



DREEM

Designing use**R** centric **E**-kickscooters &
business models for **E**nhancing
inter**M**odality

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EXECUTIVE SUMMARY

While still in a learning phase, it is clear that e-kickscooters (e-ks) are not a fad; in an increasingly congested and polluted urban landscape, cities urgently need them. Indeed, their presence in more than 490 cities & towns attests it. However, European countries are not embracing the trend in a similar way., Germany leads Europe with 15 different providers operating in 107 cities. This is followed by Italy, UK and Poland.

This brought us to the following questions – *What are the main drivers and barriers to deploy e-ks in urban areas? And also, are there specific indicators (external or local) that can make some cities better candidates than others for e-ks market penetration?*

In this first task of Work Package 5 we tried to shed light on these questions by analyzing the Belgian, Italian and Swedish markets (where the three pilot cities are located). The scope of our market research is e-ks ownership. For each target country, we looked at the mobility behaviour and the main policies relating to e-ks. We also studied the three pilot cities (Brussels, Torino and Gothenburg) on the basis of 8 dimensions: (1) Population Density and type, (2) Congestion, (3) Local urban strategy, (4) Existing mobility offer in the city, (5) Driving restrictions for fossil fuel cars, (6) Safety regulations, (7) Bicycle culture and infrastructure and (8) Weather.

This first task also helped us understand what factors in each pilot city can influence the market penetration of DREEM mobility solution. However, as users in this project play a vital role, only by crossing market (WP5) and user (WP3) research we will be able to understand the type of factors that will have most effect on the choice of DREEM as a mode of transport. Based on the first study of pilot cities and countries, the following insights have emerged:

Country Modal Split

The most common transportation mode to use in 2019 was the car, representing at least half of the users in the three countries. For both Italy and Belgium, car use represented about 60% of the users. While this number has been slightly decreasing since 2013, car ownership has increased from 2013-2018 in the three countries. Italy, as the second “most motorised” country in European Union, shows the highest rates of car ownership with 663 cars per 1000 inhabitants in 2019. An interesting fact to highlight in all countries is that cars are mostly owned by men and women tend to travel in cars more

	frequently as passengers rather than drivers. This trend is in line with a study carried out at European level [1].
City Modal Split	Looking at the modal split in three pilot cities, we can see that it is strongly linked to the mobility culture of the country and particularly to the typology of the city. While the three cities exhibit high public transport use (about 25%), the share of walking is more significant in Brussels. Moreover, of all journeys, 3-9% are travelled by bike, with the highest percentage in Gothenburg and the lowest in Torino.
Population density and type	<ul style="list-style-type: none"> • Brussels is the pilot city with the highest population density. • The three pilot cities present similar demographics in terms of student population. However, Torino is the city with the largest percentage of students, representing 10% of the population.
Congestion	Brussels tops the chart as the most congested city in Europe and 25th in the world. Given the significant demographic growth which the Region has experienced for nearly 20 years, and which has led to an increase in demand for both passenger and goods transport, it can be assumed that without this modal switch from cars to other modes of transport, the congestion problems would be even worse ¹ .
Driving restrictions, Low Emission Zones (LEZs) and Zero Emission Areas (ZEAs)	<ul style="list-style-type: none"> • The three countries (Belgium, Italy and Sweden) have a national framework with low emission zones. Indeed, Brussels, Torino and Gothenburg have LEZs. • Gothenburg, in addition, is developing the world's first large-scale zero-emissions city zone. If the initiative works as proposed, Gothenburg Green City Zone will implement 100% emission-free transport modes by 2030².
E-ks as part of the local urban strategy	The three cities adopted SUMP to give priority first to pedestrians, cyclists, public transport and finally to private cars. They will achieve this by investing in cycling infrastructure, pedestrian networks and public transport. Cycling appears to be the main area of improvement

¹ <https://environment.brussels/state-environment/report-2011-2014/brussels-context/mobility-and-transport-within-brussels-region>

² <https://smartcitysweden.com/gothenburg-green-city-zone-leads-the-way-towards-zero-emissions-transportation/>

	in all cities. Enhancing electric and shared mobility also appear as a goal although e-ks are not explicitly mentioned.
Bicycle culture and infrastructure	<ul style="list-style-type: none"> • While the three pilot cities are implementing new cycling infrastructure (new cycling lanes, bike boxes), Gothenburg appears to be the most bicycle-friendly city. Indeed, the goal of Gothenburg is to triple the number of bicycle trips by 2025 and has adopted a dedicated and ambitious cycle programme. • In Torino 70% of the city's space is allocated to roads and car parking and only 2% to cycle tracks. In Brussels 70% of the city's space is allocated to roads and car parking.
Existing mobility offer in the city	<p>The mobility offer in the three pilot cities is very competitive with trains, metros, trams, taxis and shared micromobility services. According to our analysis, Brussels is the city with the most comprehensive shared micromobility offer.</p>
Weather	<ul style="list-style-type: none"> • Extended periods of precipitation or cold temperatures appear to be a barrier for e-ks adoption. In this sense, Gothenburg presents the worst weather conditions: the rain falls for 163 days and the snowy period of the year lasts for about 4 months. • Torino, on the other hand, presents the best weather conditions: the rain falls for 180.9 days and snow falls once every year.
Safety regulations	<ul style="list-style-type: none"> • The use of e-ks are covered by specific regulations and guidelines in the three cities. In most countries in Europe (including Italy) e-ks are categorised as a bicycle. However, in Belgium e-ks are designated as a separate dedicated category and in Sweden the category depends on the power of the e-ks (250W e-ks belong to bicycle category). • The three cities apply similar regulations with regards to allowed lanes: E-ks riders have same obligations than bike users, sidewalks are not allowed and on pedestrian areas, e-ks must follow the same rules as pedestrians. • The only city with minimum age restriction for driving an e-ks is Torino. Also, riders 14-18 year old must wear a helmet (in Brussels and Gothenburg helmet is recommended but not mandatory). Also, the only city with restrictions on maximum power of e-ks is Torino (500W).

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Part I – Introduction

Roughly 35% of all urban personal trips cover distances of less than 2 kilometers (km), and 75% of them amount to less than 10 km. E-ks are typically used for trips from 0.5 km to 4 km, the equivalent of walking for 5 to 45 minutes.

In theory, therefore, e-kickscooters (e-ks) could be used for a large proportion of urban and suburban travel.

E-ks fit the bill for other reasons as well: They are around four to five times faster than walking; you can easily ride them in confined spaces; you don't have to hunt for a parking space, and no sweating is involved. They can also be paired with public transportation, thus making them a handy solution for both commuting and for the first and last mile trip.

Yet, there are still some rising challenges associated with e-ks. They don't perform well in brick-lined streets or on hilly areas; they are not well suited to inclement weather; and riders have nowhere to stow groceries or other belongings. Moreover, since first e-ks sharing services were launched in Europe in 2018, e-ks have raised a lot of criticism: 1) the rapid scale-up of e-ks companies has led to start services in cities, often without prior engagement with city representatives, leading to regulatory and operational challenges; 2) traffic safety is generally a major concern for city officials and minimum age requirements, dedicated road lanes, speed limits and insurance are key aspects of e-scooter deployment in a city; 3) shared e-ks are usually parked randomly in the middle of a sidewalk, causing inconvenience to people walking and more importantly to blind people; 4) the safety aspect has been frequently questioned with the number of accidents increasing and leading to fatalities.

While still in a learning phase, it is clear that e-ks are not a fad; in an increasingly congested and polluted urban landscape, cities urgently need them. Indeed, their presence in more than 490 cities & towns attests it (see Figure 1).

However, as shown in Figure 1 & 2, European countries are not embracing the trend in a similar way. According to a recently updated report on shared micromobility [2], Germany leads Europe with 15 different providers operating in 107 cities. This is followed by Italy (with 15 providers operating in 67 cities), UK (with 13 providers operating in 57 cities) and Poland (with 14 providers operating in 44 cities). On the other hand, we have countries like Sweden with presence in 17 cities and Spain in 14 cities.



Figure 1: Cities with shared e-ks per country (Europe) [2]



















									
Cities	107	67	44	14	29	17	57	8	9
Providers	15	15	14	7	9	9	13	8	9
Scooters	127.000	52.000	40.500	24.000	21.500	20.500	18.000	11.000	10.500
Leading operator									

Figure 2: E-scooter setup in selected countries in Europe [2]

This brings us to the following questions – *Which factors can have an effect on choice of e-scooter as a mode of transport? What are the main drivers and barriers to deploy e-ks in urban areas? And also, are there specific indicators (external or local) that can make some cities better candidates than others for e-ks market penetration?*

Work Package (WP) 5 “Market uptake, user centered business models and business plan”, will try to shed light on these questions as part of the market entry strategy of the DREEM solution.

To start with, the present study analyses the Belgian, Italian and Swedish markets (where the three pilot cities are located). The scope of our market research is e-ks ownership.

Moreover, for each target country, we looked at the mobility behaviour and the main policies relating to e-ks. We also studied for each pilot city (Brussels, Torino and Gothenburg) other external factors (city/local related) that could shape the e-ks deployment in urban areas.

Indeed, we studied the three DREEM pilot cities on the basis of 8 dimensions:

- **Population Density and type.** Literature points out that daytime population density offers a good benchmark for understanding potential local demand for micromobility modes such as e-ks [3]. Also, because young people are the largest

user group for e-ks, we looked at aspects like students constituting a relatively large percentage of the population.

- **Congestion.** Congestion is another effect of having too many cars on limited street space. High-density areas are more condensed, so trips are shorter, which bode well for e-ks and micromobility vehicles in general.
- **E-ks as part of the local urban strategy.** The integration of micromobility in urban planning helps cities' goals of shifting away from cars and toward more varied, lower-impact forms of transit, including e-ks.
- **Existing mobility offer in the city.** E-ks provide advantage in parking constrained environments as they can fill a void where there is limited access to public transport. The results of an e-ks pilot program in Portland (USA) determined that they provided travel opportunities when the public transportation is lacking [4]. Indeed, in suburban areas where the public transportation is underrepresented compared to rest of the city, it was found that e-ks were introduced to help people in movement.
- **Driving restrictions for fossil fuel cars, Low Emission Zones (LEZs) and Zero Emission Areas (ZEAs).** Post-car city road maps with targets such as banning diesel cars and fossil fuel cars would encourage greater uptake of other transport modes, including e-ks. Also, LEZs and ZEAs provide a means for cities to pilot innovations in urban mobility, prioritise walking, cycling and public transport and increase the use of zero emission vehicles like e-ks.
- **Safety regulations.** Beyond urban planning, safety is one of the micromobility concerns influencing its social acceptance and long-term growth. At present, more than 80% of fatal accidents involving bicycles or e-scooters are instances in which cars or trucks strike riders. Regulatory guardrails addressing rules of the road, public safety, parking and no-scooter zones would encourage greater uptake.
- **Bicycle culture and infrastructure.** Well-planned investment in infrastructure that supports cycling (with special bike paths, street lighting and designated parking, for example) will also advance safety and encourage greater and more responsible e-ks use.
- **Weather.** Bad weather causes a safety concern for the usage of e-ks and it is not advised to ride in icy or snowy conditions as it leads to the e-ks slipping and

resulting in accidents. So even cities that are otherwise hospitable to scooters are not prime markets if they have extreme levels or extended periods of precipitation or cold temperatures.

The market research performed in this report includes desk research and was complemented with discussions with contacts in each local market. The knowledge on local markets of DREEM pilots was key in this first phase.

Reader's guide

The body of this document is divided into three parts:

Part I – Introduction: In this first chapter we explored the market opportunity and market share of e-ks and we conducted a preliminary analysis of five e-ks models that could compete with the DREEM solution.

Part II - Market study: This second chapter is the core of D5.1 and is dedicated to the market analysis of Belgium, Italy and Sweden. For each country it provides an overview of the mobility culture and regulatory framework relating to e-ks. It further zooms on in each the pilot city by studying a series of underlying factors that could shape the market entry of the DREEM mobility solution.

Part III - Insights and conclusions: Finally, key observations made on the three markets and pilot cities are presented in the third chapter.

COMPETITION ANALYSIS

a. The e-ks market potential

Micromobility (including shared e-bikes, e-ks and electric mopeds.) has taken off in recent years in passenger transport. The market opportunity continues to expand. Worldwide, investors have put up more than \$5.7B into micromobility startups since 2015, with more than 85% targeting China [5]. The market has already attracted a strong customer base and has done so roughly two to three times faster than for car sharing or ride hailing. According to McKinsey&Company, the shared micromobility market in the US, China and Europe is predicted to be worth between \$300 billion to \$500 billion by 2030 (Figure 3).

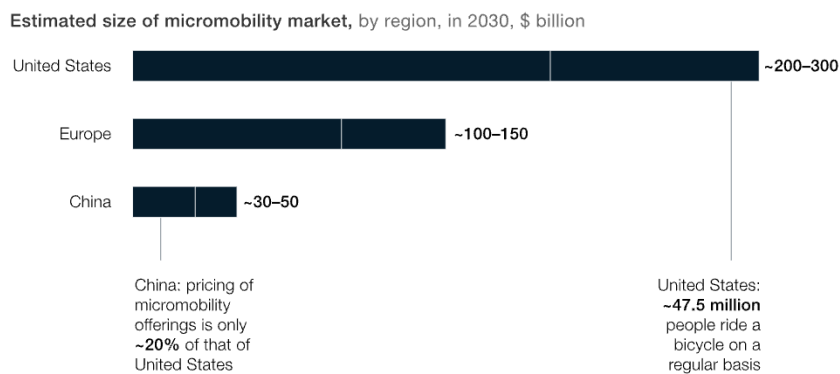


Figure 3: Estimated micromobility market size by region 2030 (McKinsey & Company) [5]

According to UC Berkeley's Haas School of Business, the e-ks share only will represent an annual revenue opportunity of between \$34 and \$42 billion by 2025 [6].

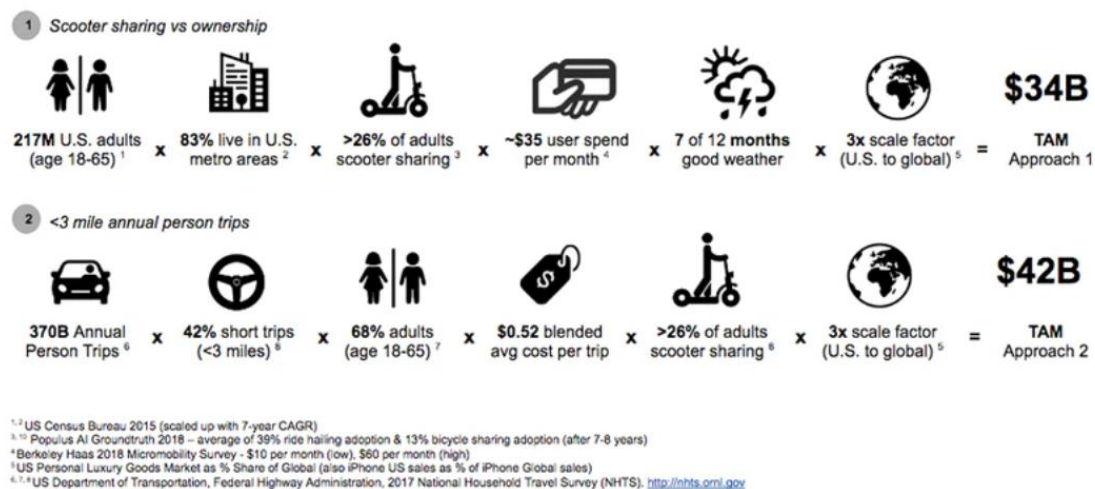


Figure 4: Estimation of annual revenue opportunity by 2025 [6]

Three reasons appear to drive this accelerated expansion:

- First, most journeys in cities are short distances. In France, for instance, 25% of motorised trips are under 1km, 50% under 3km, and 90% under 10km. Bikes and scooters in the US currently account for 60% of trips under 8km.
- Second, these personal transport devices can connect passengers to their departure and/or arrival points, and can also be paired with public transportation.
- Third, the cost of e-ks are largely favorable to companies. It is much easier to scale up micromobility assets like e-ks compared to car-based sharing solutions. For example, the current acquisition costs of an e-ks are about €400, compared to thousands of dollars to purchase a car. These devices are also easier to operate and do not require any physical exertion.

As depicted in Figure 5, the Asia Pacific region is expected to emerge as the prominent region with China as the largest e-ks market owing to the presence of several e-ks scooter manufacturers. Indeed, China accounted for the largest share of the market in 2020. This is followed by Europe (with a market share of 29.7%) and North America (with a market share of 16.9%).

On the other hand, Germany followed by France and UK are dominant in the European market (Figure 6). Indeed, Germany accounted for nearly one third of the market share in Europe in 2021 [7].



Source: AZZ Market Research Analysis

Figure 5: Global Portable Electric Scooters Market Share, by Geography Analysis, 2019, Market Share and CAGR (%) [7]

Europe	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	CAGR % (2020-26)
Germany	682.4	726.2	775.5	831.3	894.8	967.4	1,047.7	1,138.0	1,239.7	1,354.3	1,483.9	1,630.5	9.1%
France	407.7	431.6	458.6	489.2	523.9	563.7	607.5	656.6	711.8	773.9	843.9	922.9	8.6%
UK	548.1	581.3	618.7	661.1	709.3	764.4	825.3	893.6	970.3	1,056.8	1,154.4	1,264.6	8.8%
Italy	129.4	134.4	139.9	146.3	153.5	161.7	170.5	180.3	191.2	203.2	216.5	231.2	6.1%
Spain	117.0	120.7	124.7	129.4	134.7	140.7	147.1	154.1	161.8	170.2	179.3	189.3	5.1%
Rest of Europe	210.7	221.5	233.6	247.3	262.9	280.7	300.3	322.1	346.6	373.9	404.6	439.1	7.7%
Total	2,095.5	2,215.6	2,351.1	2,504.6	2,679.1	2,878.6	3,098.3	3,344.7	3,621.3	3,932.4	4,282.6	4,677.7	8.4%

Source: AZZ Market Research Analysis

Figure 6: Europe Portable Electric Scooters Market Revenue, By Countries, 2015 - 2026 (USD Million) [7]

While e-ks sharing networks will claim a majority of the e-scooter market, in a 2018 survey conducted by the UC Berkeley's Haas, it is estimated that 35% of e-ks riders³ (adults aged 18 to 45) prefer electric scooter ownership to rental, which means e-ks sales could bring \$12 billion in annual revenue by 2025 [6]. The study explains that while e-ks sharing is convenient, riders perceived them as unreliable. Riding a shared e-ks to a destination does not guarantee an available ride home. Finally, it is impossible for riders to anticipate or control whether an available e-ks has been damaged or rendered unsafe through overuse. The survey also indicated that owning an electric scooter may even be safer and more cost-effective.

b. Preliminary direct competition analysis

While new e-ks companies continue to enter the market, a small number of major companies appear to control most of the market, suggesting that the market may be stabilising and that companies could begin to focus more on differentiation through product quality and operations, instead of striving to obtain market shares. Manufacturers of e-ks are primarily focusing on enhancing durability, performance, range, implementing advanced technologies, such as swappable battery technology and GPS, and improving aesthetics.

The following graph is part of a detailed benchmark conducted by A2Z Market Research and compares the product portfolio of nine top players operating the e-ks market [7]. The vertical axis represents the market positioning⁴ and the horizontal axis shows the product portfolio⁵. As shown, Bird (U.S), Xiaomi (China), Mercane (Italy) and Unagi (U.S) appear to be the strongest competitors in terms of product portfolio. Other manufacturers like E-TWOW (Romania), Kaabo (China) and Turboant (U.S.) appear as promising ones.

³ Base: 273 adults aged 18-45 participated in the survey

⁴ Market positioning, being 0 = product not placed on the right market (geographical and customer targeting) and 10 = perfect positioning of each e-ks on the right market (geographical and customer targeting).

⁵ Product portfolio, being 0 = lack of a portfolio of e-ks for current and future market needs and 10 = availability of a portfolio of scooters that can satisfy perfectly current and future market needs

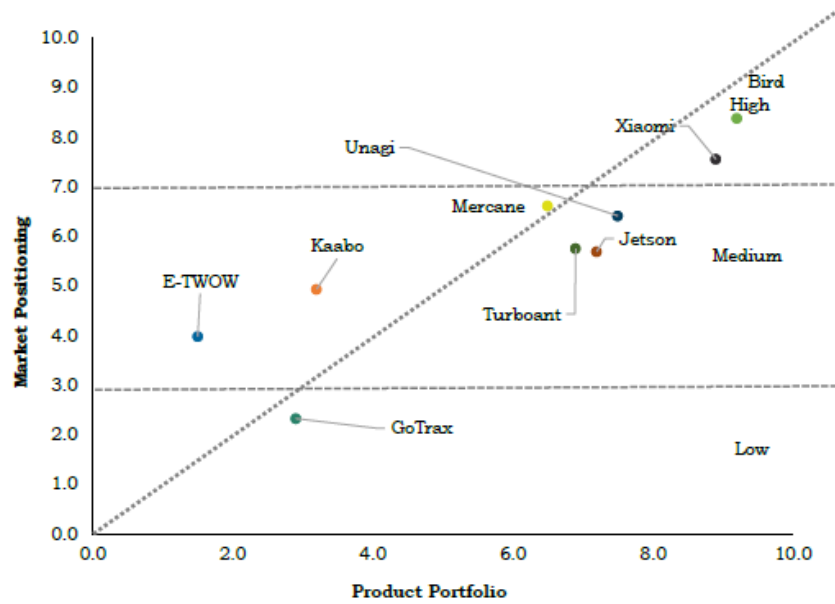












Figure 7: Benchmarking of nine top players operating the e-ks market (A2Z Market Research Analysis) [7]

In this preliminary analysis we examined in more detail five e-ks models that could compete with the DREEM solution. Two of them are part of a strong offer of big players (like Xiaomi and Xiaomi-Segway), one is focused on attracting design tech enthusiasts (Unagi) and the other two are manufactured by smaller but promising players (E-TWOW and Kaabo). In forthcoming studies, DREEM will be exploring the main competitors in greater depth, including diving deeper in their business models and services. This, together with the design of DREEM business models, will allow us to define DREEM business strategy.

The following table presents a summary of their main technical specifications:

Table 1 Preliminary assessment of main competitors of DREEM

Name manufacturer	Model	Range (Km)	Weight (kg)	Public price (€)	Max.Power (W)	Max.speed (km/h)	Tire size (inch)	Wheels	Max Climbing Angle (%)
 Xiaomi	 M2 PRO	45	14	479	600	25	8.5	2	15 -20
 ET-WOW	 Booster	30 - 40	13	599	700	35-40 (but limited to 25 km/h)	8	2	25
 Segway	 G30 Max	65	18.7	699	700	25	10.5	2	20
 Kaabo	 Mantis M8/8	50	23	899 - 1199	800	43	8	2	30
 Unagi	 Model One	25	13	800	500	32.2	9	2	15

PART II – MARKET ANALYSIS

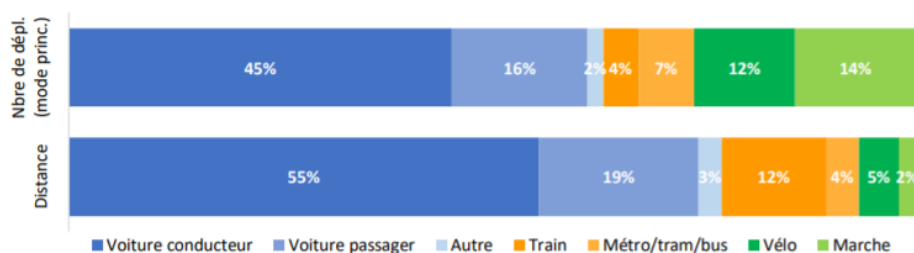
1. MARKET STUDY OF BELGIUM

This chapter provides an overview of the mobility culture (including travel modal shares and car ownership) and regulatory framework relating to e-ks in Belgium. It further dedicates particular attention to possible changes in mobility behaviours after the COVID-19 lockdown. In the second part, we studied the city of Brussels on the basis of a series of external indicators (city/local related) that could shape the market penetration of the DREEM mobility solution.

1.1 Mobility behaviour and trends

- **Travel modal shares**

Regarding mode of transport preferences among the population in Belgium as a whole in 2019 (see Figure 8), personal car use was favoured over other transport modes by a large margin (61% of trips). Walking represented 14% of all trips, biking 12% and public transport 11%. Moreover, when comparing travel modal shares in Belgium between 1999 and 2017 (see Figure 9 on the left), it can be seen that the number of trips by car is decreasing (-6%) while public transport (+4%) and active modes like cycling (+3%) saw the numbers of trips increase. If we look at the distance travelled, the drop in car use is less considerable (see Figure 9 on the right).



Graphique 4 - Parts modales des déplacements des Belges (Base : 25.168 et 25.116 déplacements)³

Figure 8: Travel modal share among the population in Belgium in 2019 (Base: 25.168 et 25.116 trips⁶) [8]

⁶ The “Autre” category includes motos, taxis, private bus, e-scooter for disabled people

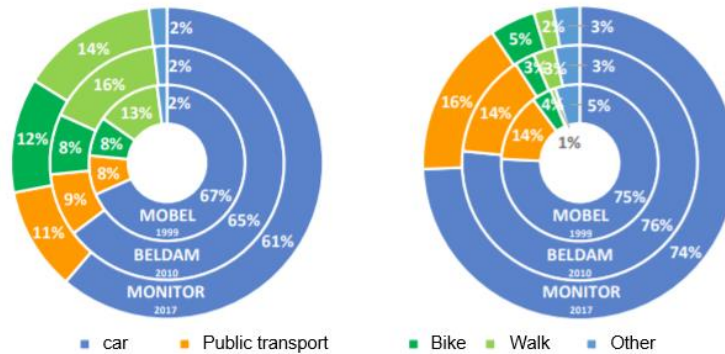


Figure 9: Travel modal share comparison in Belgium between 1999 and 2017, in terms of number of trips (left) and distance travelled (right) [8]

Looking at the modal split between three Belgian regions in 2019 (see Figure 10), we can see that the travel modal split is strongly linked to the typology of the main city. Although car is the dominant mode of transport (45% of trips), Brussels, as the capital of Belgium, offers more public transportation services reflecting higher public transport use with 25%, and shows less car use with 46%. Walking represents 24% of the split and cycling only 4%. In Flandre, the region in Belgium awarded the UCI 'Bike Region Label', biking use is significantly higher with 18% of the share. Finally, in Wallonie car use is higher with over half of the population (73%) and public transport use is low with only 10% of the share.

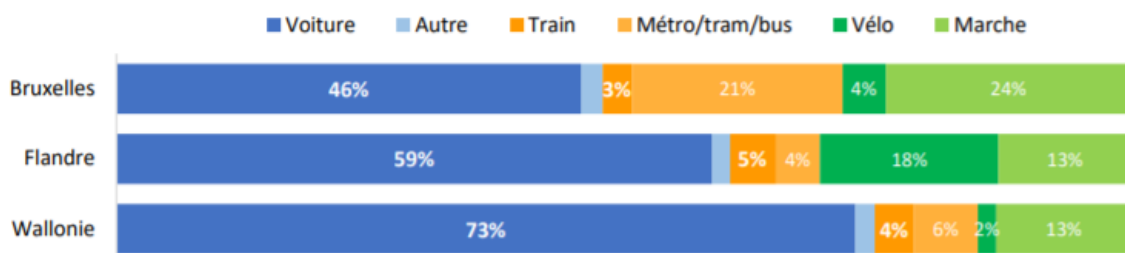


Figure 10: Travel modal share by region in 2019 in number of trips (Base: 25.168 trips) [8]

Regarding gender differences in travel patterns, we can see that although car is the main means for both, women tend to travel in cars more frequently as passengers rather than as drivers (21% for women and 11% for men). This trend is in line with a study carried out by CIVITAS at European level [1]. As revealed in this study, these gender differences are mainly accounted for by the division of roles in the labour market and in the family, as well as age and location. This will be studied more in detail in D3.1.

Concerning active modes at national level, men show similar patterns on walking and cycling while women tend to prefer walking. Note that these gender differences become less relevant in the region of Brussels.

- **Vehicle ownership in Belgian households**

Car ownership has increased from 2013-2018 in Belgium, going from 491 cars per 1000 inhabitants to 512 per 1000 inhabitants cars in 2018.

Table 2 Passenger cars per 1 000 inhabitants (Eurostat 2021)

2013	2014	2015	2016	2017	2018
491	495	501	505	509	512

Figure 11 shows the results of a survey in which Belgian households were asked in 2019 about the number and type of vehicles (car, scooter, bike, kick scooter) that were owned.

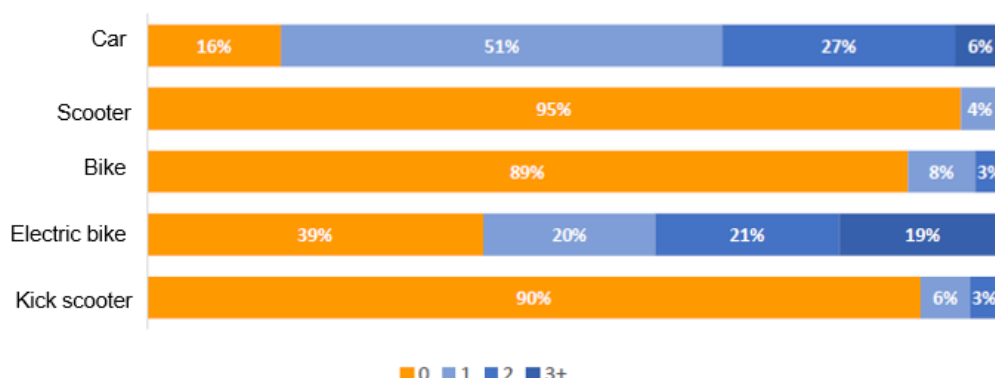


Figure 11: Number of vehicles owned by Belgian households (car, scooter, bike, kick scooter) (2019) [8]

While a large number of Belgian households own at least one car (51% of the households) and a bike (on average per household 1.4 non-electric bikes, children's bikes not included) a very small proportion own a kick scooter or an electric bike.

Car ownership is significantly lower in Brussels. A recent report compiled by Belgian statistical agency Statbel shows that 53% of Belgian households are without a car (against 16% at national level) and that this is mainly due to single people (which make up almost half of the population) [9].

Both reports show that not only does the type of household play a role, but also the municipality. Roughly speaking, car ownership is at its lowest in the central municipalities. The further from the city centre, the higher the car ownership. The socio-economic profile of the municipality also clearly plays a role: in the wealthy municipalities in the south-east

of Brussels for instance, car ownership is the highest, and these also record the largest number of families with two or more cars.

Box 1: Changes in mobility behaviours after the lockdown

Since the end of the lockdown, observers have noticed differences in people's mobility behaviours in major cities in Belgium, as frequent users reported being fearful of contagion. Here is a summary of the main points of the last national study carried out on the subject [10].

- **Remote working:** More widespread telework and a positive experience.
- **Commuting to work or studies:** a significant decrease in the number of days per week for travel home-work or home-place of study, leading to: a decrease in public transport use (from 25% to 11%); an increase in car use (from 56% to 65%); an increase in active modes such as biking or walking (from 17% to 22%). In 2021, the number of public transport users in Brussels has decreased by 36%. [11].
- **Growing reliance on e-commerce and home delivery.** The perceived health risks of venturing into crowded stores coupled with stay-at-home orders is accelerating the rapid shift toward online retail and home delivery in Belgium.

1.2 Overview of policy relating to e-ks in Belgium

Like other vehicles using the road, e-ks in Belgium operate within a regulatory framework.

First of all, e-ks in Belgium are designated as a separate dedicated category. There is a vehicle category 'personal transportation devices' with two sub-categories:

- a. "Engin de déplacement non motorisé (Motorised): skateboards, wheelchairs (if the person in the wheelchairs turn the wheels himself), kick scooter...
- b. "Engin de déplacement motorisé" (Non-motorised) : hoverboard, monowheel, Segway, e-ks..."

To comply with the law, these devices may not be wider than 1 m, and the motorised ones (including e-ks) may not go faster than 25 km/h [12]. Same definition is applied at city level.

The following table looks at the regulations related to four different areas such as safety, parking, allowed lanes and law enforcement.

Table 3 E-ks related regulations within Belgium and Brussels

Regulation	Italy	Torino
Minimum age	The highway code does not indicate a minimum age for riding a ks. In the case of free-floating services, users are required to respect the conditions of use of the operators.	<i>Same rules than national level</i>
Registration	You do not need to have a driving license in Belgium to ride a e-ks, but of course you must obey the rules of the road. No registration plate needed.	<i>Same rules than national level</i>
Maximum speed limit	For the moment the maximum speed limit for e- is 25km / h since May 31, 2019 (riding on pavement). E-ks capable of driving faster are prohibited on public roads [13].	<i>Same rules than national level</i>
Maximum power	There is no restriction on the maximum power that e-ks can have in the public space in Belgium.	<i>Same rules than national level</i>

Legal liability insurance	The Belgian law states that vehicles that cannot exceed 25 km/h are exempt from the obligation to be insured. For higher speeds, a family liability insurance (RC) is mandatory to cover damage caused to others .	<i>Same rules than national level</i>
Allowed lanes	The e-ks user must comply with the same obligations than bike users, that is to say, ride on cycle paths or, failing that, on the roadway, and obey the signs. They can also take the prohibited directions if the signs allow it for bicycles. Sidewalks are are not allowed and on pedestrian areas, e-ks must follow the same rules as pedestrians, namely: use sidewalks, cross on pedestrian crossings, obey traffic lights when there are any, etc. It is forbidden to use an e-ks in stations and public buildings and to use roads for cars and highways.	<i>The same rules than Belgium. + it is forbidden to use an e-ks in the parks.</i>
Helmet use Other safety equipment	It is not compulsory to use a helmet but is recommended. Between dusk and dawn and when it is no longer possible to see clearly up to a distance of about 200 meters, an e-ks user is required to light a white or yellow light at the front and a red light at the rear. This lighting can be placed on clothing or a backpack, for example.	<i>Same rules than Belgium</i>
Parking and No e-ks zones	The only national rule is that e-ks cannot be parked in a place where it would obstruct the circulation of other users.	<i>Same rules than Belgium</i> Every cities have their own complementary rules.
Level of enforcement	The level of enforcement is said to be infrequent.	If you ride by passing them and weave between pedestrians, it means you are going too fast. In this case, you may surprise and endanger other users of the sidewalk, and you also may be sanctioned by a police officer, competent to assess this notion of speed.
Additional information	There is a demand to restrict the number of people on a e-scooter or 'personal transportation device' in general. Currently, it is not restricted as such.	

1.3 Focus on pilot city 1: BRUSSELS

a. City profile

City area (sq.km): 161.4

Population: Brussels Capital Region is home to 1.2 million inhabitants

Population density (inh.sqkm): 7384

Type of population: The capital city has experienced a rise in population over the past few years and, just like all large European cities, the population composition is highly influenced by internationalisation. About 31.7% of the people living in the city were born outside of Belgium. There are around 86, 000 students enrolled in universities in one of the 12 universities in Brussels, representing about 8.6% of the population⁷.

Modal split: 24% PT, 24% Walking, 4% Cycling, 46% Motorised modes

#1 most congested city in Belgium and #25 in the world

b. Urban mobility context (and SUMP) in Brussels

Centrally located in Belgium, the region attracts a significant number of daily commuters from the greater metropolitan area, which includes around 2.5 million people, or 20% of the Belgian inhabitants. Often branded as 'the capital of Europe', Brussels is home to many EU institutions, which attract economic and political stakeholders, ex-pats, and an international workforce.

Besides the EU institutions, many national and international companies have their Belgian or even European headquarters in Brussels. Around 700,000 people work in the capital region, of which around 50% commute from outside the region. Around half of the commuters use the car, thus more than 100,000 commuters congest roads in the capital region, every day. Indeed, the average person living in Brussels spends 119 hours⁸ in traffic per year.

On March 2020 the Council of Ministers of the Belgian capital Brussels approved the 'Good Move'⁹ regional mobility plan for the city region [14]. By adopting this plan, the Brussels government aims to:

1. Reduce personal car use by 24%

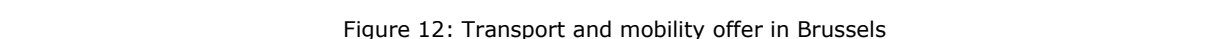
⁷ <https://www.study.eu/city/brussels>

⁸ TomTom, 2019

⁹ <https://mobilite-mobiliteit.brussels/en/good-move>

- by 2030.

A myriad of transport services, public and private, are available for commuters in the region of Brussels. Trains, metros, trams, taxis, shared bikes, shared cars, shared motorcycles or shared e-kick scooters, all allow for inhabitants and visitors to travel across the metropolis.



Public Transport¹⁰:

The region of Brussels is covered by a public transport network which is managed by four different companies¹¹:

- **STIB** (Société des Transports Intercommunaux de Brussels) brings together the Brussels network of trams, buses and metro.
- **SNCB** (Société Nationale des Chemins de fer Belges), in its rail network, connects the Brussels stations to each other: no less than 33 stops are served by train in Brussels.
- **De Lijn** (the Flemish public transport company), provides connections between Brussels and the neighboring towns or municipalities in Flanders, with numerous stops all over Brussels.
- **TEC** (Transport En Commun en Wallonie) offers border connections between Brussels and Wallonia.

The regular ticket of Brussels public transport is €2.1 and it is valid for train, metro buses and tram lines for 60 minutes after stamp it. There are daily tickets (€7.5), weekly, monthly (€5 card plus €49) and annual (€5 card plus €499).

Shared Micromobility services: At the time of the present report, the different shared mobility options available in Brussels were:

Shared bicycle services¹²: Six public and private initiatives are operating today in Brussels. These six services fit also into two large categories: one nationwide bike sharing system (Blue-Bike) and five local systems (Villo!, Billy Bikes, Uber, Lime and Swapfiets).

- **Villo!:** is the City of Brussels' bike sharing service, with over 5000 bikes and 360 stations in the city where it is possible to pick up and leave the bicycles, 24 hours a day. The annual pass (€35.7) allows to use the bike for free for a ride of less than 30 min, even several times a day. Villo! is now providing bikes which accept to plug an external battery (rent for 4€ a month) to change a normal bike into an e-bike. There is a business plan, for companies to pay the yearly amount and employees the extra fares. A 30 min single use trip is €1.65. It also offers the possibility to integrate Villo! membership into your MOBIB card.

¹⁰ https://www.stib-mivb.be/article.html?l=en&_guid=800309e8-1983-3410-b599-e90c40f84dea

¹¹ Brussels Mobilité, 2021

¹² <https://bikesharemap.com/brussels/#/12.296011223248044/4.3656/50.8446/>

- **Billy Bikes, Lime, Swapfiets and Uber** bikes aren't docked and they also offer electric bikes that you can unlock with the app and pay as you go. The benefit of Uber is that on the same app you have access to either electric bikes or e-ks and the service is available in other cities and countries. The price for using these dockless shared bikes start at €1 and €0,17 for every additional minute.
- **Blue Bikes:** It is managed by SNCB¹³, and is designed to help railway travellers continue their journey from the station to their destination point. It is present in 40 Belgian cities. If you're subscribed to both Villo! and Blue Bike, you can actually use the same MOBIB card to ride the Villo! to a train station, take the train to another city, then grab a Blue Bike to ride around that other city. The price for using Blue bikes start at €12 per year and €3,15 per day.

Shared e-ks: 6 private companies are currently in charge of several hundreds of e-kickscooters rentals (Bird, dott, Lime, Poppy, Pony and more recently Bolt). They are available to rent throughout the city of Brussels and its surrounding areas. The cost of a trip averages €1 to unlock the vehicle and €0.15-0.25 per minute. Mobile apps are all available on Google Play and Apple App Store for free. The vehicle is located through the app and unlocked by reading the QR code on it. Some offers weekly or monthly plans, with free unlocking averaging 5€ (week) to 15€ (month). The maximum speed by construction of e-ks cannot exceed 25 km/h. E-ks capable of driving faster are prohibited on public roads. The e-ks user must comply with the same obligations than bike users, that is to say, ride on cycle paths or, failing that, on the roadway, and obey the signs. They can also take the prohibited directions if the signs allow it for bicycles. Sidewalks are banned and on pedestrian areas, the e-ks must follow the same rules as pedestrians, namely: use sidewalks, cross on pedestrian crossings, obey traffic lights when there are any, etc.

Shared motorcycles: Two shared motorcycle companies are sharing the market in Brussels. The price for using a shared motorcycle start at €0.3 per minute.

Car sharing¹⁴: The main providers are Cambio (station), Poppy (free floating) and Scooty and Felyx for scooter sharing. Cozywheels, CarAmigo, Wibee and Getaround among neighbours. These vehicles can access the low emission zone (LEZ) and can park

¹³ the national railway company

¹⁴ <https://lez.brussels/mytax/fr/alternatives?tab=ShareVehicule>

in the city for free. Cost can vary among different providers, poppy for example offers €1 for unlocking and €0.36/min.

There are also ridesharing and taxi services as shown in Figure 12.

Finally, the costs of acquisition of vehicles in Belgium are: average €450-1300¹⁵ for an e-ks, €700-3000 for an ebike, €13 000-23 000¹⁶ for an electric motorbike and €20 000-45 000¹⁷ for an electric car.

d. Bicycle culture and infrastructure.

- The 'Good Move'18 regional mobility plan for the city aims to quadruple bicycle use by 2030
- There is 19 itineraries for 256km of road dedicated to bikes [15].
- The number of cyclist have doubled between 2010 and 2018 [15].
- Brussels doubled down on its mobility strategy during the pandemic by pledging to turn 40 kilometers of car lanes and parking spaces into cycle paths on main thoroughfares. It seems the these measures have encouraged people to take up cycling. Bike use is up by 44% on 2020¹⁹.
- Space: research in Brussels shows that 70% of the city's space is allocated to roads and car parking²⁰.

e. Weather

- In Brussels, during the entire year, the rain falls for 199.6 days and collects up to 852.8mm (33.57") of precipitation. The month with the highest number of rainy days is December (19.3 days).
- Throughout the year, in Brussels, Belgium, there are 23.7 snowfall days. January through April, November and December are months with snowfall.

¹⁵ <https://www.ecoconso.be/fr/content/combien-coute-un-velo-electrique-lachat-et-lutilisation>

¹⁶ <https://www.touring.be/fr/articles/moto-electrique-quel-cout>

¹⁷ https://www.engie.be/fr/blog/agir-pour-la-planete/idees_recues_voitures_electriques/

¹⁸ <https://mobilite-mobiliteit.brussels/en/good-move>

¹⁹ <https://www.bbc.com/news/world-europe-54353914>

²⁰ <https://environnement.brussels/thematiques/mobilite/la-mobilite-Brussels/chiffres>

2. MARKET STUDY OF ITALY

This chapter provides an overview of the mobility culture (including travel modal shares and car ownership) and regulatory framework relating to e-ks in Italy. It further dedicates particular attention to possible changes in mobility behaviours after the COVID-19 lockdown. In the second part, we studied the city of Torino on the basis of a series of external indicators (city/local related) that could shape the market penetration of the DREEM mobility solution.

2.1 Mobility behaviour and trends

- **Travel modal shares**

In 2018, the most common transportation mode to use in Italy was the car, representing 59.1% of the users. Walking represented 22,9% of all trips and public transport 11%. It is interesting to note that the share of biking and motorcycle remains the same among the population in Italy as a whole. This reflects the fact that Italy is the second “most motorized” country in European Union, after Luxembourg [16].

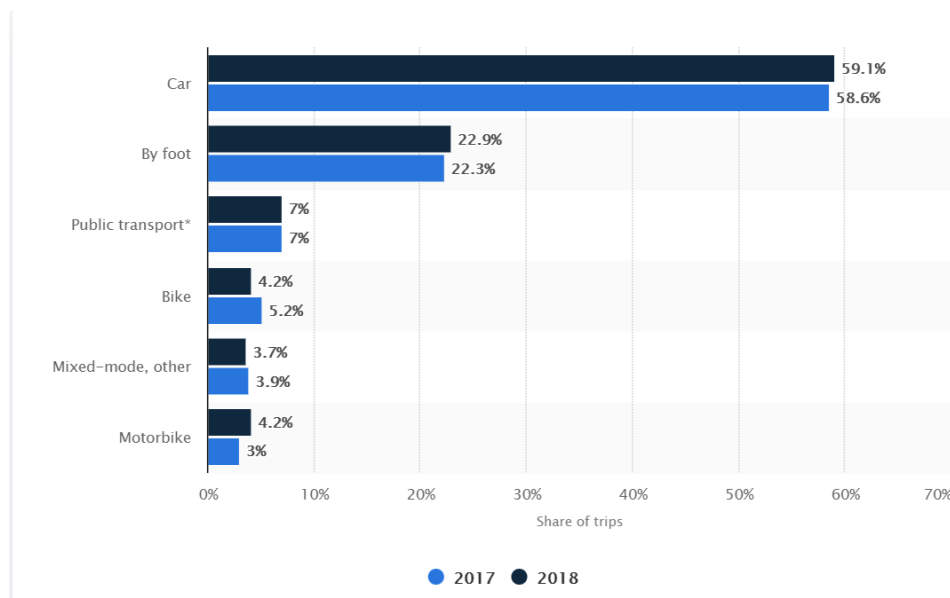


Figure 13: Distribution of trips in Italy in 2017 and 2018, by mode of transportation (Statista)

Looking at the modal split between four Italian cities (see Figure 14), we can see that the travel modal split is strongly linked to the typology of the city. In Rome, as the most congested city in Italy, cars and mopeds remain the favourite means of transport (65%).

In Palermo, car and moped use is even higher with 75% of the share. Torino, as the third most congested city in Italy, shows a similar trend as Rome in terms of public transport and car use. However, the share of walking is more significant (13% of trips). Finally Milan offers more public transportation services reflecting high public transport use with 38%, and shows less car use with 43%. The share of biking and walking (18%) in Milan is also higher than in other cities. Indeed, with the exception of Milan, overall Italian cities remain far behind many other towns in Europe for bike-friendliness, with Rome especially suffering from limited cycle lanes, heavy traffic and poorly maintained roads.

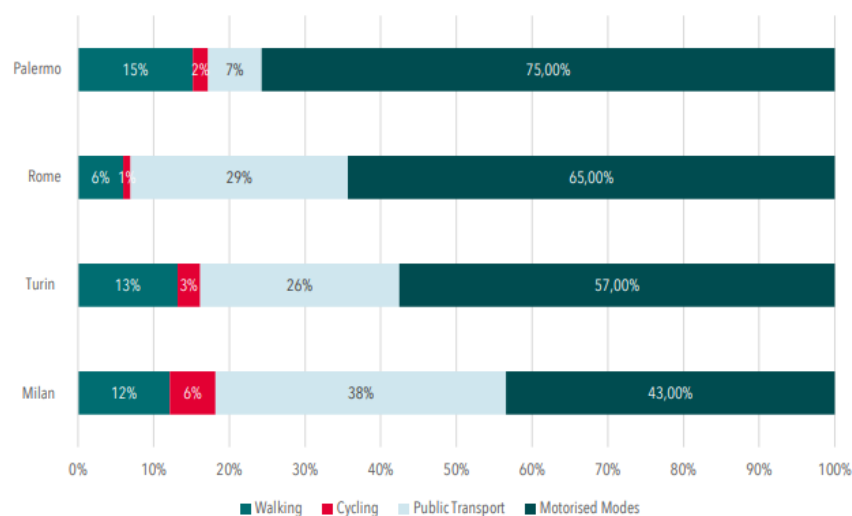


Figure 14: Travel modal split in Palermo, Rome, Torino and Milan (2018) [17]

• Vehicle ownership in Italian households

Car ownership in Italy has increased from 2013-2019, going from 608 cars per 1000 inhabitants to 663 cars per 1000 inhabitants in 2019. In 2019, Italy had the second highest number of passenger cars per inhabitant in the EU²¹. Moreover, according to a Statista Global Consumer Survey conducted in Italy in 2021, 81% of Italians own one car or more.

Table 4 Passenger cars per 1 000 inhabitants (Eurostat 2021)

2013	2014	2015	2016	2017	2018	2019
608	610	616	625	-	646	663

Bicycle sales in Italy peaked 2 million units in 2007. Sales declined in the following years before rebounding to around 1.7 million units in 2020.

²¹ Eurostat - https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Passenger_cars_in_the_EU

Demand for e-bikes gained steam in 2011, reaching 280,000 units in 2020²². This 44% rise reflects a broader trend in the EU, where e-bikes are becoming more popular every year and specially in urban areas. Covid-19 pandemic (and policy measures taken behind) helped fuel e-bike sales as more consumers in Italy were looking for socially distanced alternatives to their daily commute.

Box 2: Changes in mobility behaviours after the lockdown

Since the end of the lockdown, observers have noticed differences in people's mobility behaviours in major cities in Italy:

- About half of Italian commuters declared to have changed commuting frequency due to the pandemic. When it comes to the choice of the transportation means, the necessity to avoid crowded places and close spaces push many commuters to choose the car over public transportation. This came in a time in which public transportation was already going unpopular. Indeed, also about half of the people who do not travel for work or study reasons did not use public transportation before the pandemic and will not start using it in the next months.
- Mobilitaria 2021, the annual report by the Kyoto Club and the CNR Italian Institute for Atmospheric Pollution (CNR-IIA) revealed that Italian cities promoted cycling as a way to move around, while respecting social distancing²³. In fact, the length of bike paths in the main cities has increased: Torino (+ 11 km), Milan (+ 67 km), Venice (+ 18 km), Bologna (+ 16 km), Genoa (+ 25 km), Rome (+ 33 km), Palermo (+ 4 km), Cagliari (+ 11 km). The study also identified that there has been a decrease in car sharing in almost all cities, while bike sharing has maintained its use at the same levels, whereas micro-mobility has spread fast.
- 5T, partner of DREEM, has recently conducted an analysis of real time traffic data in the city of Torino. Their study revealed that in 2021 bike use was 66% more than in 2020 and car use was 13% more than in 2020. Moreover, while in 2021 the level of car use is still lower than normal pre-Covid levels, biking in Torino is significantly higher than normal pre-Covid levels.

²² Statista - Number of bicycles sold in Italy from 2000 to 2020

<https://www.statista.com/statistics/398304/bicycle-sales-in-italy/>

²³ <https://www.eltis.org/in-brief/news/cycle-paths-increase-italy-although-pollution-back-pre-covid-levels>

2.2 Overview of policy relating to e-ks in Italy

The Italian Law 2020/8 regulates the circulation of vehicles for personal electric micro-mobility. In Italy, e-ks are classified in the same category as bicycles²⁴, meaning they don't need to be registered or insured.

However, in order to travel on the road, the e-ks must meet specific characteristics:

Table 5 E-ks related regulations within Italy and Torino

Regulation	Italy	Torino
Minimum age	The rider must be aged at least 14.	<i>Same rules than national level</i>
Registration	E-ks don't need to be registered.	<i>Shared e-ks must have a unique identification code, impressed on the handlebar column.</i>
Maximum speed limit	There is a speed limit of 25 km/h on roads and six km/h in pedestrian areas. They must be equipped with a speed limiter.	<i>Same limitations are applied in Torino</i>
Maximum power	The electric motor must have a continuous rated power not exceeding 500 W.	<i>Same rules are applied in Torino</i>
Legal liability insurance	E-ks don't need to be insured.	<i>Same rules are applied in Torino</i>
Allowed lanes	<ul style="list-style-type: none"> • It is forbidden to use e-ks on motorways or roads with a speed limit above 50 km/h. • Sidewalks are banned to e-ks. 	<i>Same rules are applied in Torino .</i>

²⁴ Le regole per i monopattini elettrici

<https://www.interno.gov.it/it/notizie/regole-i-monopattini-elettrici>

Helmet use Other safety equipment	<ul style="list-style-type: none"> - 14-18 year old must wear a helmet. - Reflective clothing must be worn between sunset and sunrise. - All e-ks must be fitted with a bell, rear reflector and have front (white/yellow) and rear (red) lights. 	<i>Same rules are applied in Torino</i>
Parking and No e-ks zones	E-ks can be parked in areas and stalls for bicycles and motor vehicles, in points where there is no interference with pedestrians and other vehicles and in other parking areas that the Municipality will identify with special ordinances.	The Municipality of Torino has worked for the update of the Plan of stalls for bicycles and e-ks which identifies 250 park stations in the city (50 in the central area). Each station can accommodate 4 bikes plus a free area for e-ks.
Level of enforcement	No enforcement.	No enforcement.
Additional information	<p>It is forbidden to equip the scooter with a seat or to carry a passenger. Driving code:</p> <ul style="list-style-type: none"> • e-ks drivers must have free use of their arms and hands and always hold the handlebar with both hands, unless it is necessary to signal a turning manoeuvre. • e-ks drivers must always be able to see freely in front of them. • Since e-ks are intended to be used with a standing posture, they must not be equipped with a seat for the user; 	<i>Same rules are applied in Torino</i>
Other changing transport regulations and policies impacting e-ks	<p>With the DL 2020/34 "Relaunch Decree" (later extended for 2021), the Italian Government granted a contribution, called Buono Mobilità, this mobility coupon allows (adults) residents of large towns or cities to claim back 60 percent of the purchase price of an electric bike or e-ks, up to a maximum of 500 euros²⁵.</p> <p>There are 14 Italian metropolitan cities in the program.</p>	Torino is part of the Buono Mobilità program.

²⁵ <https://www.thelocal.it/20200609/heres-what-you-need-to-know-about-italys-new-electric-scooter-craze/>

2.3 Focus on pilot city 2: TORINO

a. City profile

City area (sq.km): 130

Population: 870,952

Population density (inh./sqkm): 6699

Type of population: About 16% of the people living in the city, including international students, were born outside of Italy²⁶. Around 81,700 students attend one of the universities of the city, representing about 10% of the population.

Modal split: 26% PT, 13% Walking, 3% Cycling, 58% Motorised modes

#3 most congested city in Italy and #45 in the world²⁷

b. Urban mobility context (and SUMP) in Torino

As the home of Fiat, Torino was long known as Italy's motor city. Indeed, Torino has one of the highest levels of car ownership in Europe. However, the path to become "Smart City" started in 2009, when the City Council decided to take part in the initiative of the European Commission "Covenant of Mayors" and – as one of the first Italian cities – committed to elaborate an Action Plan for Energy. The Torino Action Plan for Energy (TAPE), that represents a fundamental step towards Torino as "Smart City", has been approved in 2010 and its objective is to reduce CO2 of 40% by 2020 (baseline: 1991

In 2011 Torino approved the Sustainable Urban Mobility Plan (SUMP). The objectives of the SUMP are: 1. Improving accessibility to the city; 2. Ensuring and improving accessibility for people; 3. Improving air quality; 4. Improving the quality of urban environment; 5. Increase the use of public transport; 6. Efficiency and safety of road system; 7. Innovative technologies for mobility management; 8. Define the governance of the Plan.

In 2013 Torino also approved the Cycling Masterplan (Biciplan²⁸) whose principal objective is to increase cycling to 15% of all trips less than 5 km while promoting intermodal trips with public transportation.

²⁶ <https://www.coe.int/en/web/interculturalcities/torino>

²⁷ <https://inrix.com/scorecard-city/?city=Torino&index=45>

²⁸ http://www.comune.torino.it/trasporti/bm~doc/all1_piano-della-mobilit-ciclabile_emend.pdf

Torino's new Sustainable Urban Mobility Plan²⁹ will promote intermodality, strengthen metropolitan public transport, enhance electric and shared mobility as well as cycling and walking, reduce public space dedicated to parking and incentivize smart-working. In addition, it will make urban spaces more liveable in coherence with the vision of the newly revised General Urban Masterplan (currently underway), including more green-infrastructure and safer, more walkable neighborhoods.

c. Existing transport services and governance in Torino's region

A myriad of transport services, public and private, are available for commuters in the region of Torino. Trains, metros, trams, taxis, shared bikes, shared cars, shared motorcycles or shared e-kick scooters, all allow for inhabitants and visitors to travel across the metropolis.

The description of these transport services and governance is given in the following and pictured in Figure 15:

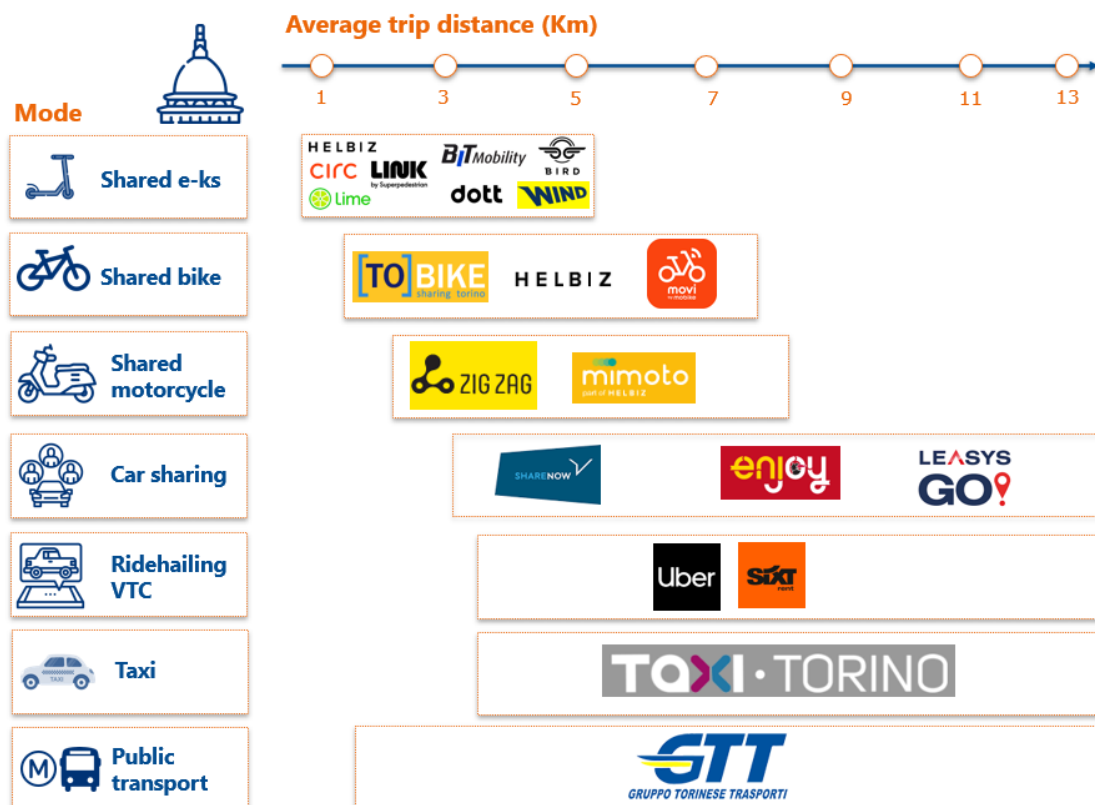


Figure 15: Transport and mobility offer in Torino

²⁹ <http://geoportale.comune.torino.it/web/sezioni-tematiche/piano-urbano-della-mobilita-sostenibile-introduzione>

Public Transport³⁰: Torino public transport includes buses, trams and the subway (metropolitana). It offers a fully automated subway system of 13.2 km with one line and 21 stations, serving 155 000 people per day, it averages 25 minutes to go from terminal station to terminal station. The regular ticket of Torino public transport is €1.5 and it is valid for buses and tram lines for 90 minutes after stamp it. There are daily tickets (€5), weekly (€5 card plus €12), monthly (€5 card plus €38) and annual (€5 card plus €310).

Shared Micromobility services: At the time of the present report, the different shared mobility options available in Torino were:

Shared bicycle services: [TO]Bike³¹ is the City of Torino's bike sharing service, with over 140 stations in the city where it is possible to pick up and leave the bicycles, 24 hours a day. The annual pass (€25) or weekly pass (€8) allows to use the bike for free for a ride of less than 30 min, even several times a day. Free floating bike sharing is also possible with [Mobike](#), [Helbiz](#), Pony³² and [oBike](#), offering innovative packages, i.e. Helbiz³³ has launched the first subscription offer of €29.99 per month allowing to make unlimited journeys of 30 min (with 20 min elapsed between trips) for bikes and e-kickscooters.

Shared e-ks³⁴: 10 private companies are currently in charge of several hundreds of e-kickscooters rentals (Bird, BIT mobility, CIRC, dott, Helbiz, Hive, Lime, Link, Wind and Tier). They are available to rent throughout the city of Torino and its surrounding areas (but trips must start and end inside Torino city perimeter). The cost of a trip averages €1 to unlock the vehicle and €0.15-0.25 per minute. Mobile apps are all available on Google Play and Apple App Store for free. The vehicle is located through the app and unlocked by reading the QR code on it. E-kickscooters are allowed in the [zona 30](#), on [bicycle paths](#), in streets with speed limit of 30km/h and inside [ZTL](#) zone (limited traffic zone). It is forbidden to ride e-kickscooters on pedestrian zones or sidewalks, against the flow of traffic, being towed by other vehicles or more than one person per vehicle. Some offers weekly or monthly plans, with free unlocking averaging 5€ (week) to 15€ (month).

³⁰ <https://mapa-metro.com/en/italy/Torino/Torino-metro-map.htm>

³¹ <http://www.tobike.it/frmAbbonati.aspx>

³² <https://www.torinotoday.it/attualita/pony-monopattini-torino-cittadini-proprietari.html>

³³ <https://medium.com/helbizofficial/in-Torino-since-may-more-than-3-thousand-bike-rides-with-helbiz-388419a5af1a>

³⁴ <http://www.studyintorino.it/electric-scooters-arrive-in-torino/>

Car sharing³⁵: The main providers are Enjoy, ShareNow, [LeasyGo](#)³⁶ and MiMoto for scooter sharing. These vehicles can access the ZTL zone and can park in blue areas, restricted to private cars. Cost can vary among different providers, sharenow for example offers €9 for registration and €0.19/min. There are also ridesharing and taxi services as shown in Figure 15.

Finally, the costs of acquisition of vehicles in Italy are: average €500-1200 for an e-kickscooter, €700-3000 for an ebike, €3 000-15 000 for an electric motorbike and €15 000- 80 000 for an electric car.

d. Bicycle culture and infrastructure.

- Cycling in the city of Torino is growing steadily, despite a lack of large investment in past years. The mostly car-oriented mobility culture, built up through decades of street design planning, is now shifting to a more balanced modal mix.
- However, the City of Torino has recently received funding of €4.9 million to implement new cycling infrastructure (cycling lanes, bike boxes)). Thanks to these investments, Torino is developing cycling solutions to be implemented within twenty-two months (by August 2022). The new infrastructure solutions were designed in accordance with regional planning tools, the Sustainable Urban Mobility Plan (SUMP) and the Bicycle Plan of the City of Torino called "Biciplan", approved in 2013.
- The Cycling Masterplan (Biciplan) approved in 2013 aims to increase cycling to 15% of all trips less than 5 km while promoting intermodal trips with public transportation.
- Space allocation: 70% of Torino's space is allocated to roads³⁷ and car parking³⁸; 27% to sidewalks; 2% to cycle tracks³⁹ and 2% to bus lanes⁴⁰.

³⁵ <http://www.comune.torino.it/torinogiovani/vivere-a-torino/car-sharing-a-torino>

³⁶ Bluetorino closed the service in Feb-2021 and LeasysGo acquired its charging infrastructure

³⁷ Directly provided by the Municipality of Torino

³⁸ Estimated on the basis of the total length of the road network of the city (1.470 km, provided by Municipality of Torino), assuming that parking is allowed on only one side, in parallel to the lane, and that stall is 10x2 m.

³⁹ Estimated on the basis of the official length of bike lanes in city, 195 km (provided by Municipality of Torino), and a width of 2,5 m (so assuming all lanes as bi-directional).

⁴⁰ Estimated on the basis of the length of bus lanes in city, 159 km (provided by GTT, the city Public Transport operator), and a width of 3,5 m.

- 201 km length of cycle network and 2,500 cyclists (on busiest route)⁴¹

e. Weather

- The climate in Torino is moderately continental, with cold, damp winters and hot, muggy summers.
- In Torino, during the entire year, the rain falls for 80.9 days and collects up to 981mm (38.62") of precipitation. The month with the highest number of rainy days is May (11.2 days). Months with the least rainy days are February and December (4.4 days).
- Snow in Torino generally falls at least once every year, although it is seldom very abundant; in amounts on average to 25 centimeters per year.

⁴¹ <https://handshakecycling.eu/Torino>

3. MARKET STUDY OF SWEDEN

This chapter provides an overview of the mobility culture (including travel modal shares and car ownership) and regulatory framework relating to e-ks in Sweden. It further dedicates particular attention to possible changes in mobility behaviours after the COVID-19 lockdown. In the second part, we studied the city of Gothenburg on the basis of a series of external indicators (city/local related) that could shape the market penetration of the DREEM mobility solution.

3.1 Mobility behaviour and trends

- **Travel modal shares**

In 2019, the most common transportation mode to use in Sweden was the car, moped, motorcycle as a driver, representing 50% of the users. This number has slightly decreased from 59% in 2013. Riding public transport has increased in recent years, going from 13% in 2013 to reaching a share of 26% in 2019. This increase illustrates the different measures that were implemented to increase the share of public transport use and the political will to “put public transport on the national and regional agenda as a means of reducing local and global emissions from transport, and as an economic development and congestion management tool [18].

The share of walking, biking, taxi and car, moped, motorcycle as a passenger, use has remained stable from 2013 to 2019.

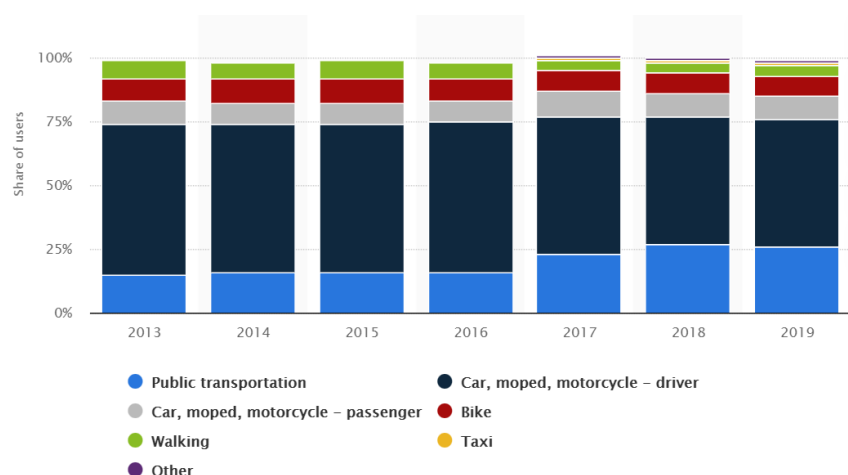


Figure 16: Distribution of transportation mode users in Sweden 2013-2019⁴²

⁴² Age group: 15-85 years; Base: 80 149 respondents in 2019) <https://www.statista.com/statistics/750110/distribution-of-transportation-mode-users-in-sweden/>

Looking at the modal split between three Swedish cities, we can see that the mode of transportation is strongly linked with the typology of the city. Stockholm, as the capital of Sweden, offers more public transportation services reflecting higher public transport use with 32%, and shows less car use with 41%. Cycling represents 7% of the split and walking 15%. Gothenburg, as the second largest city of Sweden, shows a similar modal split as Stockholm. However, in Orebro, the 6th largest city of Sweden, car use is higher with over half of the population (54%) and public transport use is low with only 8% of the share. Finally, biking use is significantly higher with 25% of the share.

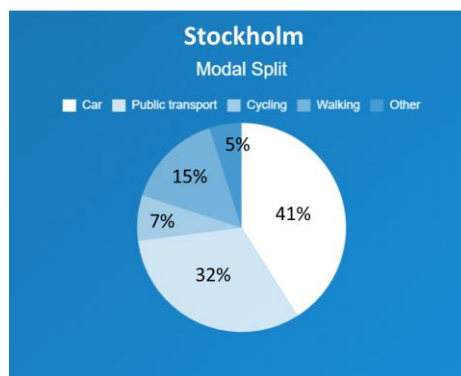


Figure 17: Modal Split Stockholm ⁴³

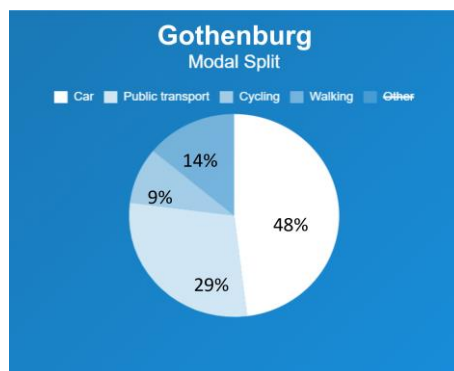


Figure 18: Modal Split Gothenburg ⁴⁴

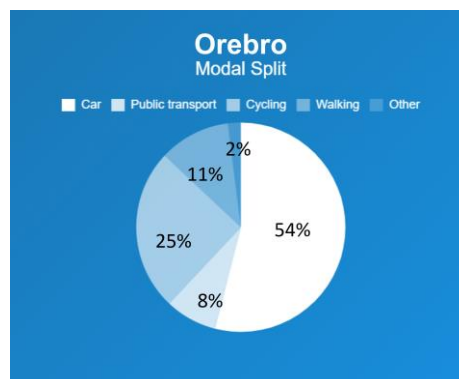


Figure 19: Modal Split Orebro ⁴⁵

⁴³ POLIS <https://www.polisnetwork.eu/member/stockholm/>

⁴⁴ POLIS <https://www.polisnetwork.eu/member/gothenburg/>

⁴⁵ POLIS <https://www.polisnetwork.eu/member/orebro/>

a. Vehicle ownership in Swedish households

Car ownership has increased from 2013-2019 in Sweden, going from 466 cars per 1000 inhabitants to 473 per 1000 inhabitants cars in 2019.

Table 6 Passenger cars per 1 000 inhabitants in Sweden (Eurostat)

2013	2014	2015	2016	2017	2018	2019
466	470	474	477	479	476	473

An interesting fact to highlight is that cars are mostly owned by men: only 35% of passenger cars in traffic owned by private individuals are owned by women[19].

Based on the 2020 Swedish Transport Analysis vehicle survey, there are 332 cars per 1000 inhabitants in Gothenburg, which is below the national average. Men own about twice as many cars than women: 52 130 are owned by women and 100 722 are owned by men⁴⁶).

Box 3: Changes in mobility behaviours after start of Covid-19 pandemic

Unlike the rest of Europe, Sweden did not opt for any form of lockdown strategy to manage the spread of Covid-19. Instead, its approach relied mostly on voluntary measures and recommendations such as social distancing, self-monitoring for symptoms and working from home. Even though there were no hard restrictions, the pandemic has brought changes and has affected mobility patterns, as public transportation for example, was not recommended by the authorities, and commuting to and from work decreased significantly during this period.

A study which analyses the effects due to the measures towards COVID-19 in Sweden, highlights an important decrease in public transport use, between 40%–60% across regions in Sweden compared with other transport modes [20]. Further analyses show that socio-economic status is a strong indicator of the tendency to stop travelling by public transport: those with a higher socio-economic status stopped using public transport to a higher degree than those with a lower status [21] .

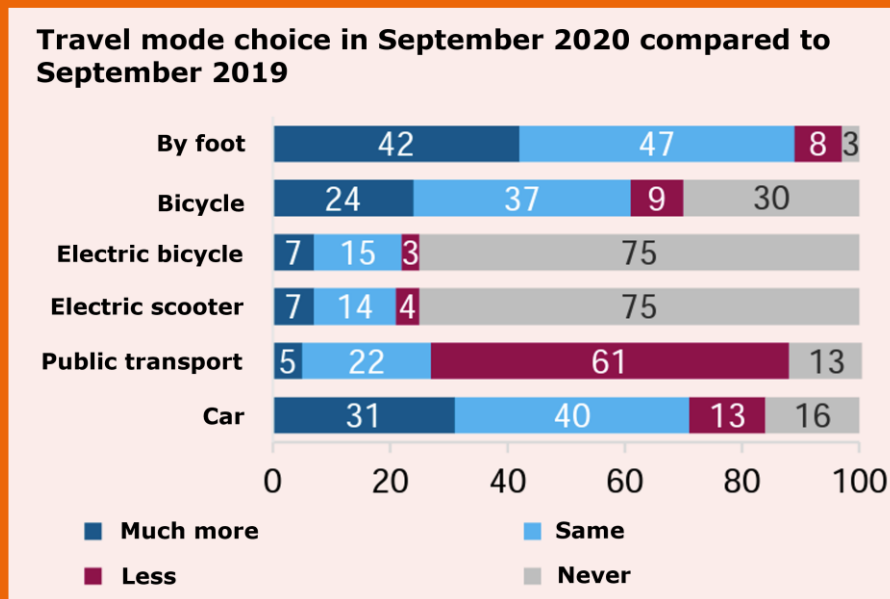
Gothenburg travel patterns during the pandemic

Concerning the city of Gothenburg, a survey on travel habits in September 2020 showed that traffic measurements were relatively normal as compared to April-May and November-December (2019)⁴⁷ . However, the choice of transport means was affected by the

⁴⁶ <https://www.trafa.se/en/road-traffic/vehicle-statistics/>

⁴⁷ September 2020 – Source Trafikkontoret report, Gothenburg Municipality

pandemic. In general, individual means of transport increased the most, i.e. on foot, bicycle and car. As many as six out of ten respondents said they used public transport less. The 18–29-year-old group chose to walk to a greater extent, while those aged 30–49 chose to cycle or take the car more. Even those aged 50–65 chose to take the car more.



3.2 Overview of policy relating to e-ks in Sweden

In Sweden the category in which e-ks are designated depends on the power and its maximum speed: it is considered a bicycle with a 250 watts motor (and 20 km/h) and can be considered a moped class I (25 km/h) or moped class II if it exceeds this limit and meets the technical standards (45 km/h) [22].

Table 7 E-ks related regulations within Sweden and Gothenburg

Regulation	Sweden	Gothenburg
Minimum age	No age restrictions.	<i>Same rules are applied in Gothenburg</i>
Registration	E-ks don't need to be registered.	<i>Same rules are applied in Gothenburg</i>
Maximum speed limit	There is a general maximum speed limit for e-scooters of 20 or 25 km/h.	<i>Same rules are applied in Gothenburg</i>
Maximum power	The maximum power depends on the category the e-scooter falls in: 250 W for a bicycle, 1000 W for a moped class I and 4000 W for a moped class II.	<i>Same rules are applied in Gothenburg</i>
Legal liability insurance	E-ks that belong to the bicycle category (250W) do not need a legal liability insurance. However, there were cases in which insurance became an issue because the vehicle was too powerful to be a bicycle.	<i>Same rules are applied in Gothenburg</i>
Allowed lanes	E-ks riders are expected to use bicycle facilities if available. If not available, they are expected to use the road lane. Riders are also allowed on the pavement if they do not travel faster than pedestrians.	<i>Riders are allowed on the Green City Zone.</i>
Helmet use Other safety equipment	Riders younger than 15 years of age are required to wear a helmet. For adults over 15 years of age wearing a helmet is recommended yet not mandatory. E-ks must have brakes, an audible warning device, such as a bicycle bell.	<i>Same rules are applied in Gothenburg</i>
Parking and No e-ks zones	e-ks cannot be parked in a place where it would obstruct the circulation of other users.	<i>Same rules are applied in Gothenburg</i>
Level of enforcement	Sweden has not been enforcing regulations on e-ks as they are categorized in the same category of bikes.	<i>Same rules are applied in Gothenburg</i>
Additional information	It is forbidden more than one person per vehicle.	<i>Same rules are applied in Gothenburg</i>

3.3 Focus on pilot city 3: GOTHENBURG

a. City profile

City area (sq.km): 447,8

Population: 580 000 inhabitants

Population density (inh./sqkm): 1300

Type of population: About 27% of the people living in the city were born outside of Sweden. The city is growing rapidly, planning to make space for 150,000 new residents by 2035⁴⁸. Around 48 000 students attend one of the two universities of the city (University of Gothenburg and Chalmers University), representing about 8% of the population.

Modal split: Public Transport 29%, Walking 14%, Cycling 9%, Car 48%

#3 most congested city in Sweden

#396 in the world

b. Urban mobility context (and SUMP) in Gothenburg

According to the transport administration of Gothenburg, the city is implementing a strategic plan to limit the number of vehicles in the transport system while ensuring accessibility and transportation to all residents. The strategy will allow commuters to travel to and from the city without increasing the number of cars from current levels. The reduction of cars is also part of Västra Götaland region's future plan "Målbild Koll 2035", where the goal is to reduce the number of cars and increase access to more sustainable modes of transport such as cycling and walking [4]. Västtrafik, the transport agency of the Västra Götaland region, as a part of their goal for 2035, conducted a user survey "Hållplats 2019" and determined that 67% of residents wanted more space for cycling and 68% wanted the current car traffic levels to decrease. Furthermore, the Swedish transport administration calculates that the number of cars should be reduced by 20% from the 2010 levels to achieve the climate objectives of Sweden. Below are listed some of the targets for 2035 by the urban transport committee of Gothenburg (transport administration, 2014):

⁴⁸ <https://www.eccar.info/en/goteborg>

- At least 35% of journeys in Gothenburg should be made on foot or bicycle.
- At least 55% of motorised journeys in Gothenburg should be made using public transport.
- The maximum time to travel between two random cores or key destinations should not be more than 30 minutes. There is a strong push from the region to not just limit the number of cars but also to reduce the number of cars on the roads. This targets congestion on the roads and cater to the environmental impact due to cars.

c. Existing transport services and governance in Gothenburg 's region

A myriad of transport services, public and private, are available for commuters in the region of Gothenburg. Trains, metros, trams, taxis, shared bikes, shared cars, shared motorcycles or shared e-ks, all allow for inhabitants and visitors to travel across the metropolis.

The description of these transport services and governance is given in the following section and pictured in Figure 20**Erreur ! Source du renvoi introuvable.**:

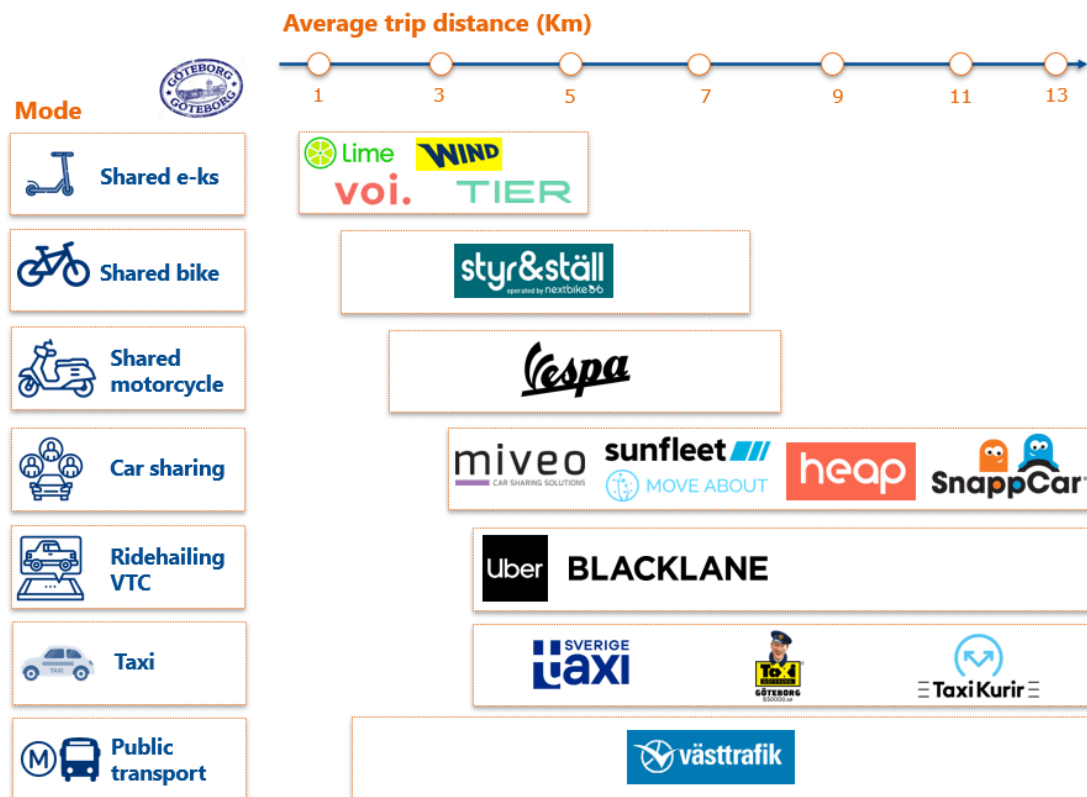


Figure 20: Transport and mobility offer in Gothenburg

Public Transport: Gothenburg has a modern and efficient public transportation network which includes trams, buses, commuter trains and ferries. The city has over 200 trams, covering 11 different routes. The single ticket of Gothenburg public transport is €3 and it is valid for 90 minutes. There are daily tickets (€10), monthly (€78), trimester (€210) and annual (€781)⁴⁹.

Shared Micromobility services: At the time of the present report, the different shared mobility options available in Gothenburg were:

Shared bicycle services: Styr & Stall⁵⁰ is the bike sharing scheme in the city, with over 130 stations in the city. The annual pass (€30) or monthly pass (€9) allows to use

⁴⁹ <https://www.vasttrafik.se/biljetter/mer-om-biljetter/vasttrafik-to-go/>

⁵⁰ <https://styrochstall.se/en/prices/>

the bike for free for a ride of less than 60 min, even several times a day. Free floating bike sharing is also possible with [Donkey](#) or nextbike⁵¹.

Shared e-ks: 4 main private providers are in charge of several hundreds of e-kickscooters rentals (Voi, Tier, Lime, Wind). Tier and Lime was launched in Gothenburg in the spring of 2019 while Voi was first released when they arrived in August 2018. E-scooters have become popular among Gothenburg citizens in a short time and a city guide made by the company Voi shows that over 500,000 trips were made in Sweden's second largest city in 2019. Which can be compared to Stockholm where over 2.5 million trips have been made and Malmö over 300,000 trips. (...) - Electric scooters have started to find a natural place in society as an alternative to short car trips in the inner city and a complement to bus, train and metro [22]. In 2019, they created the [Nordic Micromobility association](#) to join forces to ensure escooter sharing success in Scandinavia⁵². They are available to rent throughout the city of Gothenburg and its surrounding areas. The cost of a trip averages €1 to unlock the vehicle and €0.22-0.3 per minute. Mobile apps are all available on Google Play and Apple App Store for free. In all pilots, the vehicle is located through the app and unlocked by reading the QR code on it. Monthly passes start to appear, i.e. Voi has launched the Voi pass⁵³ allowing to have up to 10 rides a day (maximum 45 min), but not more than 200 min in total.

Car sharing⁵⁴: The main providers are M from Volvo Car Mobility (165 cars) and Gothenburgs Bilköoperativ (30 cars) for free floating services⁵⁵. kinto (long rental periods). These vehicles can access the Green city zone, restricted to private cars. Hygglo or Vespa offer scooter sharing options. Cost can vary among different providers, M's cheapest offer, for example, offers free registration and €10/hour⁵⁶.

⁵¹ <https://www.investingothenburg.com/news/all-news/nextbike-we-see-good-opportunities-gothenburg-and-sweden>

⁵² <https://news.cision.com/nordic-micromobility-association/r/lime--tier-and-voi-launch-nordic-micromobility-association,c2885485>

⁵³ <https://www.voiscooters.com/blog/voi-launches-subscription-voi-pass/>

⁵⁴ <http://www.comune.torino.it/torinogiovani/vivere-a-torino/car-sharing-a-torino>

⁵⁵ <https://Gothenburg.se/wps/wcm/connect/311e4659-1189-4f18-99bb-f226b36eb6e4/Bilpoolsm%C3%A5len+eng+2013-12-16.pdf?MOD=AJPERES>

⁵⁶ <https://m.co/se/en-US/pricing/>

There are also ridesharing and taxi services as shown in Figure 20**Erreur ! Source du renvoi introuvable.**:

d. Bicycle culture and infrastructure.

In a 2013 survey, 42% of the respondents agreed with the statement that Gothenburg is a bicycle-friendly city. By 2025, the aim is to increase that figure to 75%. As a growing, denser city, Gothenburg is now heavily investing in this mode of transport and has adopted a dedicated cycle programme as part of its overall traffic strategy. The goal is to triple the number of bicycle trips by 2025, compared with 2011. This means increasing from 73 000 bicycle journeys made per day, corresponding to about 6% of all trips in one day, to 219 000 bicycle trips per day in 2025, which is estimated to be equivalent 12% of all trips. It also aims for least 35% of the journeys in Gothenburg will take place on foot or by bicycle in 2035. This means doubling the total number of journeys on foot and by bicycle.

Since 1999, the bicycle path network has increased by 110 km, from 360 km in 1999 to 470 km in 2012. However, the design of these paths has mainly been based on safety issues and not the needs of cyclists such as directness, speed, and continuity. By improving its cycling infrastructure, Gothenburg wants to make cycling in their city faster, simpler and safer. Investments are being done: bicycle parkings are being built and the existing cycle paths will be improved and upgraded. In addition, around a dozen new cycle paths are being built. Safety is also improved through raised crossings for pedestrians and cyclists, and special one-way cycle paths [23].

e. Weather

- In Gothenburg, the rain falls for 163 days and amounts to 791 mm during the year. It ranges from 40 mm in the driest months (February, April) to 85 mm in the wettest (October and November).
- The snowy period of the year lasts for about 4 months, from end of November to end of March.
- On average, there are around 1,755 sunshine hours per year. The temperature drops below -5 °C for 40 days a year, and below 0 °C for 100 days. At worst, the temperature can drop to -20°C or below. In summer, there are 13 days with a temperature above 25°C, while 30°C are reached very rarely.

PART III – INSIGHTS AND CONCLUSIONS

Starting mid-March 2020, governments in Europe began to impose social isolation measures to effectively stop the spread of COVID-19, restricting all movement that was not considered essential. The new reality has led many people who previously relied on public transportation to look for alternatives they may not have considered before. This includes walking and biking to work, and using shared or personal electric vehicles like e-bikes and e-ks. A study commissioned by Lime⁵⁷ found that micromobility transit poses the lowest risk of contracting COVID-19, which is primarily spread indoors. Another share company, Bird, has found that more people are trying e-scooters for the first time and with increasing repeat riders⁵⁸. This is good news for the shared micromobility industry, and in particular to the e-ks one, which has taken a huge economic hit, according to a market analysis by McKinsey [24].

However, in a post-COVID world, rather than relying on shared e-ks services, more and more riders are finding that owning their own e-ks offers the flexibility they need to adapt quickly to changing conditions, according to UC Berkeley's Haas [6].

In a post-COVID world, e-ks ownership appears as an alternative to driving, walking, public transit, taxis, and ride sharing.

The e-ks market appears to be stabilising. While new companies have tried to hit the market for the last five years, a small number of major companies appear to control the majority of the market today (Bird (U.S), Xiaomi (China), Mercane (Italy), Unagi (U.S), E-TWOW (Romania), Kaabo (China) and Turboant (U.S.)). Instead of focusing on quickly obtaining market share, manufacturers of e-ks are primarily focusing on enhancing durability, performance, range, implementing advanced technologies, and improving the e-ks aesthetics.

In order to stay ahead of the competition, e-ks manufacturers will need to redirect efforts towards product and service differentiation instead of striving to obtain market share.

⁵⁷ <https://www.engadget.com/lime-report-micromobility-travel-avoid-covid-19-130251959.html?guccounter=1>

⁵⁸ <https://www.bird.co/blog/3-most-compelling-e-scooter-trends-post-covid/>

As part of the DREEM market entry strategy, we tried to understand the underlying factors that can make some cities better candidates than others for e-ks market penetration. To start with, we analysed the Belgian, Italian and Swedish markets and we studied the three DREEM pilot cities (Brussels, Torino and Gothenburg) based on 8 dimensions: (1) Population Density and type, (2) Congestion, (3) Local urban strategy, (4) Existing mobility offer in the city, (5) Driving restrictions for fossil fuel cars, (6) Safety regulations, (7) Bicycle culture and infrastructure and (8) Weather.

Table 8 below presents for each pilot city a preliminary list of local indicators that could impact the successful entry of the DREEM e-ks. On the other hand, Table 9 zooms on in the safety dimension, covering the main city policies and regulations.

Pilot city assessment

Based on the first study of pilot cities and countries, the following insights have emerged:

Country Modal Split	<p>The most common transportation mode to use in 2019 was the car, representing at least half of the users in the three countries. For both Italy and Belgium, car use represented about 60% of the users. While this number has been slightly decreasing since 2013, car ownership has increased from 2013-2018 in the three countries. Italy, as the second “most motorised” country in European Union, shows the highest rates of car ownership with 663 cars per 1000 inhabitants in 2019. An interesting fact to highlight in all countries is that cars are mostly owned by men and women tend to travel in cars more frequently as passengers rather than drivers. This trend is in line with a study carried out at European level [1].</p>
City Modal Split	<p>Looking at the modal split in three pilot cities (see Table 8), we can see that it is strongly linked to the mobility culture of the country and particularly to the typology of the city. While the three cities exhibit high public transport use (about 25%), the share of walking is more significant in Brussels. On the other hand, of all journeys, 3-9% are travelled by bike, with the highest percentage in Gothenburg and the lowest in Torino.</p>

Population density and type	<ul style="list-style-type: none"> • Brussels is the pilot city with the highest population density. • The three pilot cities present similar demographics in terms of student population. However, Torino is the city with the largest percentage of students, representing 10% of the population.
Congestion	<ul style="list-style-type: none"> • Brussels tops the chart as the most congested city in Europe and 25th in the world. Given the significant demographic growth which the Region has experienced for nearly 20 years, and which has led to an increase in demand for both passenger and goods transport, it can be assumed that without this modal switch from cars to other modes of transport, the congestion problems affecting the Region would be even worse⁵⁹.
Driving restrictions, Low Emission Zones (LEZs) and Zero Emission Areas (ZEAs)	<ul style="list-style-type: none"> • The three countries (Belgium, Italy and Sweden) have a national framework with low emission zones. • Brussels, Torino and Gothenburg have indeed LEZs. • Gothenburg, in addition, is developing the world's first large-scale zero-emissions city zone. If the initiative works as proposed, Gothenburg Green City Zone will implement 100% emission-free transport modes by 2030 ⁶⁰.
E-ks as part of the local urban strategy	<p>The three cities adopted SUMPs to give priority first to pedestrians, cyclists, public transport and finally to private cars. They will achieve this by investing in cycling infrastructure, pedestrian networks and public transport. Cycling appears to be the main area of improvement in all cities. Enhancing electric and shared mobility also appear as a goal although e-ks are not explicitly mentioned.</p>
Bicycle culture and infrastructure	<ul style="list-style-type: none"> • While the three pilot cities are implementing new cycling infrastructure (new cycling lanes, bike boxes), Gothenburg appears to be the most bicycle-friendly city. Indeed, the goal of Gothenburg is to triple the number of bicycle trips by 2025 and has adopted a dedicated and ambitious cycle programme with clear targets.

⁵⁹ <https://environment.brussels/state-environment/report-2011-2014/brussels-context/mobility-and-transport-within-brussels-region>

⁶⁰ <https://smartcitysweden.com/gothenburg-green-city-zone-leads-the-way-towards-zero-emissions-transportation/>

	<ul style="list-style-type: none"> • In Torino 70% of the city's space is allocated to roads and car parking and only 2% to cycle tracks. • In Brussels 70% of the city's space is allocated to roads and car parking.
Existing mobility offer in the city	<p>The mobility offer in the three pilot cities is very competitive with trains, metros, trams, taxis and shared micromobility services.</p> <p>According to our analysis, Brussels is the city with the most comprehensive shared micromobility offer.</p>
Weather	<ul style="list-style-type: none"> • Extended periods of precipitation or cold temperatures appear to be a barrier for e-ks adoption. In this sense, Gothenburg presents the worst weather conditions: the rain falls for 163 days and the snowy period of the year lasts for about 4 months. • Torino, on the other hand, presents the best weather conditions: the rain falls for 180.9 days and snow falls once every year.
Safety regulations	<ul style="list-style-type: none"> • The use of e-ks are covered by specific regulations and guidelines in the three cities. • In most countries in Europe (including Italy) e-ks are categorised as a bicycle. However, in Belgium e-ks are designated as a separate dedicated category and in Sweden the category depends on the power of the e-ks (250W e-ks belong to bicycle category). • The three cities apply similar regulations with regards to allowed lanes: E-ks riders have same obligations than bike users, sidewalks are not allowed and on pedestrian areas, e-ks must follow the same rules as pedestrians. • The only city with minimum age restriction for driving an e-ks is Torino. Also, riders 14-18 year old must wear a helmet (in Brussels and Gothenburg helmet is recommended but not mandatory). Also, the only city with restrictions on maximum power of e-ks is Torino (500W).

Future work

As mentioned before, the main objective of WP5 is to prepare the market entry strategy of DREEM, thereby facilitating the transition from a demonstration phase (WP3) to commercialisation and scale up phase. This first task allowed us to characterize the three countries and cities where our pilots are located. Indeed, it helped us understand what factors in each pilot city can influence the market penetration of DREEM mobility solution. However, as users in this project play a vital role, only by crossing market (WP5) and user (WP3) research we will be able to understand the type of factors that will have most effect on the choice of DREEM as a mode of transport.

In forthcoming studies, DREEM will be exploring the main competitors in greater depth, including diving deeper in their business models and services. Also, we will identify and map stakeholders in each pilot city. This, together with preliminary results of demonstration activities from WP3, will serve us to elaborate viable business models to succeed in the commercialisation of the DREEM mobility solution. Finally, it should be noted that the present analysis will also serve as a direct input for developing a scale up strategy over other European cities.

Table 8 Comparison of DREEM pilot city characteristics (demographics, mobility profile and weather)

Pilot cities	City demographics			City mobility profile				Weather
	Population (inhabitants)	Population density (inh./sqkm)	Student population	Modal split	Congestion	Low Emission Zone?	Bicycle culture & infrastructure	Rainfall Snowfall (days/year)
<u>Brussels</u>	1.2 million	7384	8.6% of the overall population	Public Transport 24% Walking 24% Cycling 4% Car 46%	#1 in Belgium #25 GLOBALLY	- LEZ scheme in place - Diesel cars will be banned by 2030 & petrol and gas-powered cars by 2035.	- Aim of X4 the number of bicycle trips by 2025 (Good Move Regional Plan) - Brussels doubled down on its mobility strategy during the pandemic by pledging to turn 40 kilometers of car lanes and parking spaces into cycle paths	199.6 (Rain) 23.7 (Snow)
<u>Torino</u>	870,952	6699	10% of the overall population	Public Transport 26% Walking 13% Cycling 3% Car 57%	#3 in Italy #45 GLOBALLY	LEZ scheme in place	- The City of Torino received funding of €4.9 million to implement new cycling infrastructure - Only 2% of Torino's space is allocated to cycle tracks	80.9 (Rain) 1 (Snow)
<u>Gothenburg</u>	580,000	1300	8% of the overall population	Public Transport 29% Walking 14% Cycling 9% Car 48%	#3 in Sweden #396 GLOBALLY	LEZ scheme in place Green City Zone	- Aim of X3 the number of bicycle trips by 2025 - Dedicated and ambitious cycle programme with clear targets.	163 (Rain) 40 days (Snow)

Table 9 E-ks policy comparison between pilot cities

Pilot cities	Regulations							
	Minimum age	Registration	Maximum speed limit	Maximum power	Legal liability insurance	Allowed lanes	Helmet use	Other safety equipment
<u>Brussels</u>	No minimum age	- No driving license needed - No registration needed	25 km/h	No restriction on the max. power	Vehicles that do not exceed 25 km/h are exempt from the obligation to be insured. For higher speeds, a family liability insurance (RC) is mandatory	- Same obligations than bike users - Sidewalks are not allowed and on pedestrian areas, e-ks must follow the same rules as pedestrians	Recommended	- White or yellow light at the front and a red light at the rear
<u>Torino</u>	at least 14	- No driving license needed - No registration needed	- 25 km/h on roads - 6 km/h in pedestrian areas	Not exceeding 500 W	E-ks don't need to be insured.	It is forbidden on motorways or roads with a speed limit above 50 km/h. Sidewalks are banned to e-ks.	14-18 year old must wear a helmet	Reflective clothing must be worn between sunset and sunrise. - All e-ks must be fitted with a bell, rear reflector and have front and rear lights.
<u>Gothenburg</u>	No minimum age	- No driving license needed - No registration needed	25 km/h	Depends on the category: 250 W for bicycle, 1000 W for moped class I	In bicycle category (250W) no need a legal liability insurance.	- Same obligations than bike users - Pavements allowed only at pedestrian speeds.	Riders younger than 15 years of age are required to wear a helmet. For adults over 15 years is recommended yet not mandatory.	E-ks must have brakes, an audible warning device, such as a bicycle bell.

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PARTNERS



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