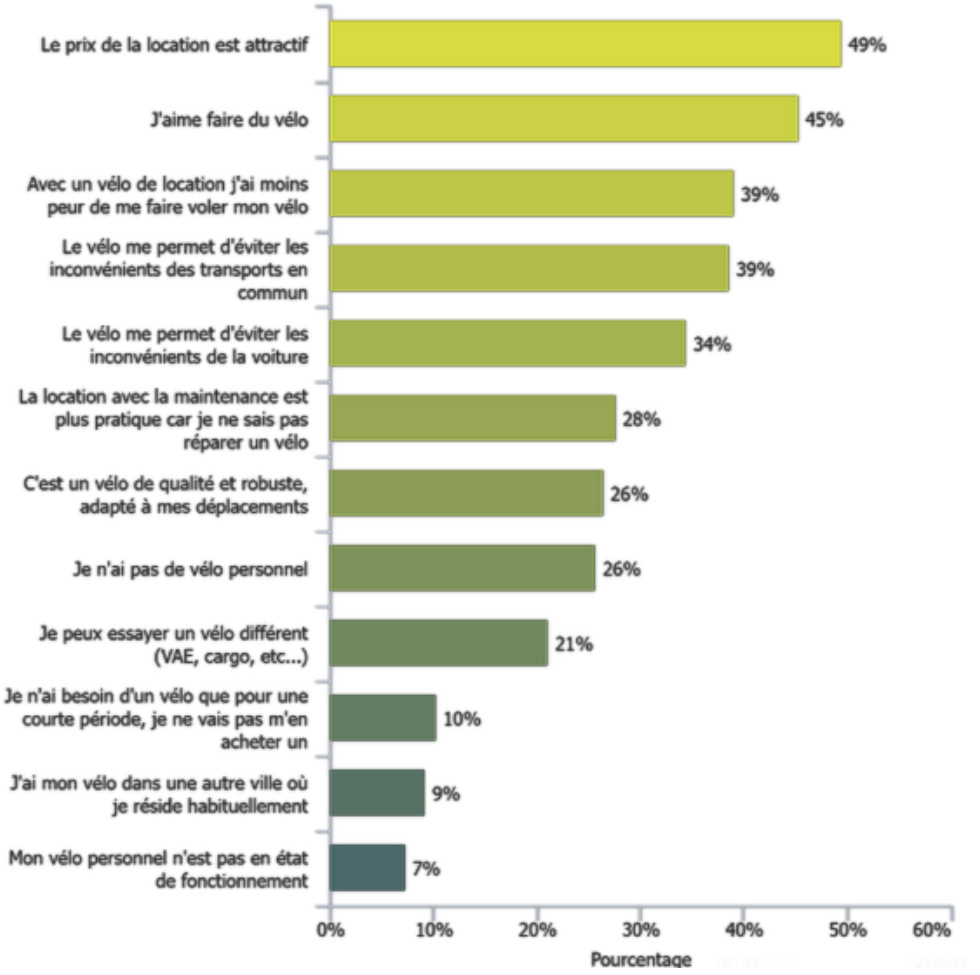


La relation est très significative. p-value = < 0,01 ; Khi2 = 152,7 ; ddl = 20.

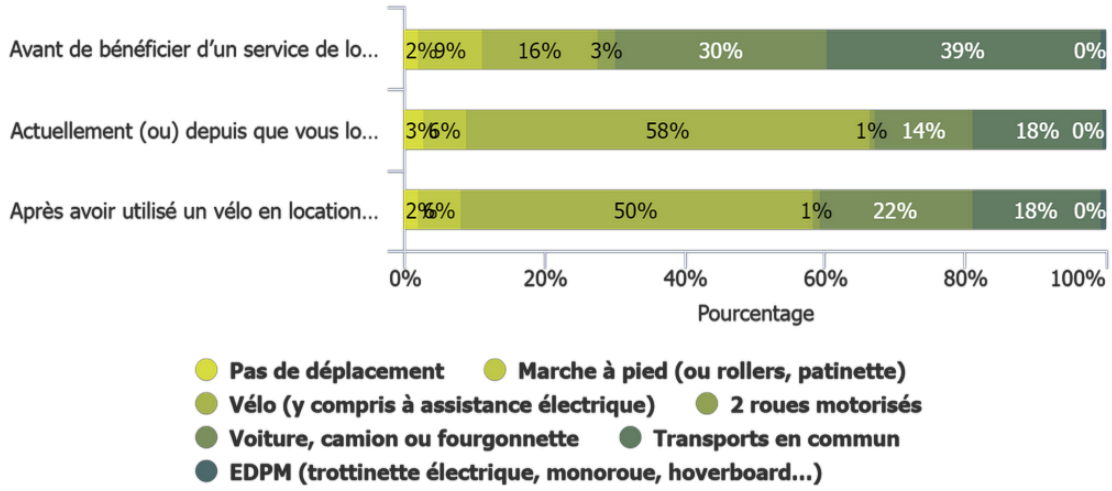
10.8.2 Would you say that renting has led you to …



10.8.3 Why do you prefer to rent a public bicycle?

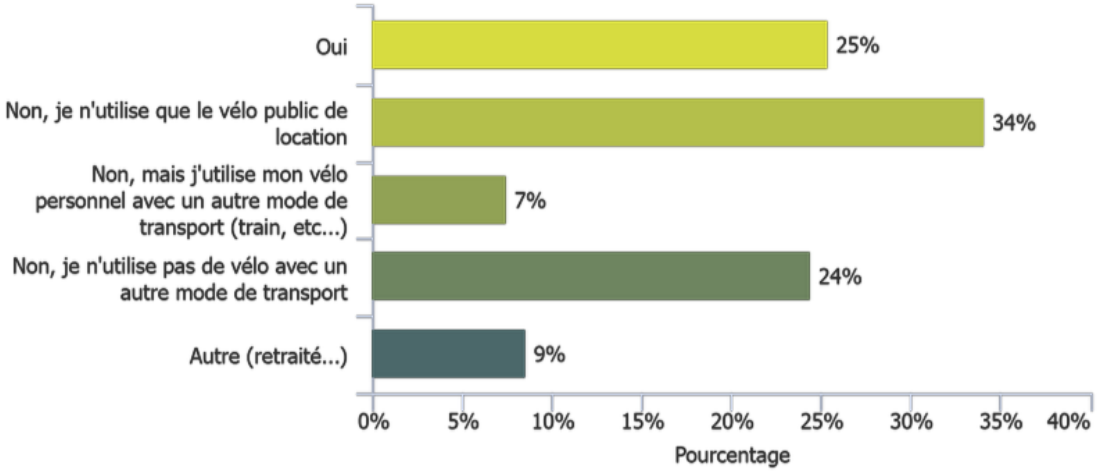


10.8.4 Modal share trends before, during and after public bike rental

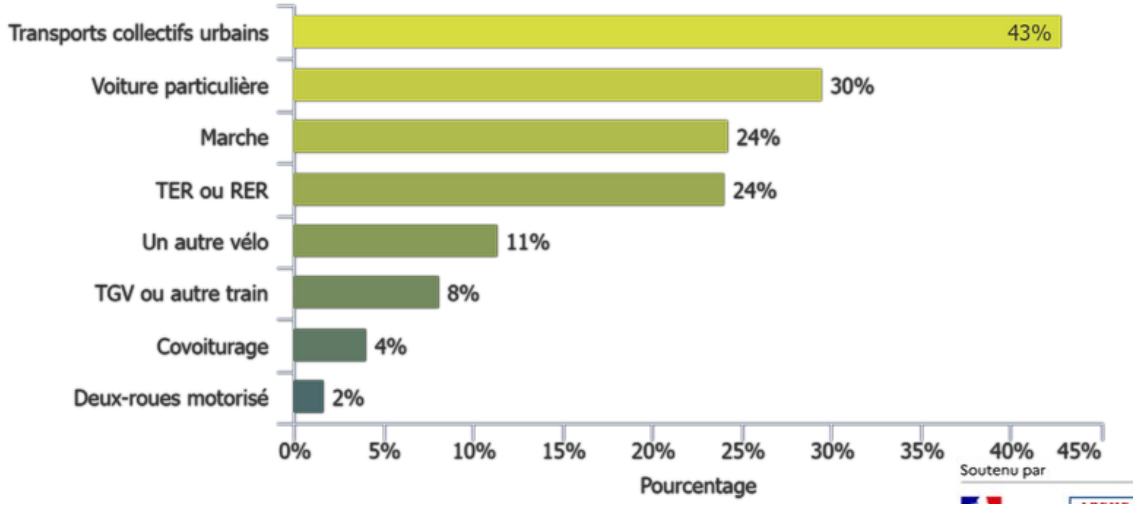


10.8.5 Intermodality

For your commute to work, do you combine your rental bike with other modes of transport?



If so, with which other means of transport?



10.9 Social LTR - Focus on two inspiring Belgian experiences

10.9.1 Vélo Solidaire in Brussels

Vélo Solidaire is a project initiated by Brussels Mobility and implemented by three associations: Pro Velo, Cyclo and Les ateliers de la rue Voot. The following data is based on exchanges with Cyclo in November 2023.

Vélo Solidaire targets people with no initial cycling skills or who are not comfortable getting around in traffic. The service, which is based on close collaboration with local associations, consists of:

- **training to learn to ride a bike**. Training generally lasts 30 hours, but varies according to the learner's basic level. The cost of 30 hours' training is estimated at €400/person, paid for by the public authorities. Conventional bikes are rarely the right size for the target audience, with a need for smaller bikes.
- **provision of a test bike for 12 months at the end of the training course**. The bike on offer is a second-hand bike reconditioned in the Cyclo et Ateliers de la rue Voot workshops by people enrolled on a professional integration pathway. The cost of a bicycle to the public authorities is estimated at €1,500, including:
    - €650 for the "organisation of the professional integration pathway" of the people working on the bike, including their supervision
    - €450 for the "bike" part, which includes new parts for the bike, logistical coordination for the provision of bikes, and overheads.
- **Subsidised purchase option price of €25 for the beneficiary**. 60-70% of people who complete the training course buy the bike at the end of the process. In this way, 300 bikes are purchased by people who have completed the training course.

The total cost to the public authorities of the whole project is around €1,500 per person who buys a bike. Above and beyond this figure, the pleasure and autonomy gained by beneficiaries are priceless.

Figure 115: Vélo Solidaire (Photo: Cyclo)

10.9.2 Fietsschool in Leuven

Fietsschool was launched in 2011 in Leuven and has since expanded its activities in Flanders. It is a bicycle training, testing and purchasing service provided by Mobiel21. This data is based on exchanges with Mobiel21 in November 2023.

Participants:

- learn to ride a bike in 30 sessions in groups of 20, for €20 only.
- test a bike for three months.
- benefit from a €75 bike purchase option.

Every year, around 200 people benefit from this service and 125 people buy a bike. There is always a waiting list. 90 to 95% of beneficiaries are women. Only 20% of participants have at most a secondary school diploma.

The vast majority of participants do not have a car at their disposal. While this service does not reduce car use, it does profoundly change the lives of the beneficiaries who have learned to ride a bike, as the following testimonials illustrate:

- "I feel better, my health is better."
- "My life has changed."
- "I've gained confidence in myself and I know I'm still capable of learning something."
- "I no longer need to complicate my life by taking the bus with a buggy and my child."
- "I've found a new freedom."
- "I save time on my travels, as I can now clean in four places instead of two" *(source 69).*

The total cost to the public authorities, per person trained and who then bought a bike, is €525 (€325 for training and bike test divided by the proportion of people who then buy the bike, 62%). The service is therefore very similar to the *Vélo Solidaire* in Brussels, with lower costs.

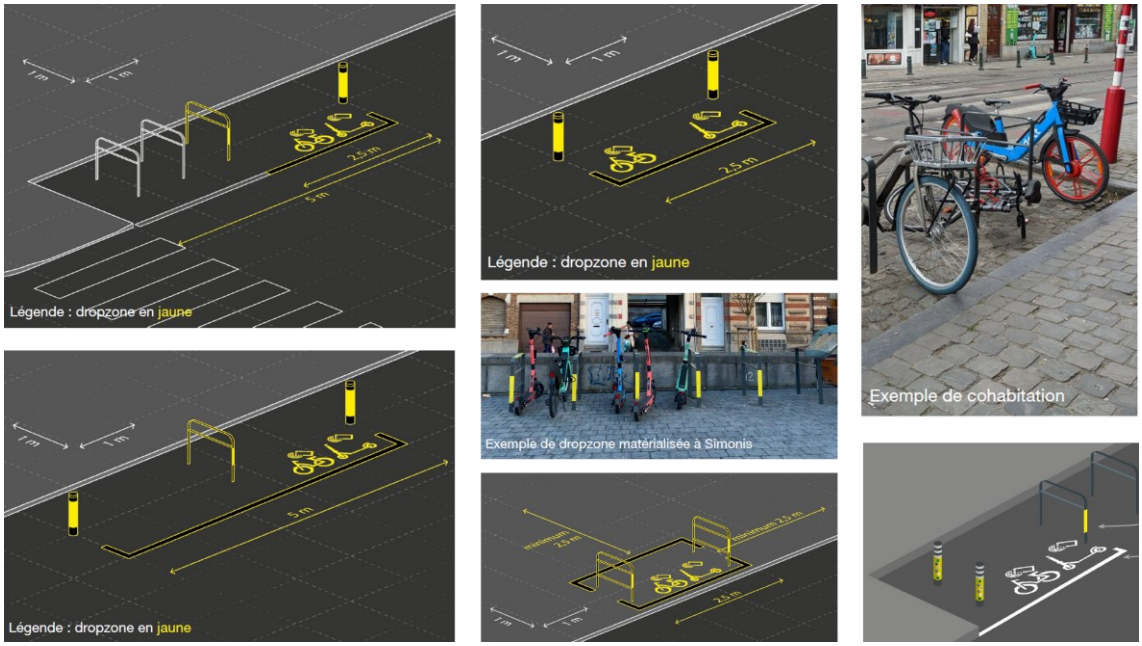
Figure 116: Fietsschool Leuven (photo Mobiel 21)

10.10 Abandoned scenario: each bicycle rack is a virtual station

"Each bicycle rack is a virtual station. As with private bicycles, any shared bikes should be attached to bicycle racks"; this scenario was created by:

- observing the mix and confusion of parking uses between private bikes, PB in stations, private SB and shared e-scooters.
- realising that private SB in Brussels are accepted in existing bike racks on a temporary basis until dropzones are fully deployed (*Source 46*).
- hoping to bring order to public space by forcibly attaching SB and shared e-scooters to bicycle racks.
- considering the common battery model for SB and e-soocters.
- believing that battery swapping was cheaper than stations, even on long-term.
- investing huge public money once in parking racks (infrastructure useful to all cyclists and depreciable by the public authorities over several decades) rather than investing in PB stations (dedicated, proprietary parking supply, depreciable over ten years, to change).
- making dropzones accessible to all cyclists without dedicating them to private SB operators, who enjoy a competitive advantage over PB thanks to a finer territory coverage.
- considering public infrastructure such as removable battery charging hubs, accessible only to operators. These would be shelters in public spaces with charging cabinets, reducing journey times and hence swapping costs.

Figure 117: Extracts from the Brussels' dropzone guide (Source 55)



The idea was to install the 8,800 bike racks already provided for in the parking plan and add 20,000 new bike racks in place of the current dropzones and *Villo !* station locations. At €150 per stainless steel rack, including installation, this represents a one-shot investment of €3 million. On-street parking would then increase from 41,000 bicycle spaces at the end of 2022 to 100,000 at the end of 2026 *(Figure 118 and Figure 119)*. This would narrow the gap with the 265,000 on-street car parking spaces (1,325 million linear km) and the 295,000 car parking spaces in buildings and homes recorded in 2014 *(Source 50)*.

Figure 118: Repair of available land for on-street bicycle parking in Brussels

Figure 119: Estimated potential for bicycle racks and parking places

	Parking category			
	Dropzones	**Villo ! Stations**	**Bicycles racks battery**	**Total**
Parking areas	3,000	345	7,300	**10,645**
Bicycle spaces			40,800	
Easement	3,75 *	1 mètre par bornette,	2 places par arceau	
Bicycle spaces per easement		2 places vélo par mètre		
Bicycle racks projects			8,800	
Additional bicycle spaces			17,600	
Cumulative length	11,250	8,500	29,200	**48,950**
Potential bike places end 2026	22,500	17,000	58,400	**97,900**

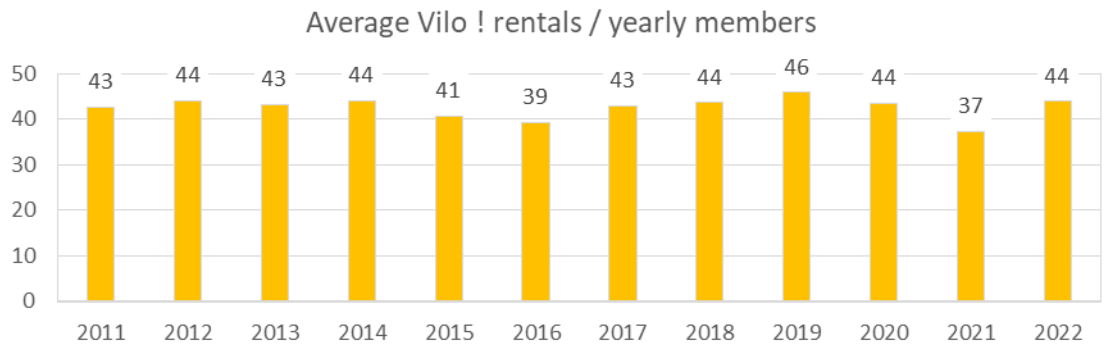
** Average. Dropzones measure 2.5 to 5 m | assumption of a similar number*

In the end, however, this prospect was not adopted for the following reasons:

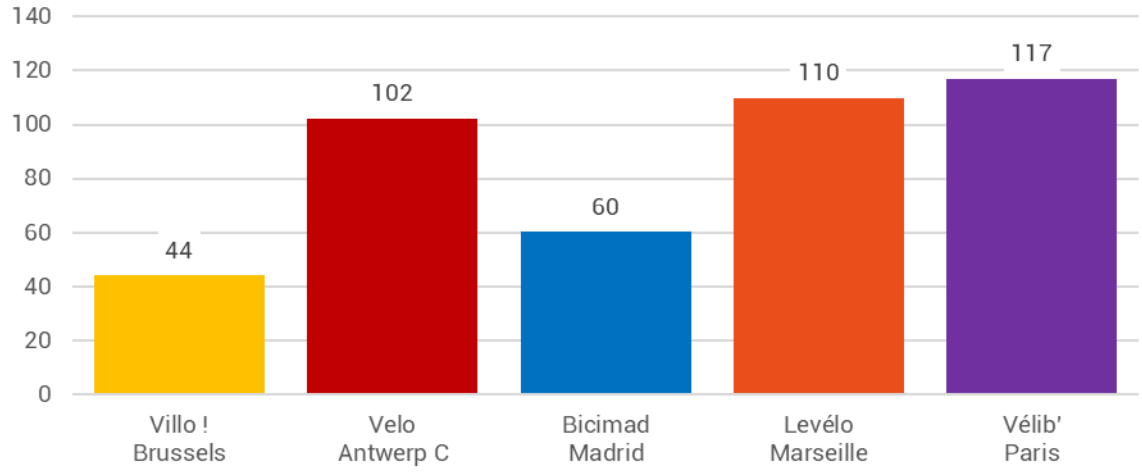
- no robust mechanism to check that the padlock is wrapped around an urban furniture.
- a variety of racks and rack heights in Brussels.
- a lack of suitable parking racks on the market to stabilise both bicycles (parallel parking) and e-scooters (front parking).
- no battery standard or a e-scooter standard that unnecessarily burdens the bicycles.
- administrative and governance complexity in Brussels for the installation of bike racks.
- space between two racks.
    - If it is too small, it makes it difficult to insert or remove a vehicle, especially with the increasing size of PB, private cargo bikes, bikes with baskets, child seats or panniers. Collisions between vehicles can damage them, leading to legal complications for the operator and dissatisfaction among users.
    - If it is too wide, users run the risk of placing the shared bike or e-scooter between two racks, de facto blocking an available space and resulting in user dissatisfaction.
- operational complexity for the operator, where the multiplication of bicycle drop-off/collection points increases costs and accelerates deterioration.
- The history of the Brussels PB calls for calming decision rather than bike share revolution risk.

10.11 Ratios of rentals per PB subscriber

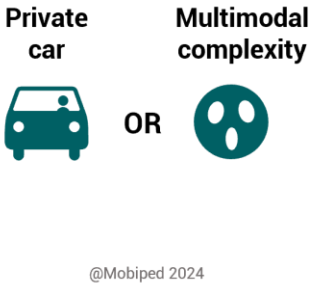
10.11.1.1 Brussels ratio of annual rentals per subscriber (~43)



10.11.1.2 Ratio of rentals per subscriber in the benchmark (~80)

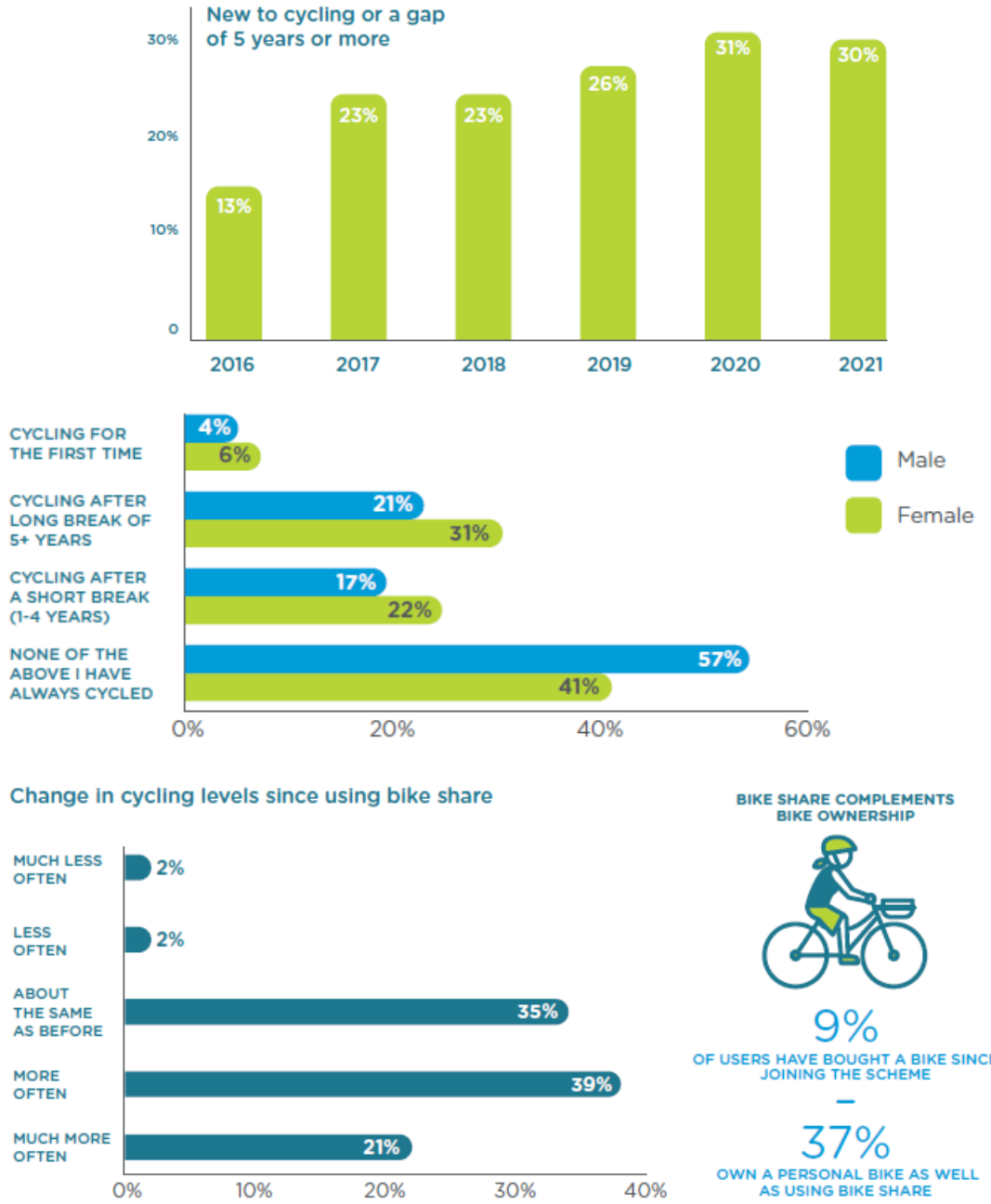


10.12 Private car versus 35 mobility offers



Mass transit	4	Urban: STIB | Inter-regional: De Lijn, TEC, waterbus | Train: SNCB, Thalys, Eurostar | Coach: FlixBus, Ouibus
Car parking	3	MyFlexiPark, BePark, Commuty
One-way shared bikes	6	Villo !, Dott, Tier, Pony, Bolt, Voi
Bike rentals	4	Blue bikes, Swapfiets, Pro Velo, Cambio, Monkey, etc.
Carsharing	8	Cambio, Getaround, Poppy, Cozywheels, Wibee, Dégage, Green Mobility, MILES Mobility
Scooters	7	Dott, Lime, Poppy, Pony, Voi, Bolt, Tier
Mopeds	1	Felyx
Carpooling	4	Blablacar, Commuty, Kowo, Carpool
Taxi	6	Collecto, Taxis verts, Taxis bleus, Taxi.eu, Victor Cab, Handycab

10.13 Impact of bike sharing on cycling in the UK



Source 12

10.14 Monthly rental prices for pedal, pedelecs and cargo bikes in LTR in 2023

		Solidarity	Student	Normal	Website
Pedal bikes	FietsAmbassade (Ghent)		€7/month		https://fietsambassade.gent.be/en
	Vélocité (Liège)			3 months: €30 (€10/month) 6 months: €50 (€8/month) 12 months: €80 (€6.70/month)	https://www.liege.be/fr/vivre-a-liege/mobilite/velocite
	Swapfiets (Brussels)			€22/month	https://swapfiets.be/
	Pro Velo (Brussels)			€172/month	https://www.Pro Velo.org/en/services/bicycle-hire-in-brussels/
	M Vélo+ (Grenoble)	€7/month	€4.90/month	€27/month	https://www.veloplus-m.fr/
Pedelecs	Véligo Location (Paris)	€20/month	€20/month	€40/month	https://www.veligo-location.fr/what-is-veligo-location/
	M Vélo+ (Grenoble)	€14/month		€54/month	
	Vélocité (Liège)			3 months: €180 (€60/month) 6 months: €300 (€50/month) 12 months: €480 (€40/month)	
	Swapfiets (Brussels)			€65/month	
	FietsAmbassade (Ghent)			€140/month	
	Pro Velo (Brussels)			€336/month	
Cargo bikes	Véligo Location (Paris)	€40/month		€80/month	
	M Vélo+ (Grenoble)	€14/month		€54/month	
	FietsAmbassade (Ghent)			€275/month	
	Pro Velo (Brussels)			€423/month	

10.15 Legal context of bike sharing in Brussels

The following details are provided for information purposes only. While they are partly the result of the interpretation and popularisation of exchanges with the legal departments of Brussels Mobility and STIB, any decision must be subject to legal analysis in accordance with the rules.

10.15.1 Some key documents

Jurisdiction	Text
Brussels-Capital Region | Convention *Villo !*	• 5 December 2008: concession to operate an automated bicycle rental system in the Brussels-Capital Region. • 9 June 2011: amendment n°1 (content and duration of phase 2). • 24 April 2014: amendment n°2 (control over the waiver of fees related to the occupation of the regional public domain). • 19 July 2018: amendment n°3 (introduction of *e-Villo !* with portable battery) • 16 September 2026: end of concession.
Brussels-Capital Region	• 25 October 2010: Ordinance governing the operation of a public service of automated bicycle rental. • 29 November 2018 (amended on 22 March 2022): Ordinance on the use of shared transport modes as an alternative to the car. • 13 July 2023: Decree of the government of the Brussels-Capital Region implementing the ordinance of 29 November 2018 on the use of shared transport modes as an alternative to the car.
European Commission	• Decision 2012/21/EU of the European Commission of 20 December 2011 concerning the application of article 106, paragraph 2, of the Treaty on the Functioning of the European Union Treaty to State aid in the form of public service compensation granted to certain undertakings entrusted with the operation of services of general economic interest (OJ L 7 of 11.1.2012, p. 3). • Decision of 24.6.2019 on the State aid implemented by Belgium for JC Decaux Belgium Publicité.
European directives	• Directive 2010/40/EU on Intelligent Transport Systems (ITS). • Directive 2014/23/EU on the award of concession contracts.
European Regulation	Regulation (EC) No 1370/2007 of the European Parliament and of the Council of 23 October 2007 on public passenger transport services by rail and by road.
Altmark case law	Judgment of the Court of Justice of 26 October 2016, Orange v. Commission, C-211/15 P, ECLI:EU:C:2016:798, paragraph 44.

10.15.2 PB would not be a public passenger transport service

A bike sharing rental scheme does not appear to qualify as "public passenger transport" within the scope of Regulation (EC) 1370/2007. This then calls into question the formula of the 2010 ordinance.

10.15.3 Are public bicycles an SGEI?

In 2019, the European Commission appeared to confirm the existence of an SGEI and State aid for the *Villo !* contract (*Figure 120, Source 10*).

Figure 120: Service of General Economic Interest

Service of general economic interest (SGEI): SGEI are economic activities which deliver outcomes in the overall public good that would not be supplied (or would be supplied under different conditions in terms of quality, safety, affordability, equal treatment or universal access) by the market without public intervention. The PSO is imposed on the provider by way of an entrustment and on the basis of a general interest criterion which ensures that the service is provided under conditions allowing it to fulfil its mission.

But in 2019, operators of private B2C shared bikes initiatives either did not exist or were still in their infancy. Does their development call into question the notion of SGEI? Whether an activity qualifies as an SGEI depends in particular on the existence of a market failure. If an operator only considers its commercial interest, it will not offer a level of service that meets a real need for a

specific public service. This failure would then be an objective reason for considering that public intervention is required to guarantee the provision of this service, with the constraint that it must be provided universally. In view of the elements studied *(see section 4.4.3)*, the SGEI still seems relevant.

10.15.4 Some implications to consider for an SGEI

- Since 2012, the mandate of an SGEI company cannot exceed ten years.
- For an SGEI, the financial compensation (= a financial contribution) of users is required.
- Additional aid is possible above the €15 M/year ceiling, subject to prior notification to the European Commission. The aid must meet stricter criteria, in line with the 2011 SGEI guidelines (existence of a mandate, prior determination of the parameters for calculating compensation, control of any overcompensation and the principle of repayment). The European Commission may impose additional conditions in terms of incentives to improve SGEI efficiency and compliance with public procurement rules where applicable.
- All direct or indirect contractual documents between the BCR and the operator must include the following information:
    - the nature and duration of the public service obligations.
    - the company and the territory concerned.
    - the nature of any exclusive or special rights granted to the company by the aid granting authority.
    - a description of the compensation mechanism and the parameters for calculating, monitoring and revising the compensation.
    - how to recover any overcompensation and how to avoid it.
    - a reference to this decision.

10.15.5 Awarding of an SGEI without competition

The awarding of an economic mission without competitive tendering in accordance with Altmark case law can be qualified as State aid unless the four conditions are met:

- the beneficiary company must have clearly defined its public service obligations.
- the method used to calculate compensation is objective, transparent and pre-established.
- the compensation does not exceed the amount required to cover all or part of the costs incurred in discharging the public service obligations, taking into account the related revenues and a reasonable profit. There can be no overcompensation.
- where the company which is to perform the public service obligations is not chosen following a public procurement procedure, the level of compensation is determined based on an analysis of the costs which a typical company, well run and adequately provided with means of meeting the necessary public service requirements, would have incurred in performing those obligations, taking into account the relevant revenues and a reasonable profit for performing the obligations. This last option could a priori be accepted by the Commission only in exceptional cases. On this last point, costs can be requested from candidates as part of the competitive dialogue.

In addition, discussions are currently underway on regulatory changes to exclude bicycles from State aid.

10.16 Household composition and number of adults in 2022

	Households in 2022	Adults
One-person household	263,886	263,886
Married couples without children	50,787	101,574
Married couples with children	103,298	206,596
Unmarried couples without children	30,557	61,114
Unmarried couples with children	28,507	57,014
Single-parent families	65,482	65,482
Other household types	21,365	21,365
NUMBER OF HOUSEHOLDS	563,882	777,031
ADULTS PER HOUSEHOLD		1.38

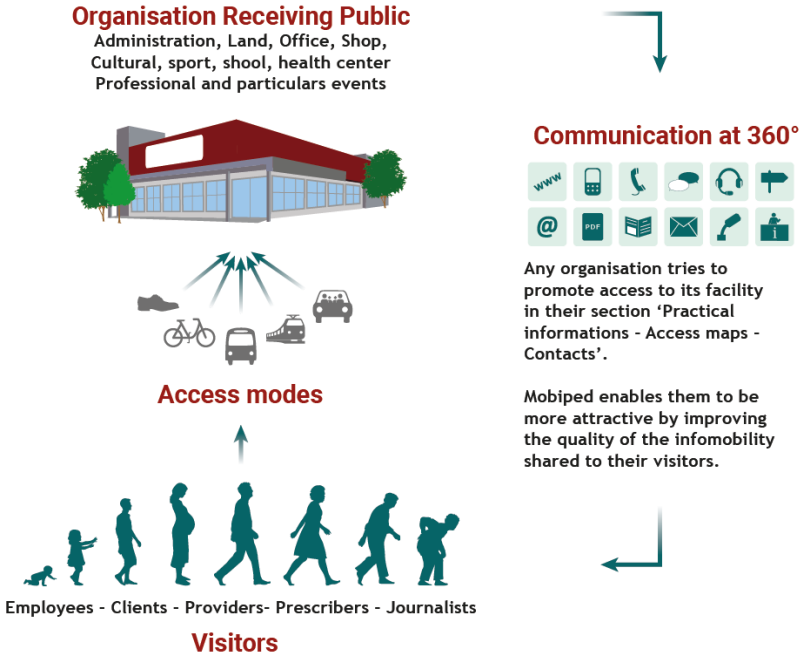
Number of private households on 1 January by household type by region | *Data*: Federal Planning Bureau; FPS Economy - Statbel (source 56).

10.17 Digital skills of Brussels residents

		Belgium (Household income)				
	Brussels	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile
Advanced	36%	12%	16%	23%	35%	47%
De base	26%	20%	27%	29%	31%	31%
Low	15%	18%	19%	22%	19%	14%
Very low	7%	17%	17%	12%	8%	4%
Limited	5%	9%	8%	5%	3%	1%
None	4%	6%	3%	4%	2%	1%
Not user of Internet	6%	18%	10%	6%	3%	1%

Source 16

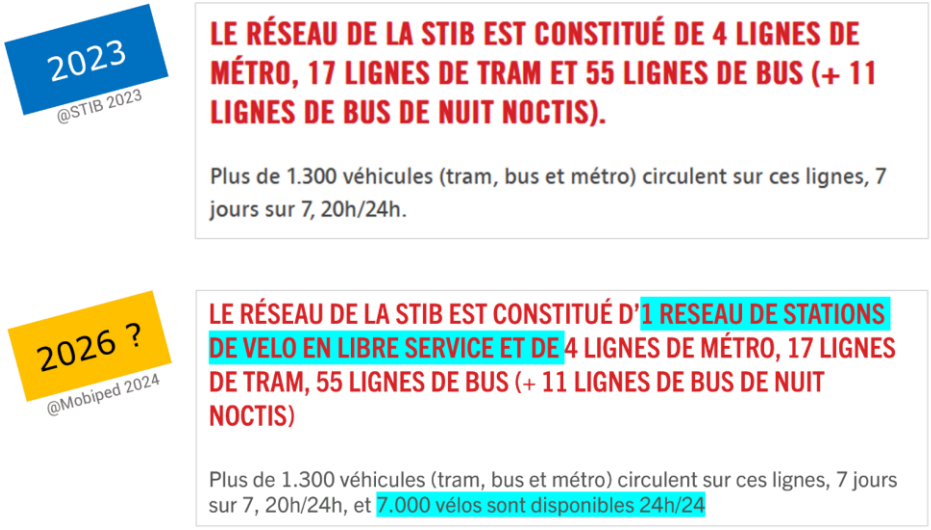
10.18 Multimodal information disseminated by mobility generators receiving various audiences (visitors, employees, suppliers)



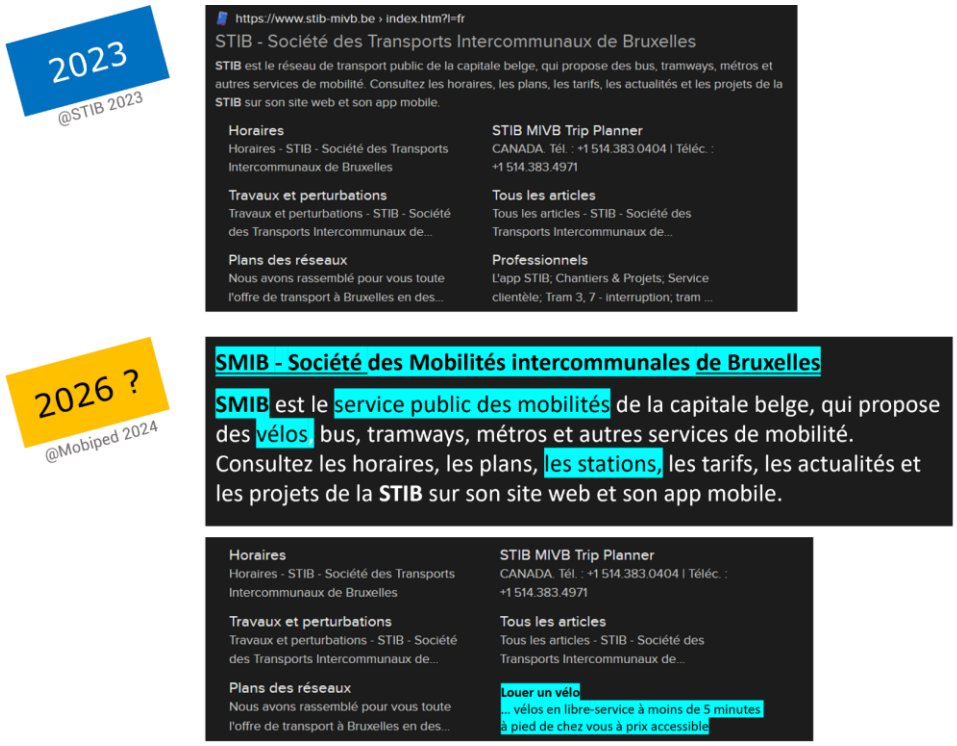
Source 77

10.19 Forward-looking approach to integrating PB into STIB communication media

10.19.1 Network presentation integration PB features



10.19.2 Google search results from PT operator to mobility operator



10.19.3 Change of name from STIB to SMIB with a mobility focus rather than transport

2023

@STIB 2023

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2026 ?

@Mobiped 2024

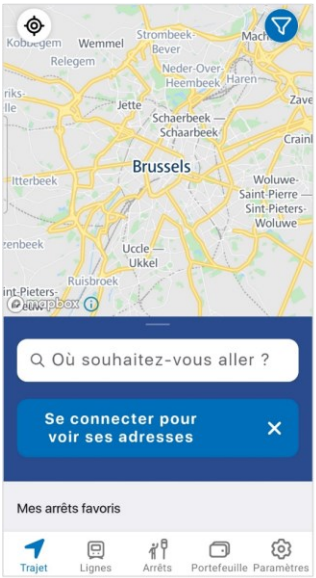
SUIVEZ LE GUIDE

La SMIB (Société des Mobilités Intercommunales de Bruxelles) est le principal opérateur des services publics de mobilité Bruxelles. Notre réseau, composé de lignes de métro, de tram et de bus et de stations de vélo en libre-service, vous permet de vous déplacer aux 4 coins de la ville tous les jours.

10.19.4 Home of the STIB app with direct access to PB station

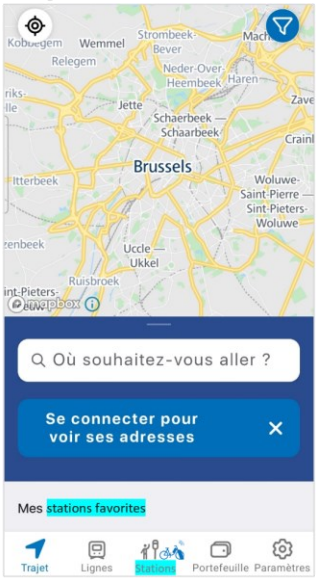
2023

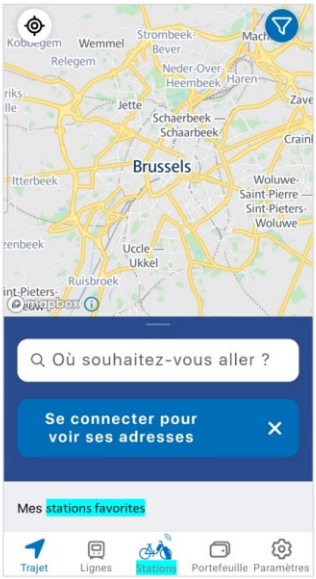
@STIB 2023



2026 ?

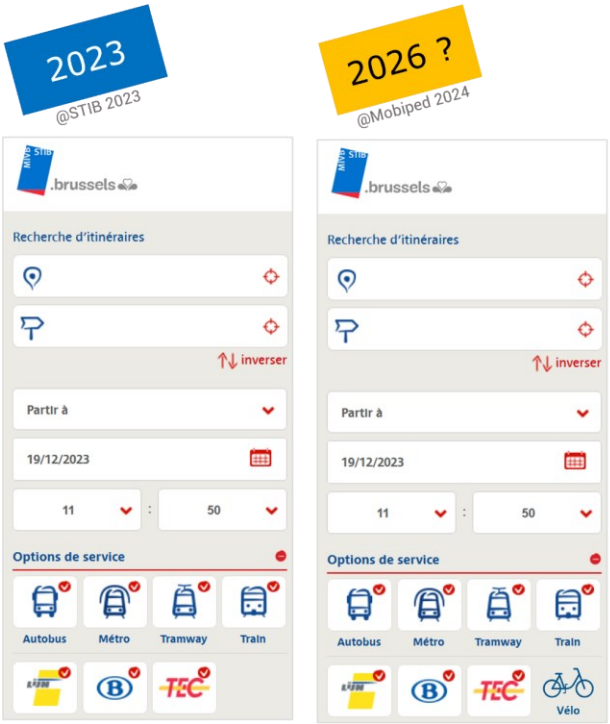
@Mobiped 2024



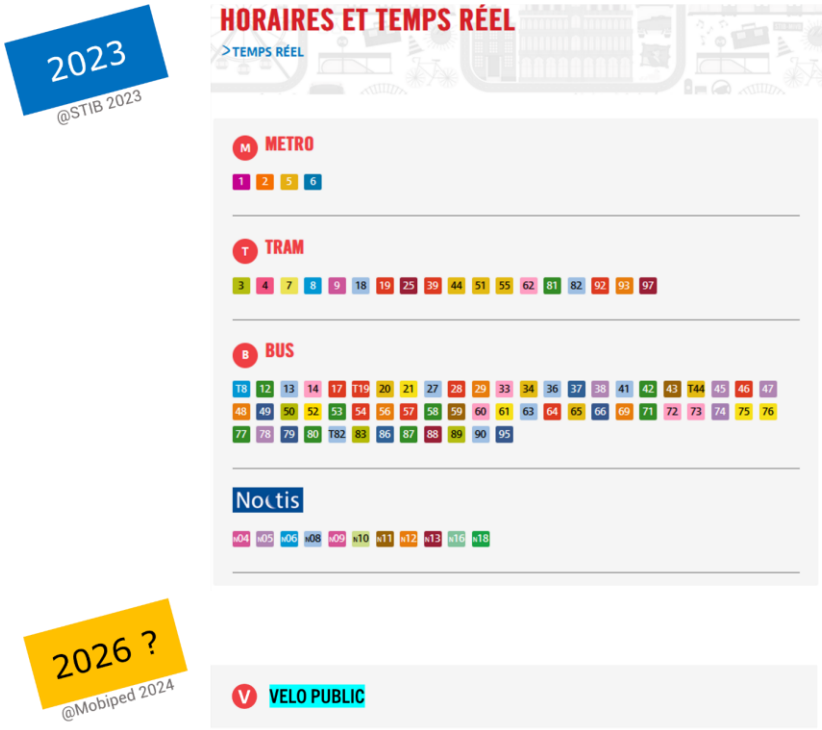


10.19.5 Home of Floya, the Brussels MaaS app, with a priority to public service on shared e-scooters and including the notion of public bicycle service

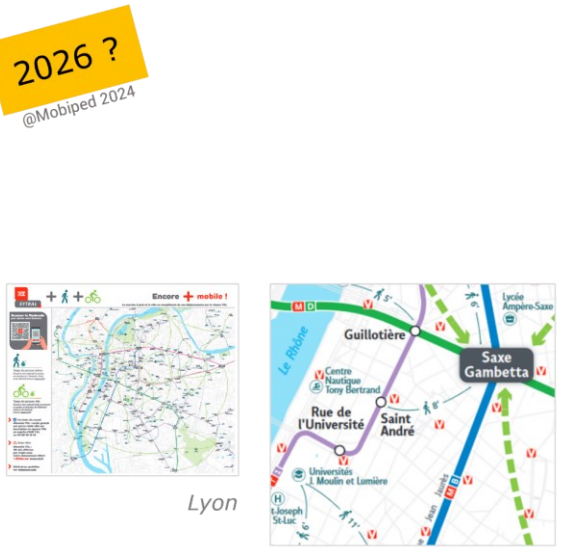
10.19.6 STIB route search engine with bike as a research criteria



10.19.7 Real-time information, including bike availability at each station



10.19.8 Network map with PB stations



Lyon

10.20 Extract of the Innov@talier design sprint

10.21 Some information on the Brussels context

CLIMATE

Temperature and rainfall (Source 76)

Mois	jan.	fév.	mars	avril	mai	juin	jui.	août	sep.	oct.	nov.	déc.	année
Température minimale moyenne (°C)	0,8	0,6	3	4,9	8,9	11,6	13,7	13,4	10,9	7,6	3,7	2	**6,8**
Température moyenne (°C)	3,2	3,6	6,5	9	13,3	15,8	18	18	14,8	11	6,5	4,3	**10,4**
Température maximale moyenne (°C)	5,6	6,5	9,9	13,1	17,7	20	22,3	22,4	18,7	14,4	9,1	6,5	**13,9**
Record de froid (°C)	−21,1	−18,3	−13,6	−5,7	−2,2	0,3	4,4	3,9	0	−6,8	−12,8	−17,7	**−21,1**
Record de chaleur (°C)	15,3	20	24,2	28,7	34,1	38,8	39,7	36,5	34,9	27,8	20,4	16,7	**39,7**
Précipitations (mm)	71,1	52,7	72,9	53,7	69,3	77,5	68,9	63,6	62,3	68,1	79,1	78,8	**817,8**

Source : Meteo Stats[24]

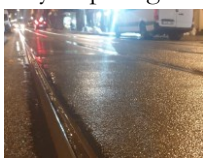
INFRASTRUCTURES

Road covering

Cobblestones => Sturdy frame, tyre grip in the rain, comfortable to use.
https://data.mobility.brussels/mobigis/fr/ > Bicycles > Roads

Tram tracks

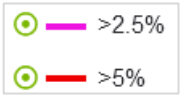
There are 150 km of tram track, with regular sharing of use with other modes. A bicycle pictogram is sometimes affixed in the middle of the two lanes.



TOPOGRAPHY

Slopes

The Brussels area has an impact on people's willingness to make an effort by bike and on battery life:
https://data.mobility.brussels/mobigis/fr/ > Bicycle > Slope.



HISTORY

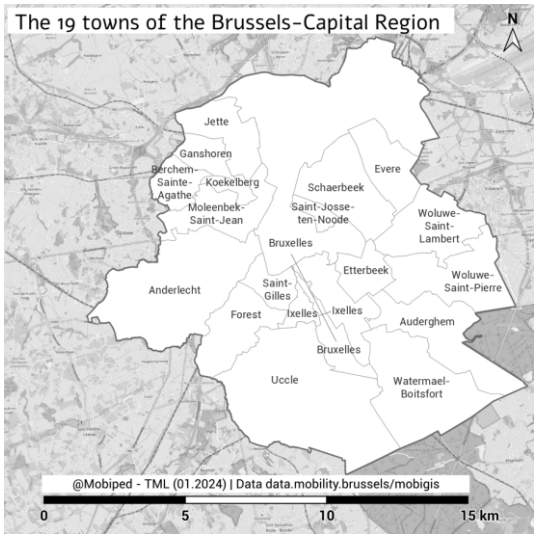
Protected heritage

Some buildings and sectors are classified as UNESCO sites, which may impose specific architectural constraints.

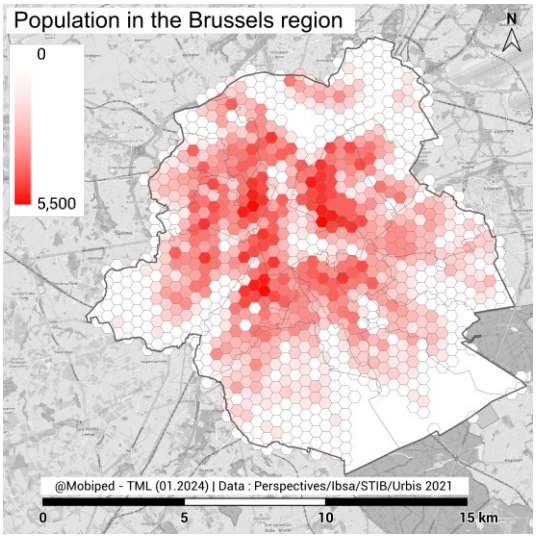
VANDALISM

Vandalism

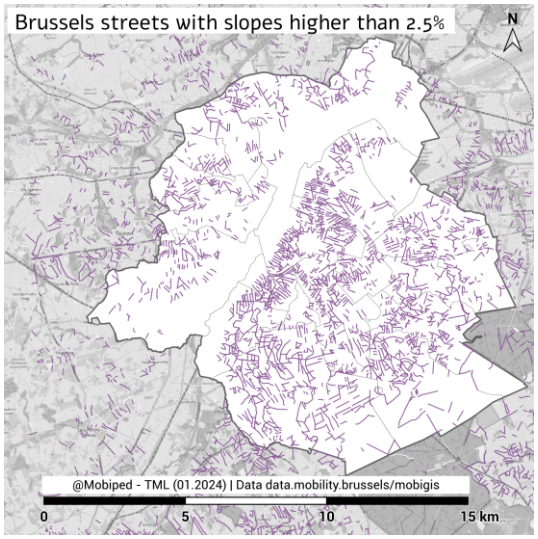
©Max de Radiguès *(Source 71)*.



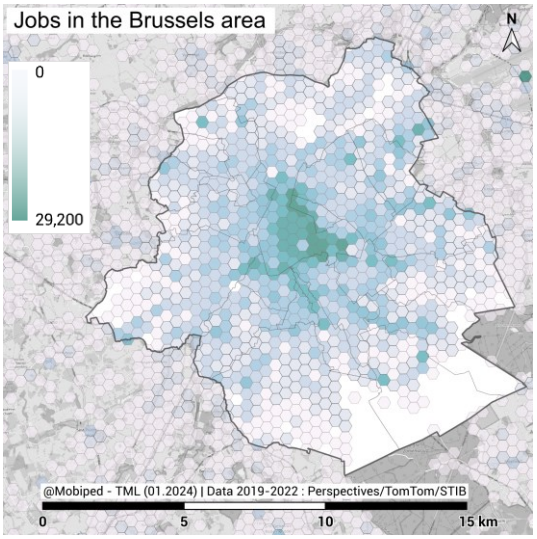
Administrative boundaries of the 19 towns



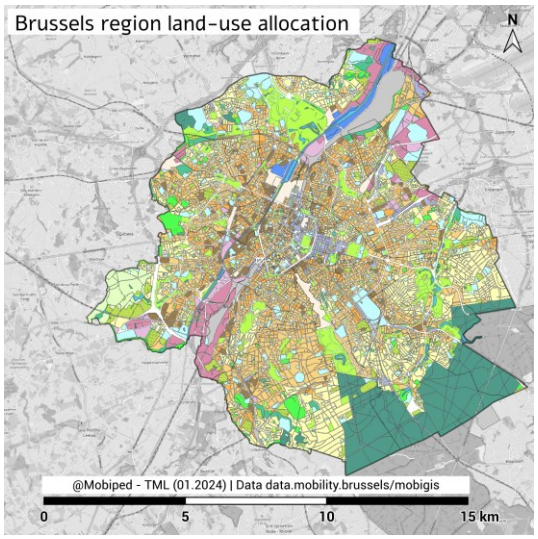
Population



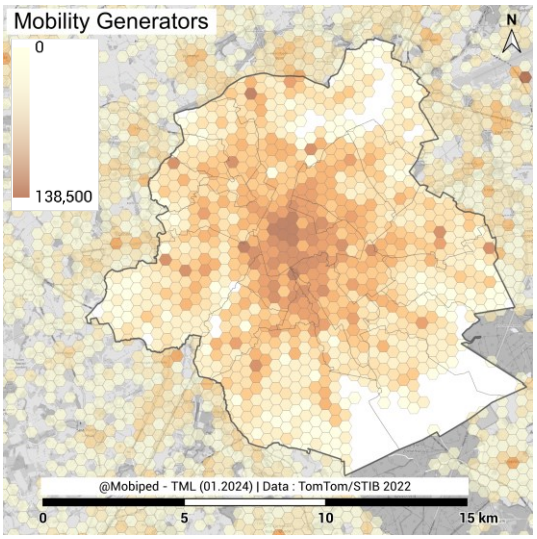
Streets with slopes greater than 2.5%



Jobs



Land use



Mobility generators

11 Table of illustrations

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Financing

NextGenerationEU is a temporary stimulus package of over 800 billion euros to help repair the immediate economic and social damage caused by the coronavirus pandemic. Post-Covid-19 Europe will be greener, more digital, more resilient and better adapted to current and future challenges.

The Recovery and Resilience Facility, the centrepiece of NextGenerationEU, is endowed with 723.8 billion euros in loans and grants to support the reforms and investments undertaken by EU countries. The aim is to mitigate the economic and social consequences of the Covid-19 pandemic and make European economies and societies more sustainable, more resilient and better prepared for the challenges and opportunities of the ecological and digital transitions.

The "Preparatory study for the public bicycles service of the Brussels-Capital Region in 2026: Benchmark and Recommendations" is part of these priorities established by the Brussels Government and at European level, and concerns in particular the Mobility axis and the Acceleration of MaaS deployment component. More specifically, it aims to plan the Brussels-Capital Region's future public bicycle service. In financial terms, the "Preparatory study for the public bicycles service of the Brussels-Capital Region in 2026: Benchmark and Recommendations" is supported to the tune of €197,816.75 incl. VAT.