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

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Commissioner

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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

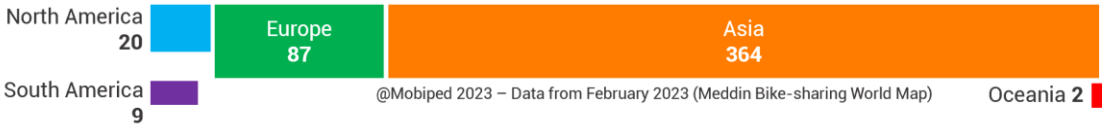
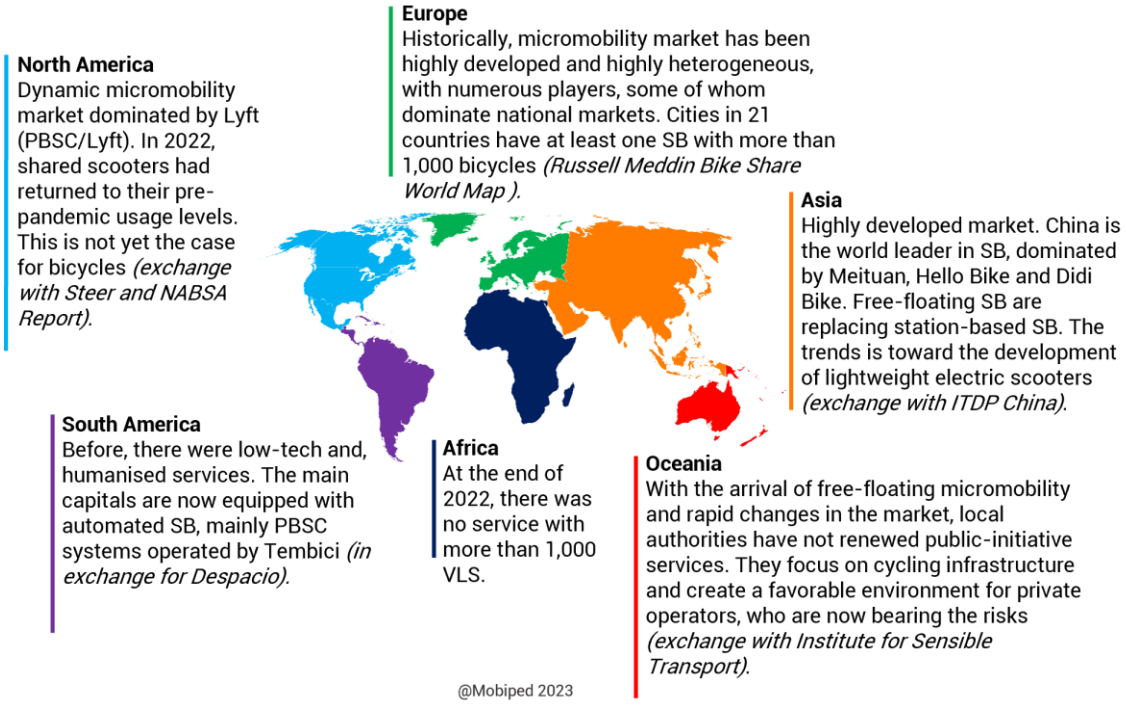


Figure 2: Overview of continental markets for cities with over 1,000 shared bicycles



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

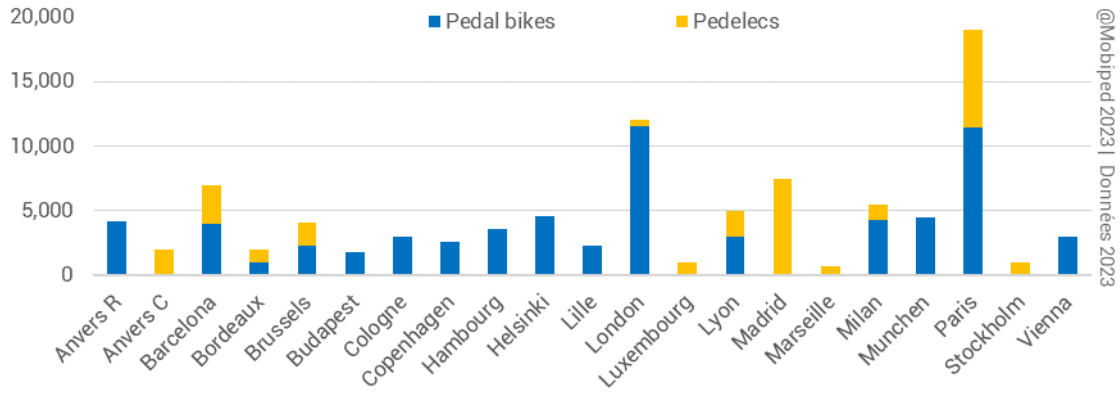


Figure 5: Annual rentals/available bikes/365 days

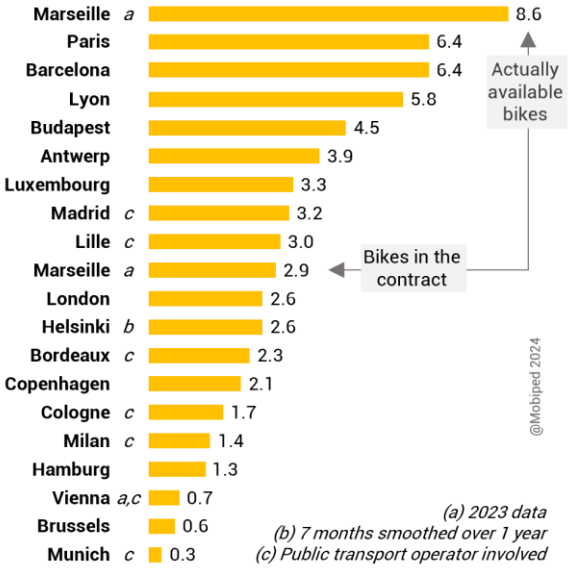


Figure 6: 2022 annual ranking of the cities with the most journeys by bike and per capita (Source 4)

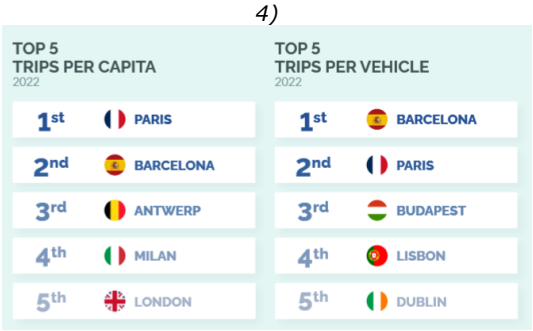
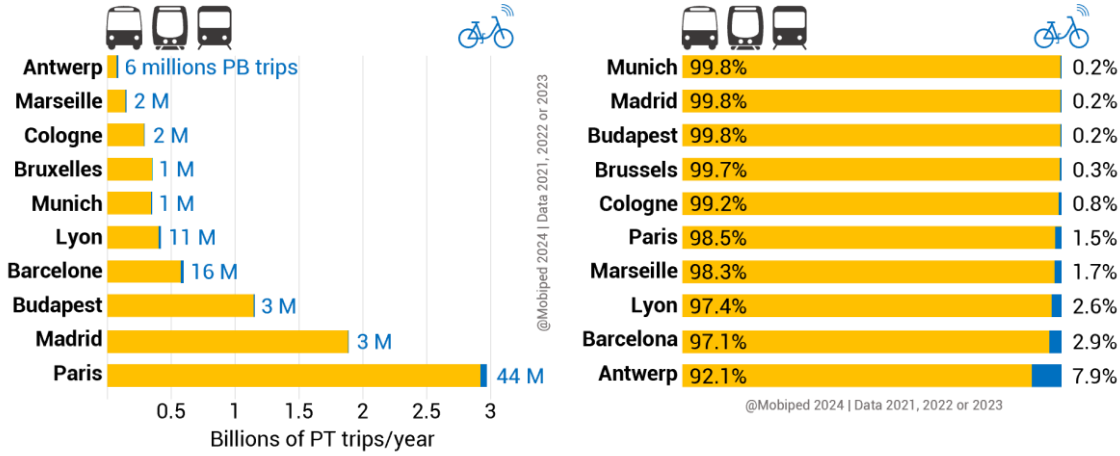


Figure 7: Trips comparison between Public Bicycles services and urban public transport networks



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*).

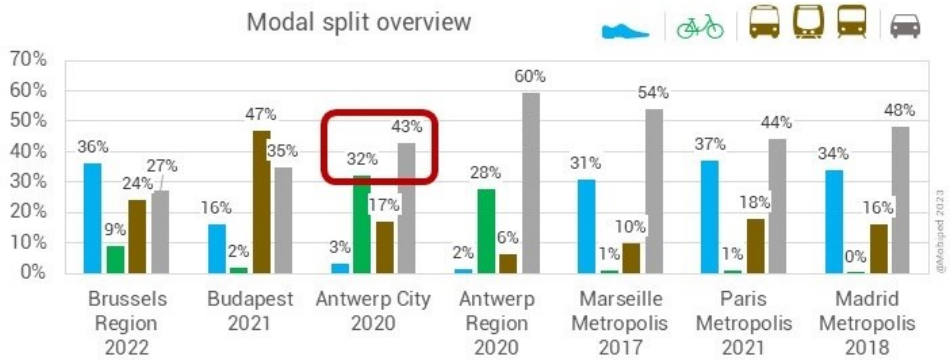
Topography: with the exception of Antwerp, the territories are undulating or hilly.

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.

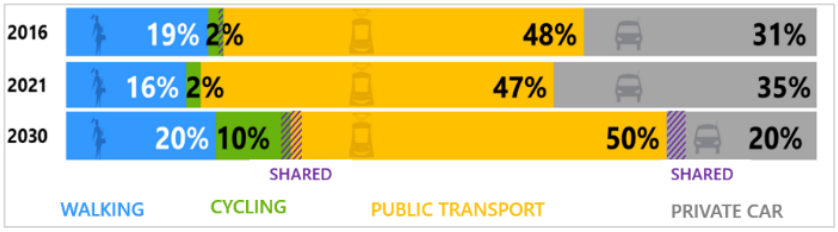
Figure 12: Modal shares of different modes in the 7 regions



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

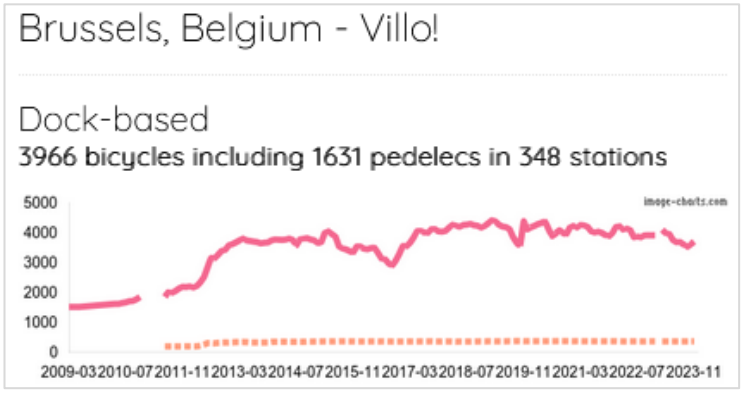
Offer performance ratio	Urban PB	Brussels	Antwerp R	Annexes
Bikes/Station (theoretical)	10 - 14	14	4	6.7.1
Parking slots/bike	2 – 2.7	2	not known	6.7.2
Parking slots/station	20 - 32	24	4	6.7.3
Contractual bikes nb/km² (System area)	24 - 59	38	2	6.7.4
Contractual bikes nb/km² (Administrative area)	4 - 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

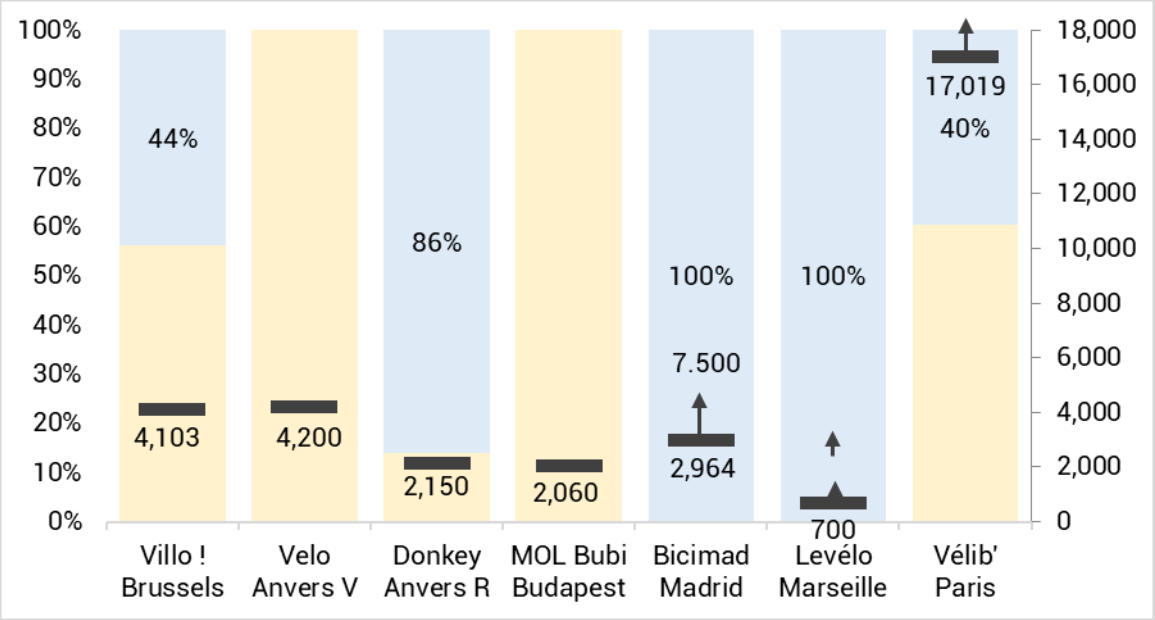
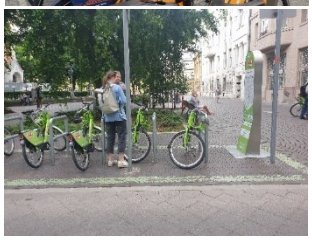
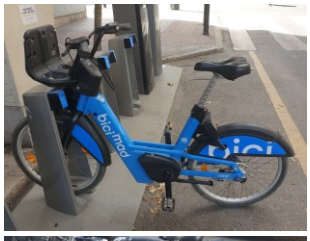


Figure 20: Photos of public bikes generations and current stations

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.

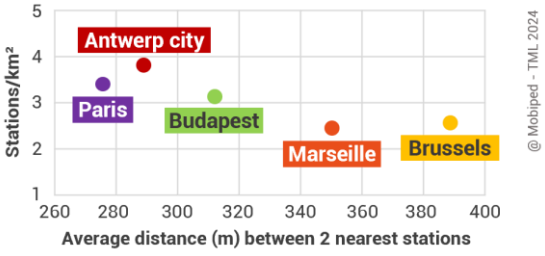


Figure 21: Analysis of "station density" and "average distance between two nearest stations" for urban PB systems

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).*

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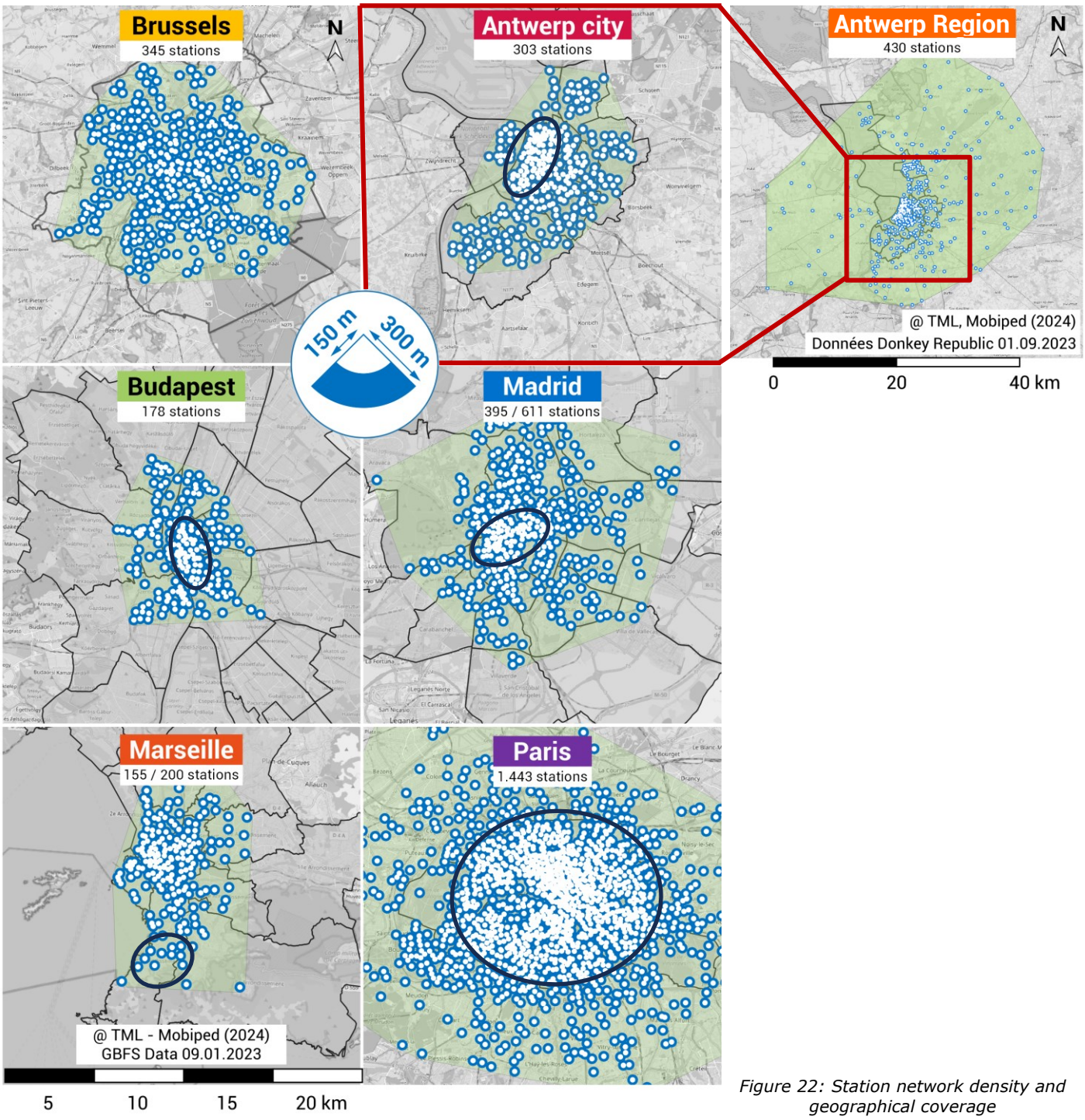
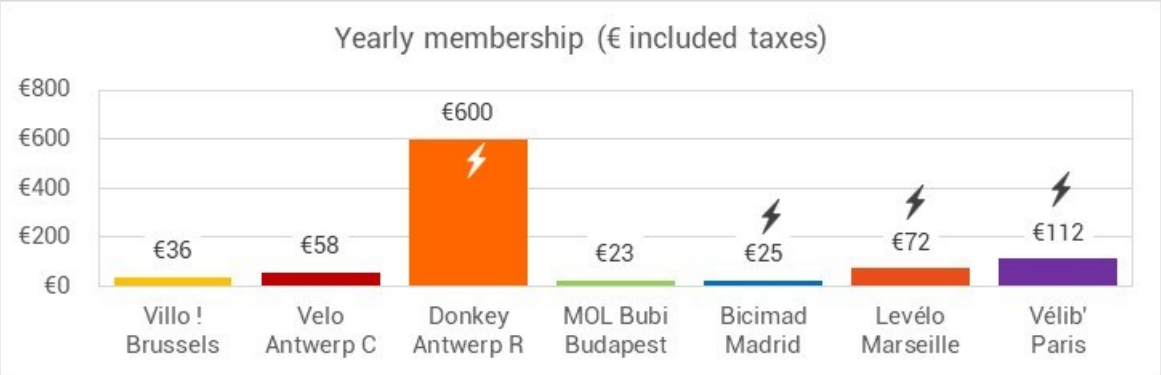


Figure 22: Station network density and geographical coverage

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.

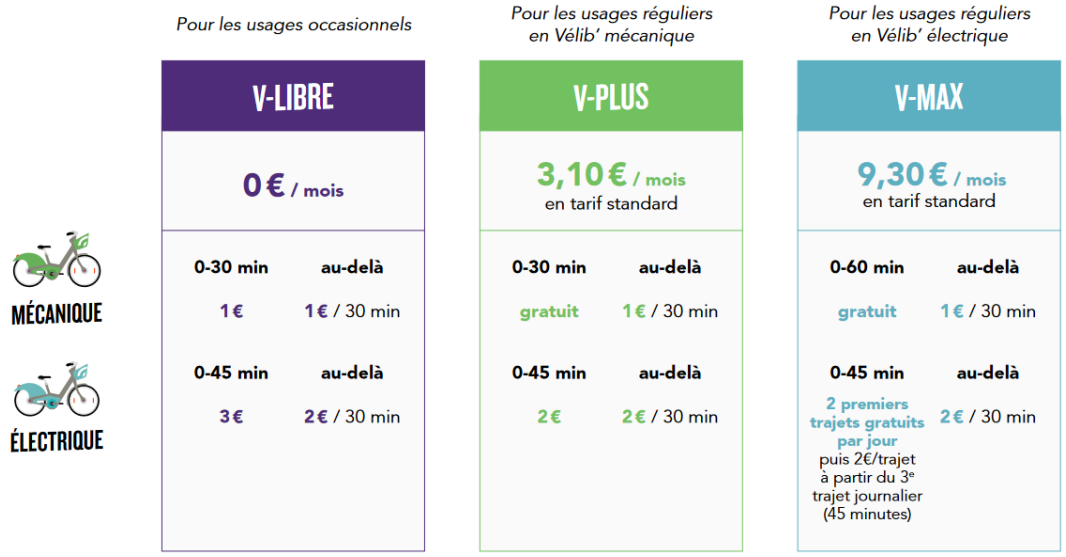


2.2.3.2 Usage and specificity

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.

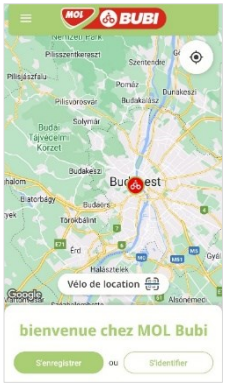
Figure 23: Donkey Republic Pay-as-you-Go price range (2023)

Figure 24: Vélib' price range (2023)

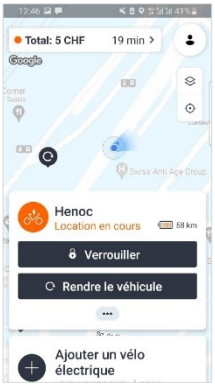


2.2.4 Ticketing support: apps predominate

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

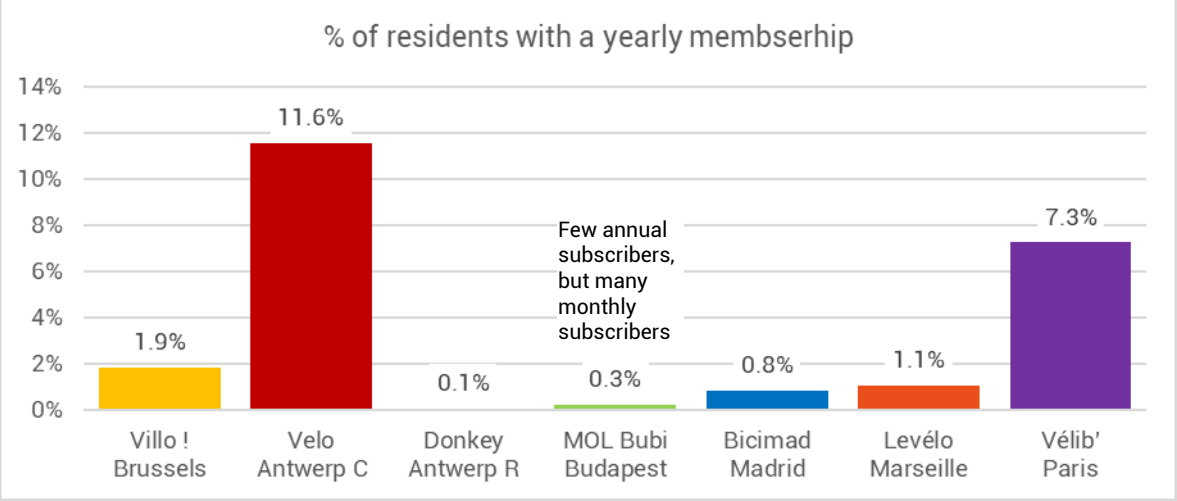
The trips analysis focuses on rental data, users *(Figure 25)* and modal choice.

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

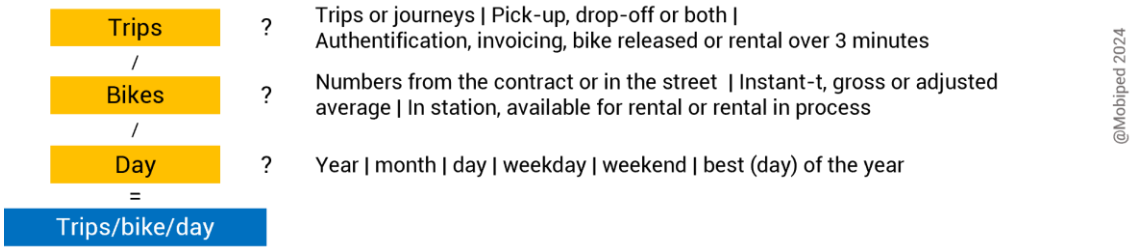


Figure 27: Rentals/bike/day (contract bikes and theoretical bikes)

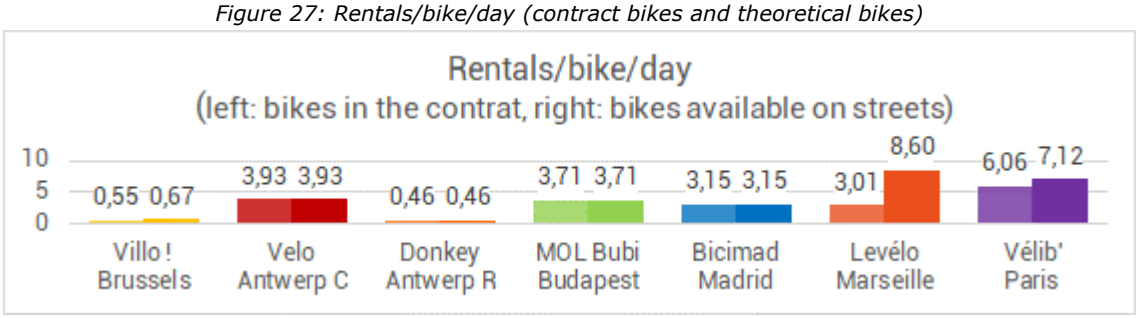
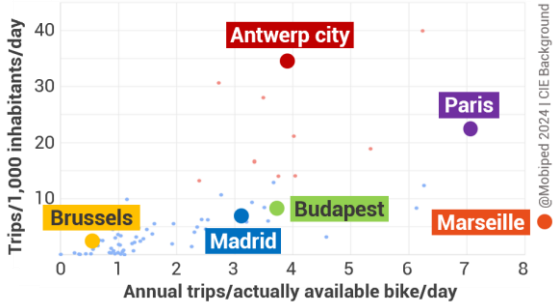
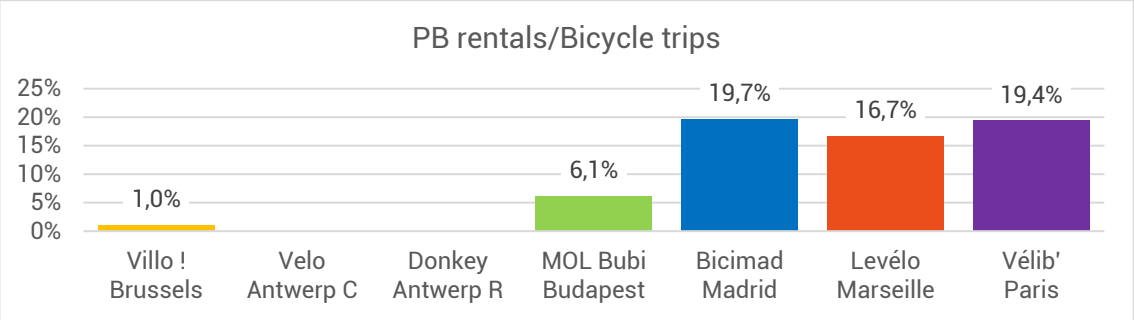


Figure 28: Rentals/1,000 inhabitants vs. rentals/bikes on the ground/day (background: CIE with all bike sharing data combined [3])



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.

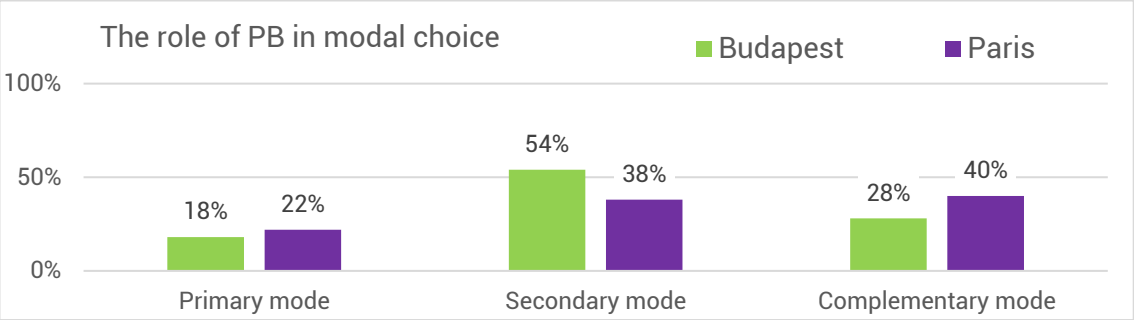
Figure 29: Overuse of pedelecs to pedal Vélib'

	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

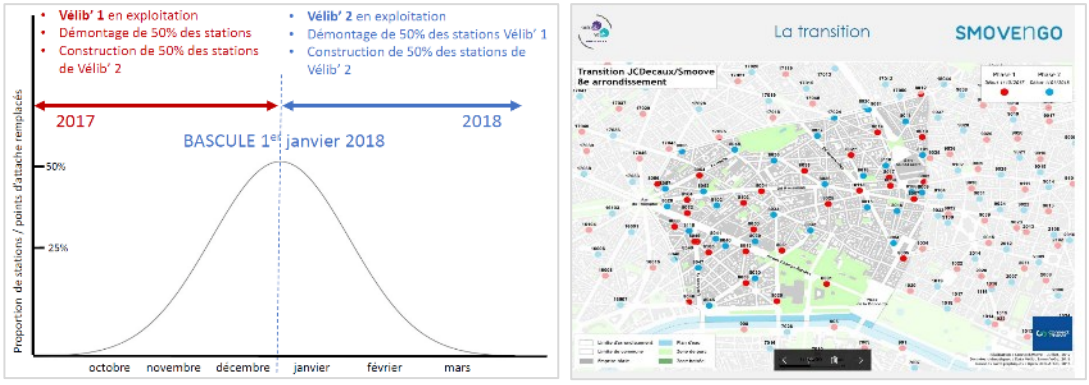
Contract monitoring: Paris has a highly structured monitoring system with follow-up meetings (weekly for operations and bimonthly for service quality), field audits agreed by both parties (10% of stations/month, +20,000 bicycles/year), a user committee, indicators for 164 contractual obligations and, 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

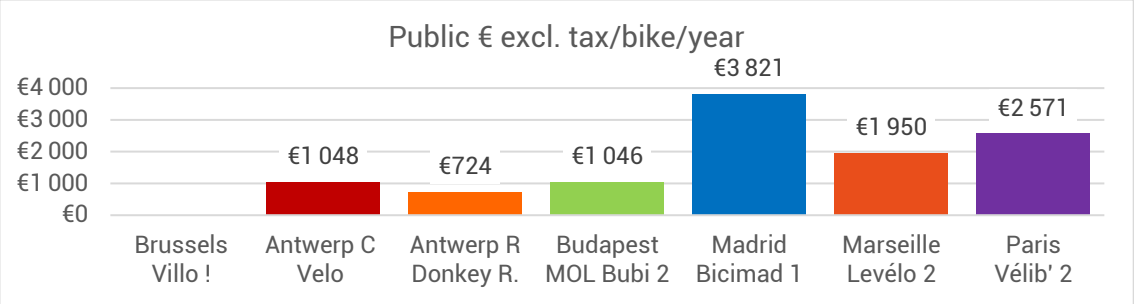
The following analyses should be analysed with caution, given the diversity of financial data:

- 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.

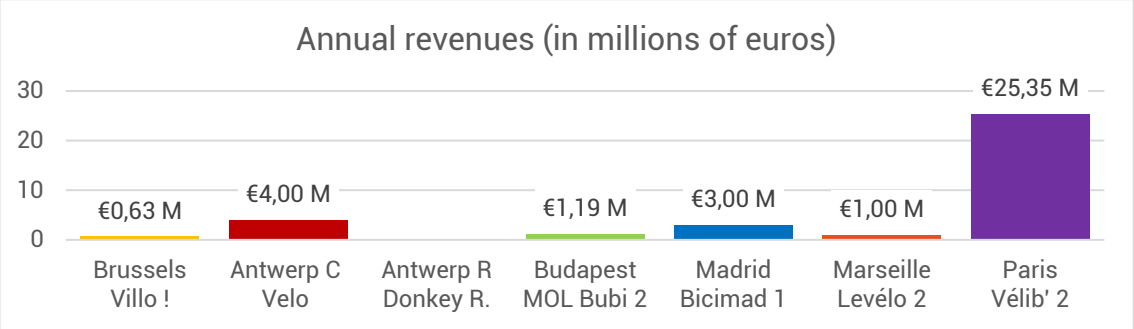
E-PB without charging station: Donkey's station-free system logically has a lower price, but the territorial extent of the service generates high-cost logistical and swapping constraints.

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.

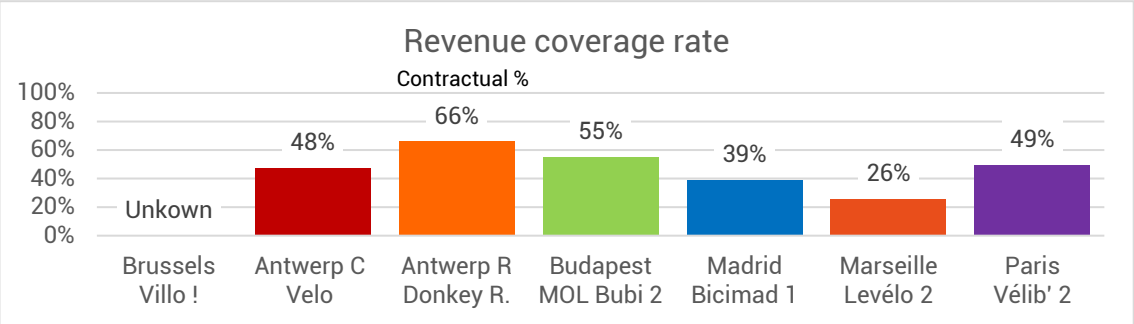
2.4.6.2 Revenues

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.



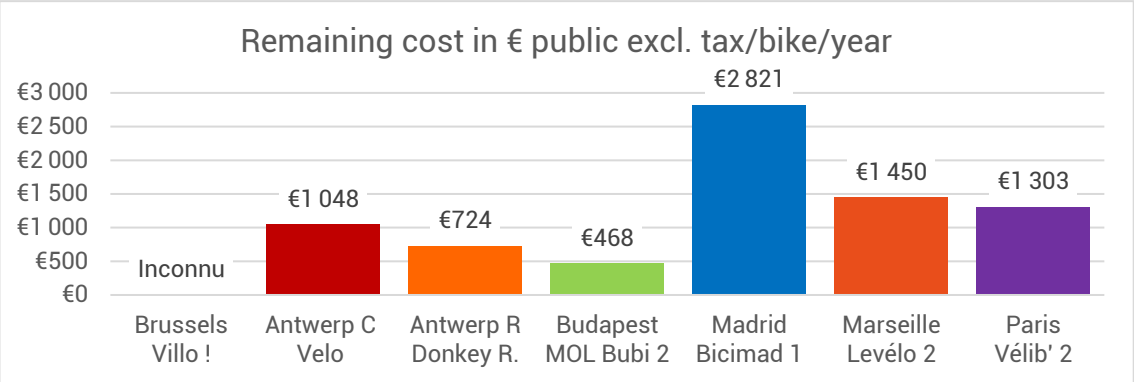
2.4.6.3 *Variable remaining payment from public euros excl. tax/bike/year*

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.

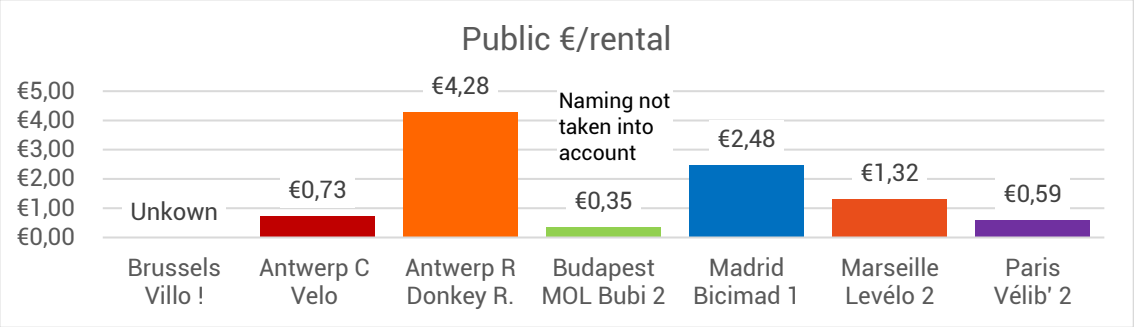
E-PB with charging stations: Madrid's remaining payment is very high, probably due to the price of the old technology and a very affordable subscription. In 2022, Paris had a remaining outlay of €1,303/bike. With €1 M in the first year, the remaining cost is €1,450 ex-VAT/bike/year. With annual revenues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

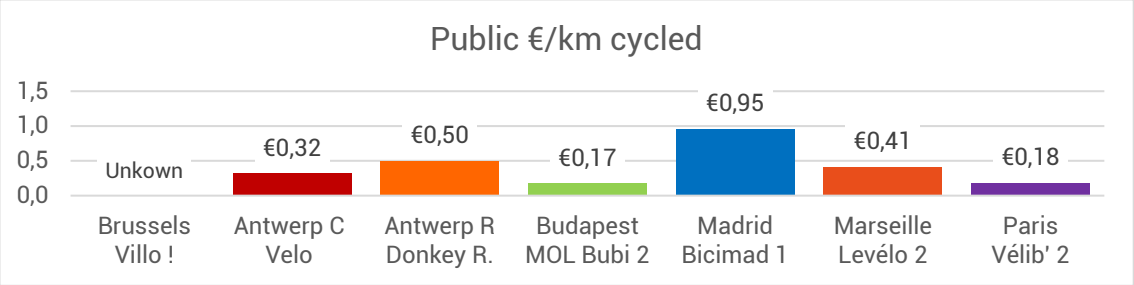


2.4.6.4 *Public € excl. tax ratios (investment + operation)*

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.

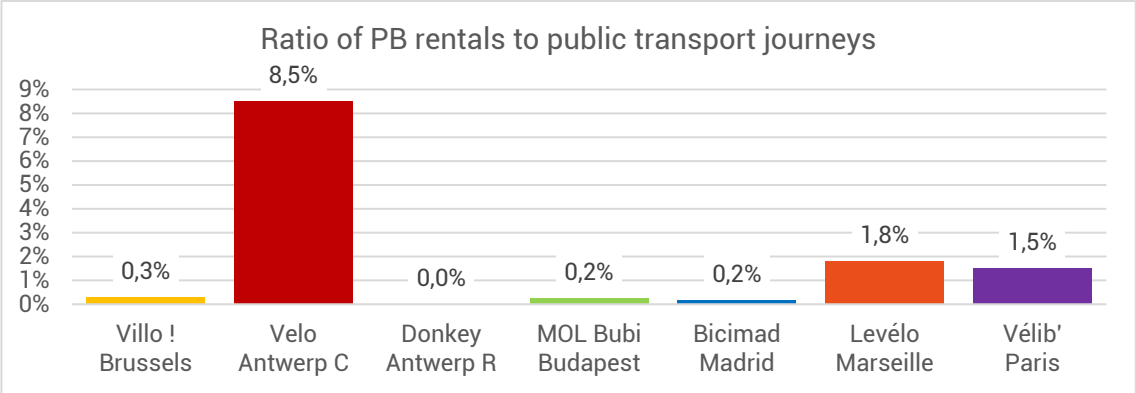
Figure 35: Data and ratios for private SB in Ghent (FietsAmbassade data 2023 | Calculation: Mobiped)

	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:

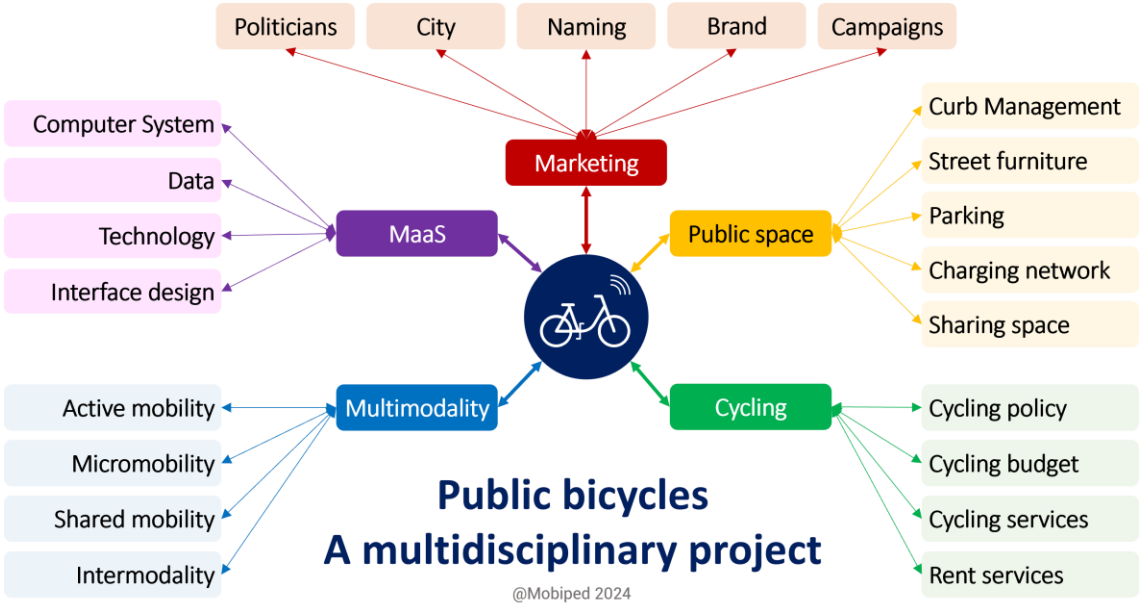
- **€ excl. tax/rental**: between €0.35 and €2.48 for urban PB and €2.95 for regional PB.
- **€/km travelled**: between €0.17 and €0.95 for urban PB and €0.34 for regional PB.
- **coverage rate**: revenues represent between 26% and 55% of PB costs in urban areas, and 66% in the contract for the regional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

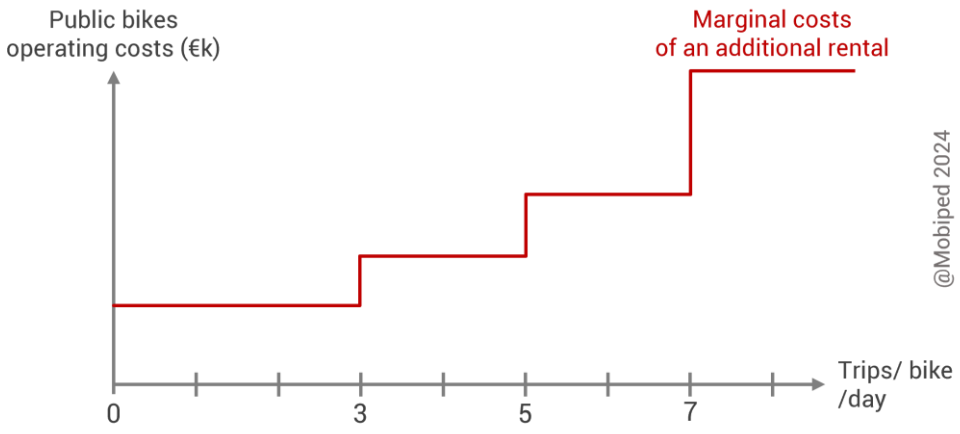
Figure 37: Public Bicycles, a multidisciplinary project to integrate cycling into a number of public policies



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:

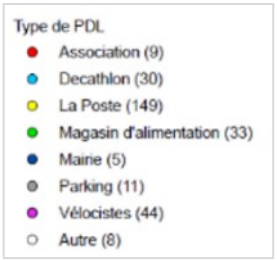
- supply, service and maintain the bicycles
- provide and maintain the management systems
- manage bike storage and retrieval logistics
- insure the bikes
- maintain customer relations
- collect revenues
- communicate

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%.

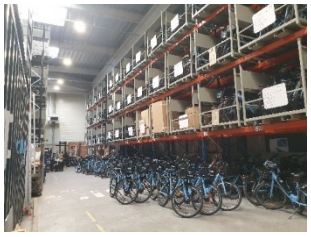
Véligo Location is the result of a cautious political order for IdFM to offer its own bike rental service. Its success was surprising and had a positive impact on the image of cycling for decision-makers, with IdFM receiving a lot of media coverage. There is a consensus on cycling, with no opposition 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

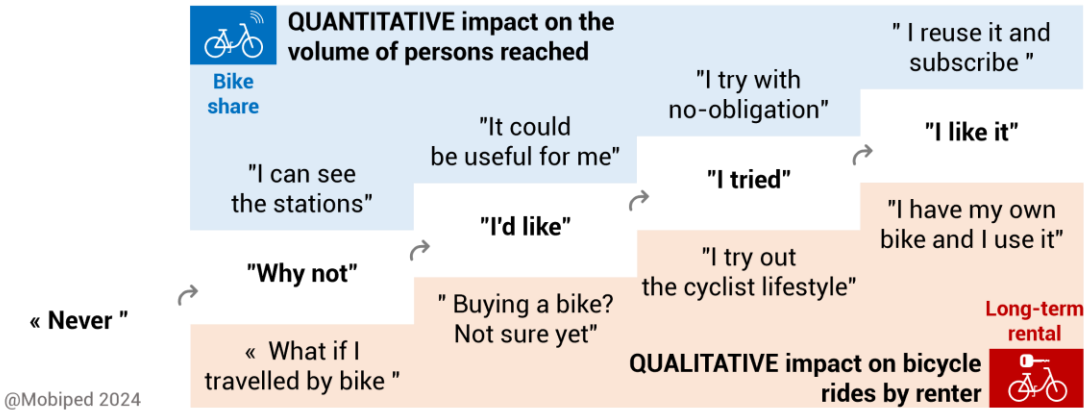


Figure 41: Bike share, a simplified cycling experience (in blue)

	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

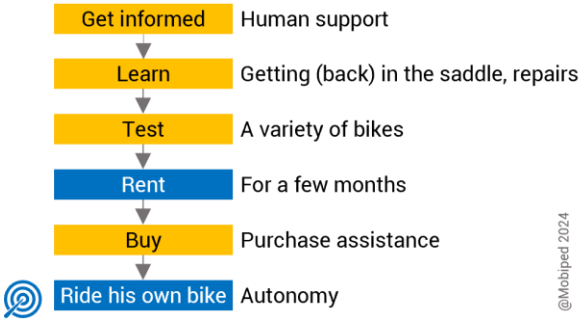
Figure 43: PB Vélib' Métropole and LTR Véligo Location in Paris in perspective (2022 data)

	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

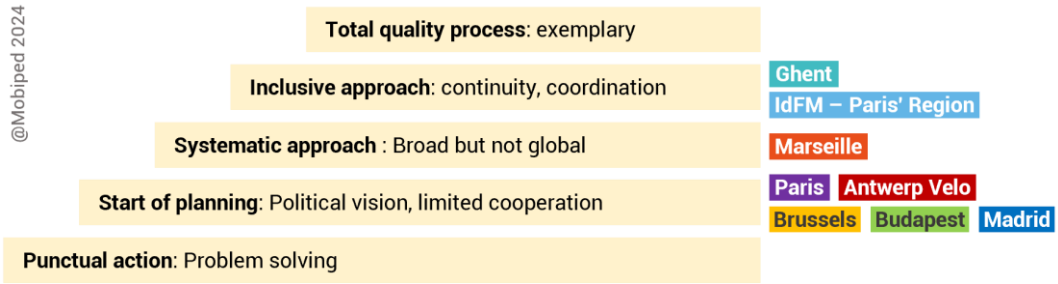
PB services are often self-reliant and poorly integrated into cycling and mobility systems. However, there are many opportunities to support multimodal practices:

- 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

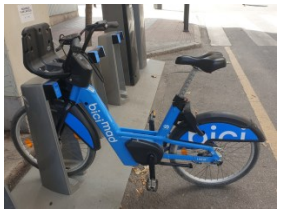
City	Information gleaned in March 2023	Internet sources (visited in March 2023)
Antwerp (Belgium)  *Velo Antwerp*	**Velo Antwerp** • Operated by Clear Channel. • Service among the best in Europe. • Belgian context • Very high bicycle modal share. • Since 2020, use of artificial intelligence in bicycle 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

Location		Name	Stakeholders			Contract (b)				Supply (c)						Use (d)	Supply inidicator				Use indicator			
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)
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

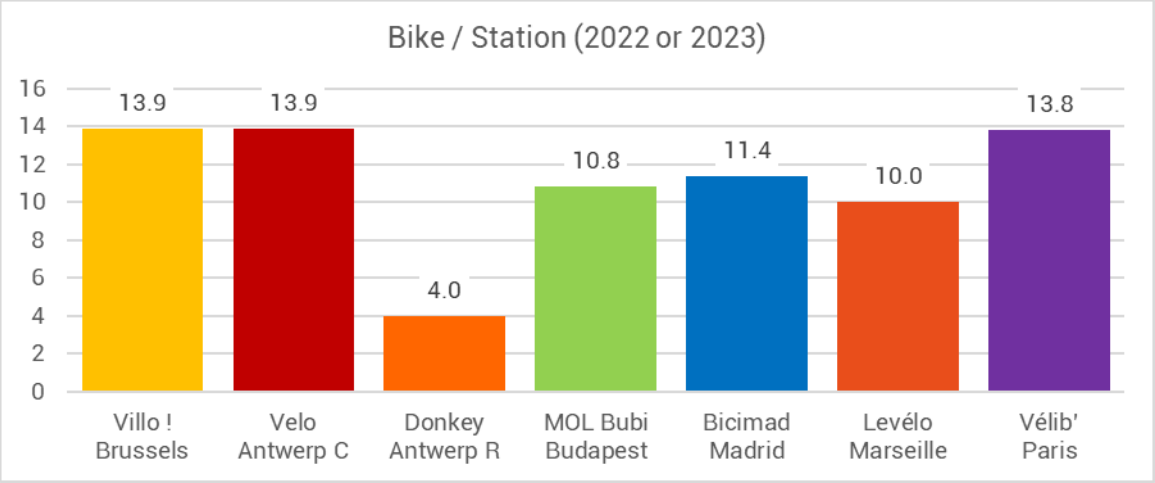
	Brussels Villo !	Antwerp C Velo	Antwerp R Donkey R.	Budapest MOL Bubi 2	Madrid Bicimad 1	Marseille Levélo 2	Paris Vélib' 2
Reference year	*2022*	*2022*	*2023*	*2022*	*2022*	*2023*	*2022*
Context							
Population of conurbation or urban area	1,222,637	510,000	1,135,000	1,774,000	6,780,000	1,903,173	5,200,000
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

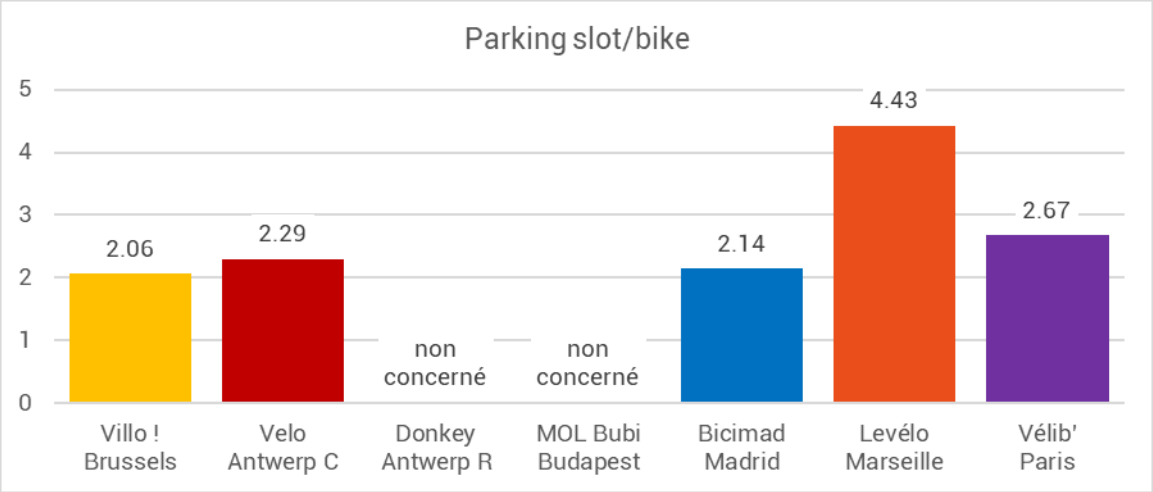
	Brussels Villo !	Antwerp C Velo	Antwerp R Donkey R.	Budapest MOL Bubi 2	Madrid Bicimad 1	Marseille Levélo 2	Paris Vélib' 2
Governance							
System provider	JC Decaux	Clear Channel	Donkey Republic	Nextbike	Bonopark & Booster-bikes (Bicimad 2 : PBSC)	Fifteen	Fifteen (ex-Smoove)
Service operator	JC Decaux	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

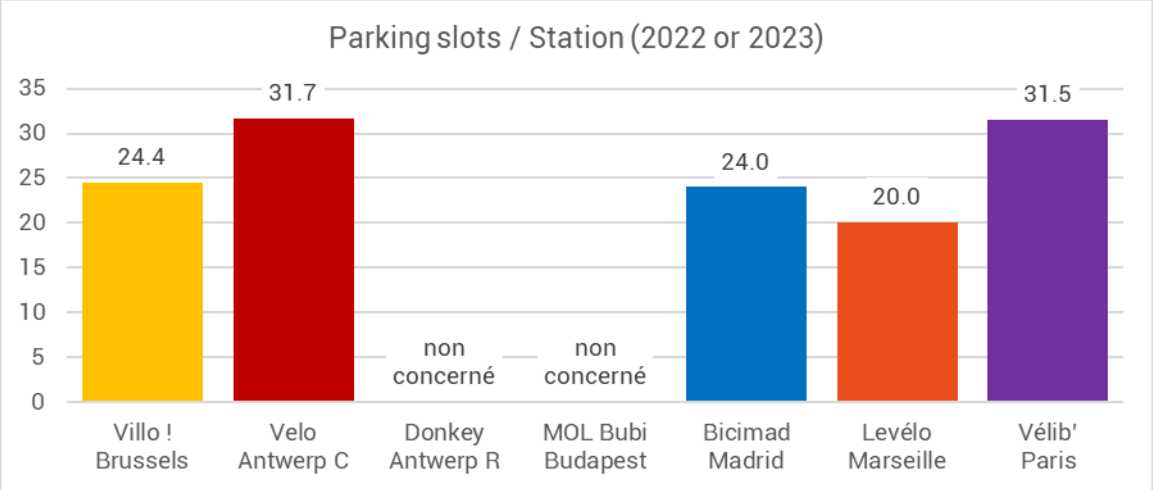
6.7.1 Contractual bikes/station



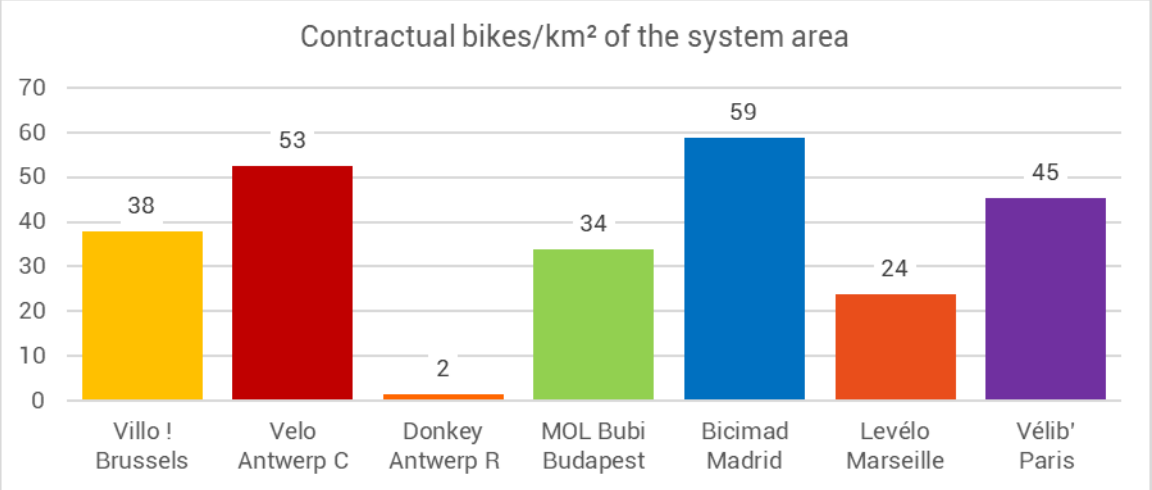
6.7.2 Slots per bikes on the ground



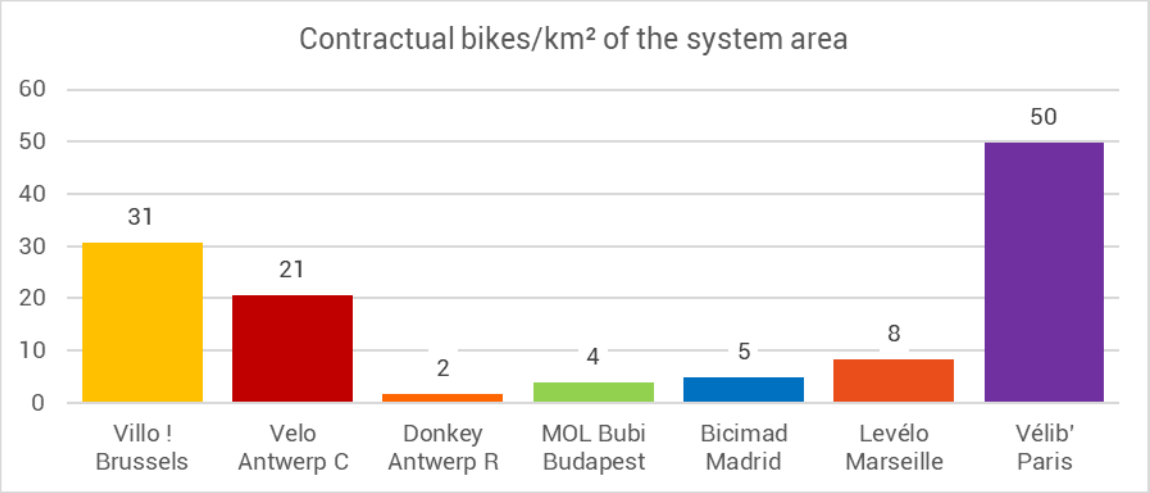
6.7.3 PB parking capacity/station



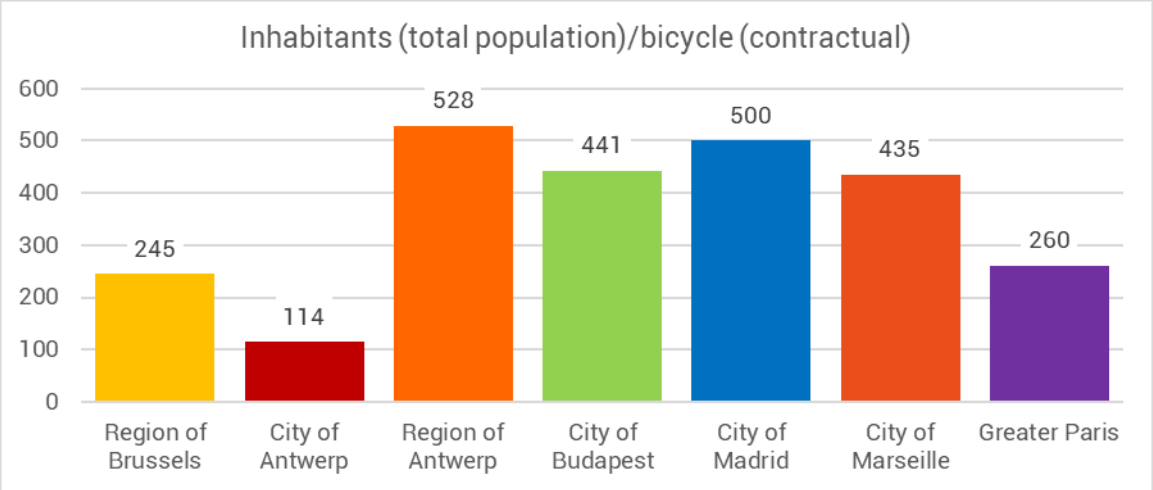
6.7.4 Contractual bikes/km² (System area)



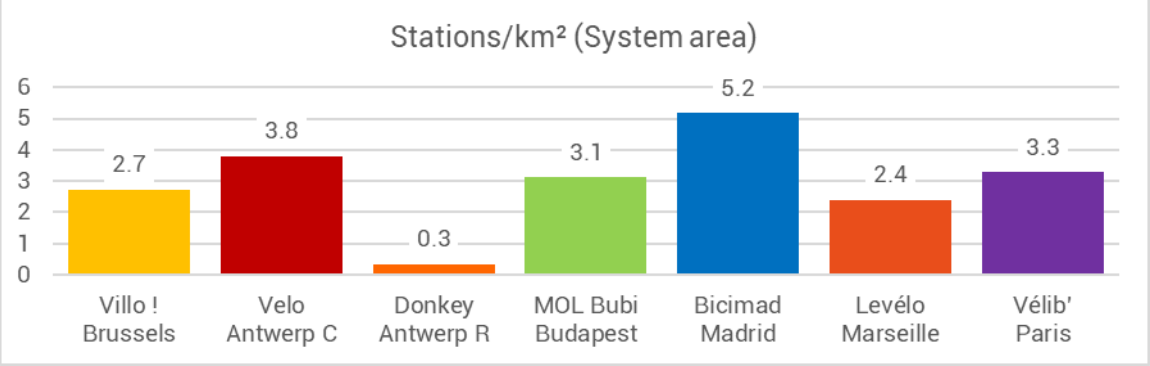
6.7.5 Contractual bikes/km² (Administrative area)



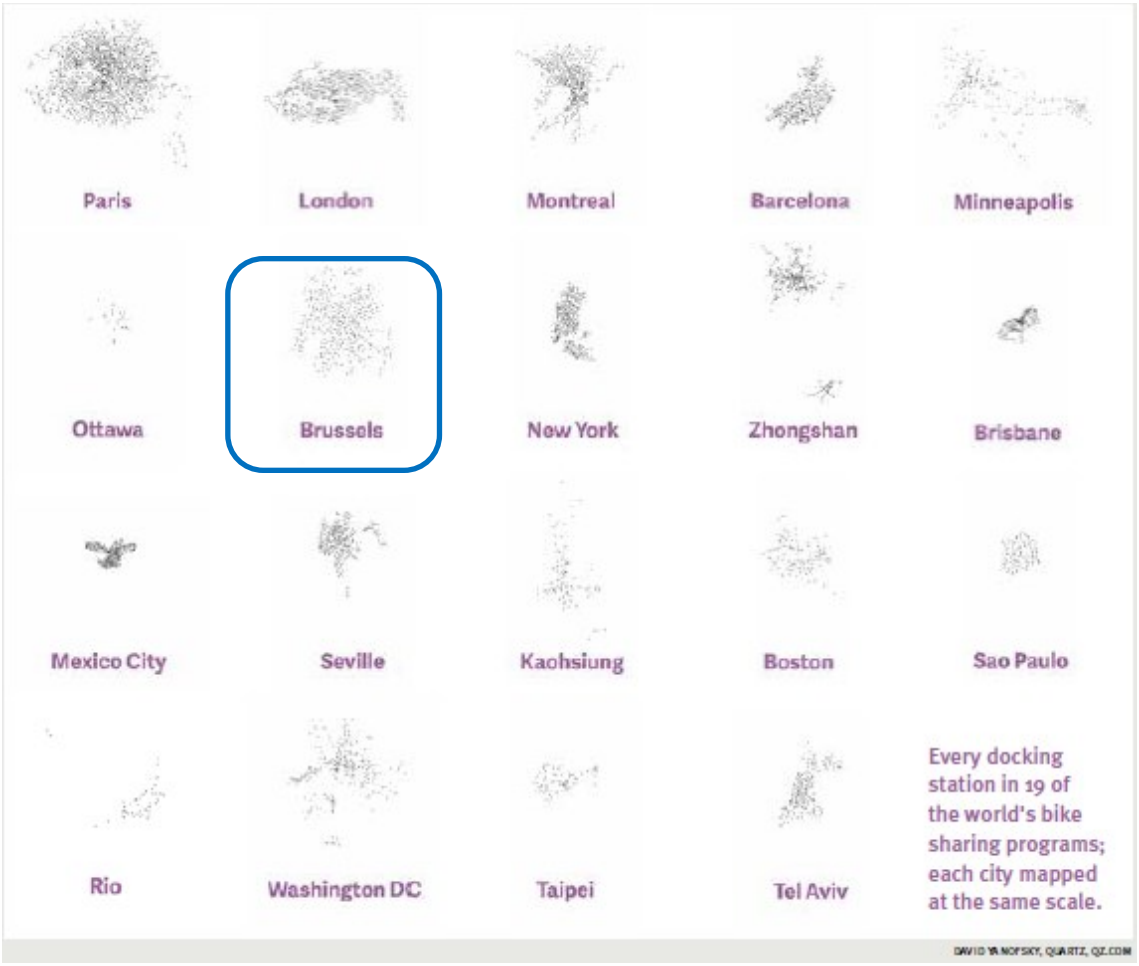
6.7.6 Inhabitants for one contractual bike



6.7.7 Stations/km² (System area)

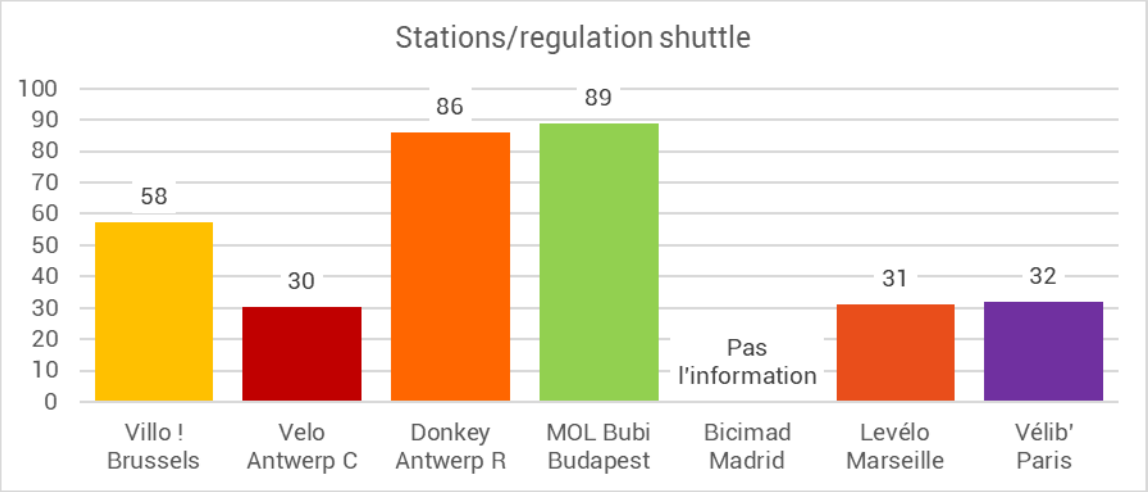


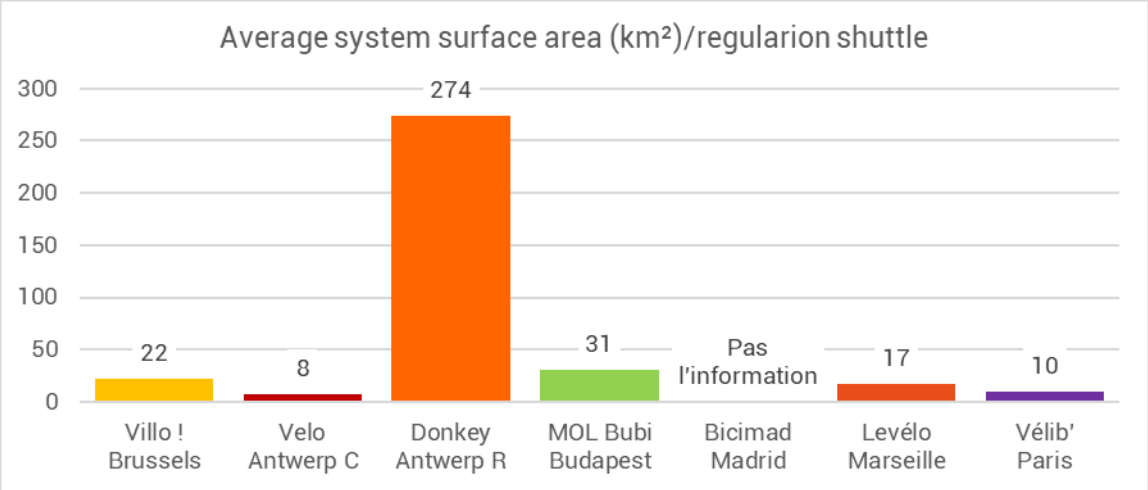
6.8 Density of PB stations worldwide in 2013



Source 11

6.9 Shuttle ratios



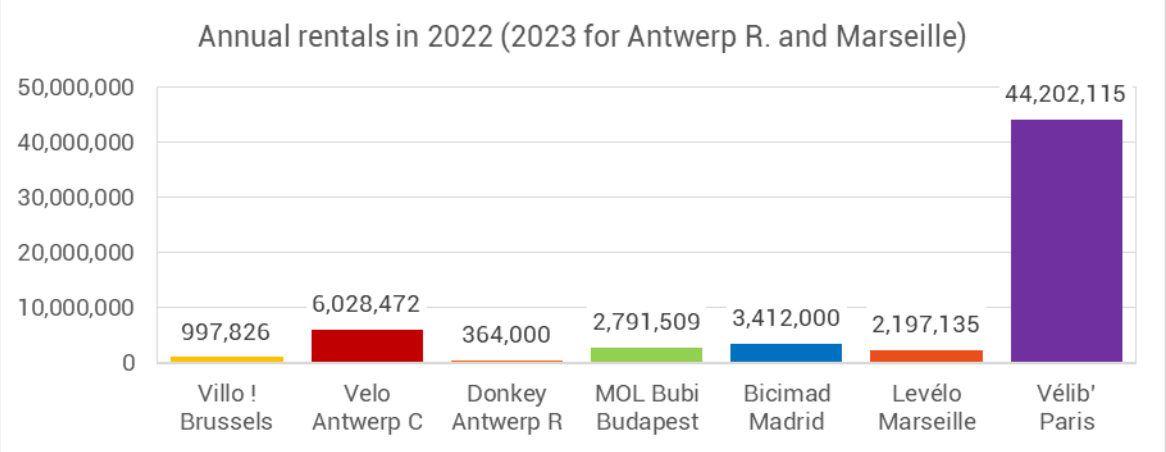


6.10 PB service operating volumes

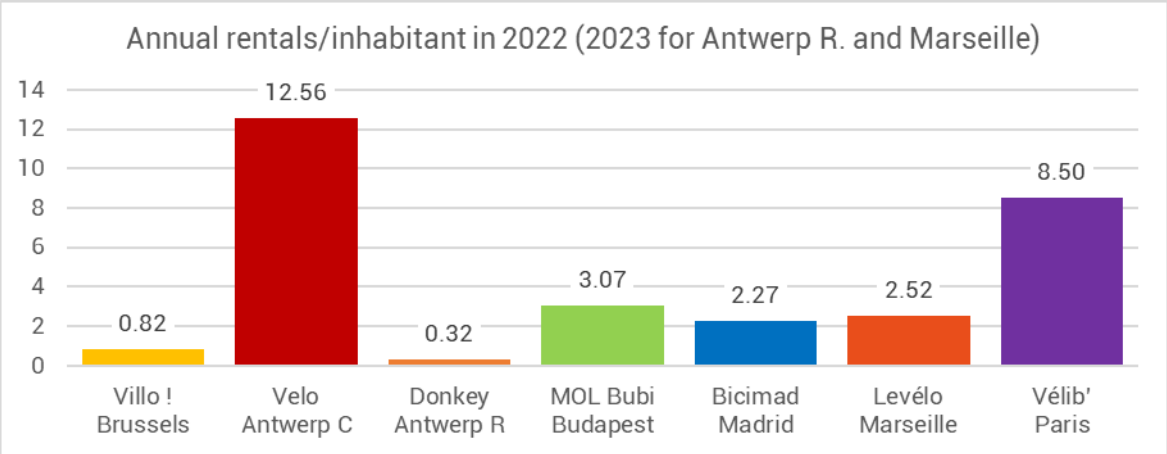
	Brussels Villo !	**Antwerp C** Velo	**Antwerp R** Donkey R.	**Budapest** MOL Bubi 2	**Marseille** Levélo 2	**Paris** Vélib' 2
Authority employees (Full Time Equivalent)	1	2	1	6	1	20
Operator employees	40	60	24	15	25	500
Warehouses	1	1	2	3	1	2
Bike repaired/day	40	60	n.c.	100	300	500 - 700
Regulation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

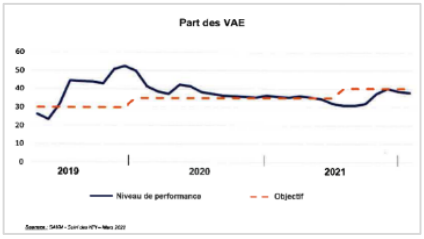
Reste à charge (€ public/déplacement)	
CAPEX + OPEX - Direct revenues	872,905,967
Number of journeys in 2022	337,700,000
€ public (CAPEX+OPEX)/journey	€2.58
Remaining cost (€ public/km travelled)	
Average distance (OVG 6)	6.85
Total distance	2,313,245,000
€ public (CAPEX+OPEX)/km	€0.38

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

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.