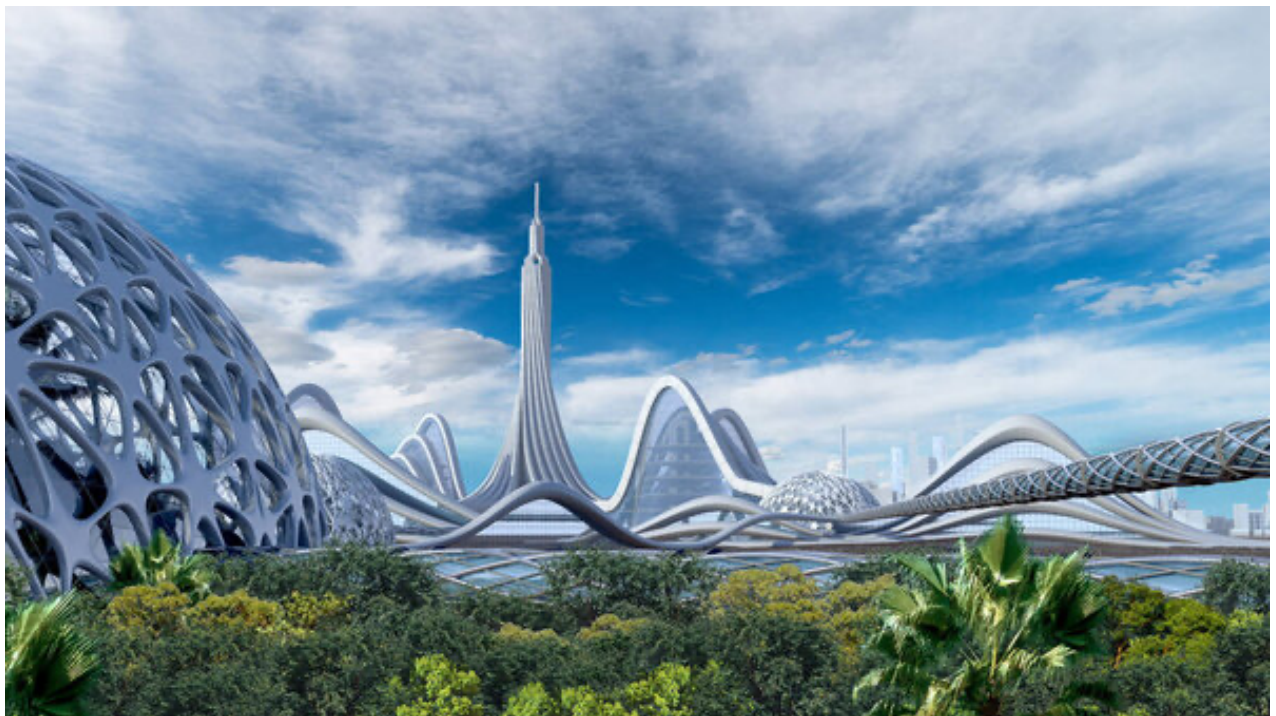


# EDUC - Green City

## Strategy on sharing mobility for Brno - metropolitan hinterland



<https://fr.depositphotos.com/stock-photos/green-city-illustration.html>

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## **Chapter 1: Introduction to Green City**

The planet Earth holds an active ecosystem and provides a healthy environment to its lifeforms. The global environment of the planet consists of several local ecosystems which can be so different from each other however they affect each other in direct or indirect ways. For instance, deserts like the Sahara have a very different ecosystem than the rain forest of Amazon. The oceans and seas have their own local ecosystem too. In a healthy ecosystem, mostly, every living being or non-living thing plays a role in each other's life span. The abundance or lack of a certain thing or lifeform can alter the state of the local system. For instance, considering humans and their need at first, radiation released from telecommunication networks causing the lack of bees or other flies in local system, which reduces the pollination process in plants causing reduction of fruits, or to produce an immense amount of food for growing human population, chemical fertilisers being used in agriculture sector which ultimately altering the soil property as well as water quality. High greenhouse gas emission in the past few decades, for energy production or transportation, has created a depletion layer of concentrated gases in the atmosphere which raises the local as well global temperature of the planet. Deforestation, mass extinction of other species, extensive extraction of fossil fuel, production of non-organic waste, expansion of cities, and several more other factors ultimately start to cause a change in seasonal pattern of the planet which is recognised as "climate change" in modern times.

### **EDUC Green City :**

The political and education program - 'Green City' is an initiative taken by a team of professors from Masaryk University to develop an environmental concept for Brno city as a response to the climate change. Considering the air quality, public health, waste management, mobility within the city and the urban economy as the prime factors, the program aims to devise new solutions for the current issues. Other five member universities of EDUC ([European Digital UniverCity](#)) alliance - Potsdam, Cagliari, Rennes, Pecs and Nanterre have sent their students to Brno, for developing a plan for the city which will be proposed to the Brno municipality.

## **Chapter 2: Challenges in present times**

With global average temperatures accelerating since the industrial revolution, increasingly frequent forest fires, rising sea levels, intensification of rainfall, increase in severe tropical cyclones, increase in periods of aridity and drought and the retreat and melting of glaciers, all phenomena due to human activity, we must review our habits, our consumption and travel patterns.

The challenge of a more neutral mobility, adapted to the increase in the world population requires : mobilisation of entrepreneurs and citizens to bring out the supply (of products or services) and demand; a good articulation of the transport offer at the local, national and international level; public-private cooperation to jointly remove certain regulatory or financial obstacles, for example.

Transforming mobility is both an economic challenge that involves experimentation, innovation and the search for sustainable models. It is also a social and societal issue, in which citizen participation has its place. Finally, it is obviously a strong environmental issue, for the preservation of our living environment.

Modes of mobility have evolved considerably over the past ten years with the rise of shared mobility and the emergence of non-carbon-based individual means of transport, but the car remains by far the first resort for daily journeys and should continue to develop. In the decades to come if nothing is done. Economic models will still have to evolve. Within 15 years, the number of vehicles in circulation should double, rising from 1.1 billion to 2 billion.

What impacts ?

- Increase in the number of accidents
- Greenhouse gas emissions on the rise
- Congestion in large metropolises
- Increased fuel consumption

All of which lead to negative effects on health and the environment. Taking into account environmental, demographic, social and economic constraints will then modify our relationship to the car and to travel.

Because mobility is evolving and must meet many challenges (multimodality, safety, fight against pollution, etc.), we will study in this section the different challenges it involves.

## a. Urbanisation

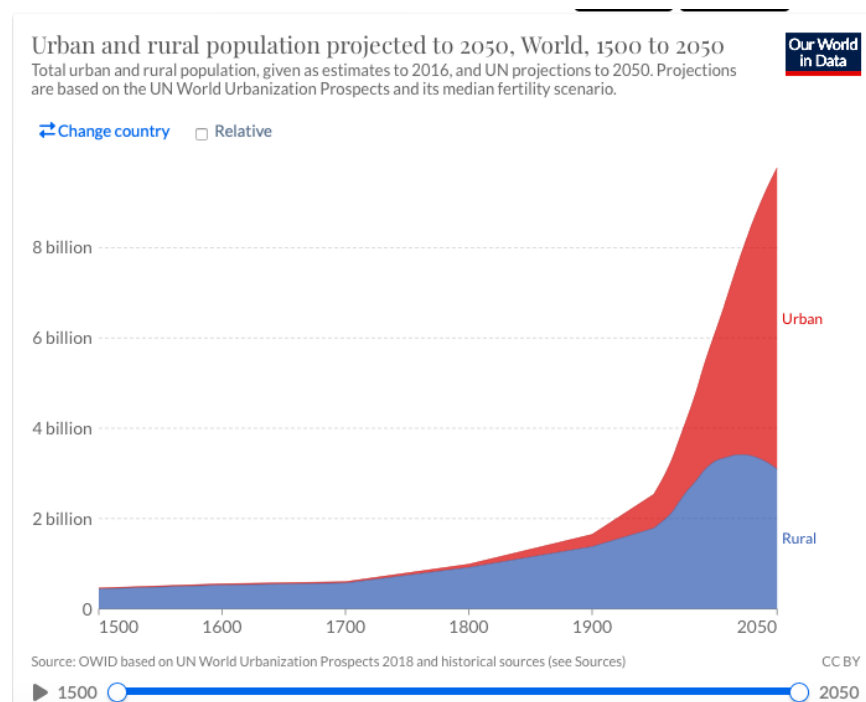
The questions of urbanisation, the impact of innovations on the urban territory and the mainly urban demographic growth must be raised.

We observe in cities and towns, the multiplication of modes of transport. Mobility is becoming multimodal. Whether it is urban or peri-urban travel, citizens are always on the move and their needs increasingly varied. To satisfy them, new services are being added to existing modes of transport. All are complementary and respond to a growing demand for flexibility, cost reduction and environmental impact.

The appearance of car-sharing services, self-service electric scooters, electric scooters, free-floating bicycles, etc., testifies to changes at work in the way we move, but also in our lifestyles.



Several factors lead to the emergence of a multimodal transport offer. On the one hand, flexibility is a growing demand in the context of rapidly increasing urbanisation. While the personal vehicle still accounts for almost all home-to-work trips in developed countries, the use of public transport and that of shared modes is developing strongly in urban areas. In fact, metropolises and large cities are going through great changes, and in particular an exponential growth in the urban population over the past 50 years, which does not seem to be stopping since, according to the latest United Nations estimates, more than a third of the world population will live in an urban area by 2050, i.e. 2.5 billion more people.



In this context of densification, a multimodal transport offer organised around public transport is essential. But to attract as many people as possible, the promise of being able to go "anywhere, anytime", including on the outskirts and at night, must be kept. Free-floating car-sharing brings this freedom once offered by the personal vehicle.

One of the first challenges that businesses and mobile researchers will face is that of infrastructure. Thinking about new ways of getting around cannot be conceived without considering the impact of these innovations on infrastructure.

Here is a project that is particularly affected by this point.

The **French UrbanLoop** project aims to offer a mobility solution which, if adopted by large cities, would relieve traffic congestion through transparent, individual or duo capsules to go anywhere in the city circulating in tubes. Adapted at the French countryside in order to carry out full-scale tests. For more details you can read the chapter 3.

But these projects still have a problem: if they want to be able to compete with personal cars and taxis in large urban centers, they require work, such as the construction of tunnels passing under the road network, and it has a certain cost.

Cycling is an alternative that is still confined to urban areas. Since the arrival of the first free-floating bicycles, the urban practice of cycling for daily trips has progressed, particularly in town centers with more than 100,000 inhabitants where the distances travelled are less than five kilometres. But still in 2022, even if many cities and close suburbs finance electric bicycles accompanied by their charging stations, very few rural areas are not accessible by this means of transport because of the colossal investment that would be to create terminals charging stations for electric bicycles (or scooters, cars) for areas that are rarely used.

This raises the question of the purely economic aspect of mobility.

## **b. Economical Aspects**

The constraints that weigh on the ownership of a vehicle in the city encourage change. A "free floating" car-sharing vehicle, shared by hundreds of users, used five to six times more often than a personal vehicle, allows a significantly lower cost of use for those who use their car occasionally, while providing great flexibility of use, it is therefore a profitable public investment in view of the social well-being generated.

It is for this reason that car-sharing must be supported by communities, which must also adapt charging and parking infrastructure to allow it to flourish. City policy must be geared towards adapting to new ways of life and travel, in collaboration with companies that innovate in this sector and which therefore constitute essential partners in urban development. But this type of mobility requires heavy investment that not all countries are necessarily able to afford.

Thanks to the development of electric mobility services, communities can build in a few years the charging infrastructure necessary for the electrification of the vehicle fleets of individuals and professionals on their territory at lower costs.

The economic impacts of sustainable mobility can be analysed and measured from six different perspectives : user (individual user and industry), sectoral, macro-economy, societal, distributional, authority and government. Assessment methods differ for the different perspectives, as do their results.

Stakeholders from the transport industry and consumer organisations tend to focus on user costs when discussing transport policies. The usual argument is that cost reductions are positive economically as they reduce production costs and increase competitiveness, or reduce transport expenditures leaving room for other forms of consumption. Looking at the other side of the coin and applying the same simple economics, the cost reductions will increase the demand for transport, which in turn will increase the negative environmental impacts of transport, and possibly, depending on the area, also may lead to greater infrastructure scarcity and thus congestion. Considering sustainability when making policy choices means deviating from a one-dimensional assessment objective (e.g. the traditional focus on reducing user costs) and taking further dimensions into account.

A similar caveat holds for the welfare perspective which builds on conventional transport cost-benefit-analysis (CBA) and largely generates benefits from travel time savings. This approach also needs to consider the impacts on economic growth, distribution and government budgets as further economic aspects of sustainable mobility.

Here a few figures should illustrate the economic impacts of sustainable mobility from different perspectives. Taking the user perspective and estimates of CO<sub>2</sub> abatement costs for three different measures reveals a broad range of outcomes : setting CO<sub>2</sub> emission standards for new cars to 130 gCO<sub>2</sub>/km in 2012 results in an abatement benefit of 100 €/tCO<sub>2</sub> for German car owners between 2008 and 2020. In contrast, the abatement cost for biofuels in 2020 would be in the range of 132 to 322 €/tCO<sub>2</sub> saved. For maritime shipping, it is estimated that 28% of CO<sub>2</sub> emissions here can be saved by slow steaming at an abatement cost of 0 €/tCO<sub>2</sub>. It must be emphasised that the exact figures are strongly influenced by several parameters like oil price assumptions, the chosen discount rate or the effects of technology learning.

Taking the macro-economic perspective and looking again at setting CO<sub>2</sub> emission standards for cars in Germany, we find that GDP could be increased by EUR 30 billion in 2020 while consumers would spend EUR 79 billion less on fossil fuels over 12 years. A significant share of this saving, however, would be reduced fuel taxes, potentially leading to drastic consequences from the government's revenue perspective.

In summary, the economic aspects of sustainable mobility are undoubtedly relevant for making policy choices. Assessing the indirect and long-term effects of transport eco- innovations properly should reveal that, in most cases, long-term benefits outweigh potential short-term losses. Thus the role of policy-making is to get the incentives right in order to overcome the short-term losses, if these exist, in order to reap the longer term benefits.

### **c. Environmental Aspects**

Climate change has affected nearly every species on the planet. From the burning forests, melting glaciers, flooded rivers to drying landmass, its devastating effects have been recognized in every part of the planet. In recent decades, record-breaking extreme weather conditions have challenged us all, yet nothing can be predicted about the upcoming long term forecast of climate change. Man-made contribution to its cause is certainly large, as more than [14.6%](#) of earth's landmass is already modified by human beings, at present of which, food giving agricultural land rapidly getting covered with concrete for real estate and the left over natural resources have transformed into the personal business commodity of individuals or organisations of individuals. This rapid devastation of nature must need to be reverted or balanced out in any possible scale, if not in decades then might in a century.

### **d. Social Aspects**

On a generic level the concept of social sustainability seems difficult to define, let alone to quantify. But the concept has more potential as a frame to assist and to improve sustainability projects. Using social sustainability here creates an appropriate bridge for the use of social sustainability related to mobility and transport.

Social sustainability is mostly related to the dimensions of : Basic transport needs should be satisfied, Intra-generational transport equity should be promoted. Transport equity means that access to transport should not vary systematically across population groups. Accessibility is here the essential issue.

The current mobility system in Western countries is dominated by the car and by the socio-technological "regime of automobility ". This system now expands over the globe. It will be difficult to change the mobility system as the technical aspects of the transport system (vehicles, infrastructures, etc.), the organizational models (like individual car ownership, car and bike sharing, and ticketing schemes), the regulatory framework, the user habits, etc. are all co-evolving. These interactive dynamics create path dependencies which make it difficult to alter the overall direction of the development. Making the mobility system sustainable would require a long-term transition where technical and non-technical developments align in mutually reinforcing processes.

Achieving social sustainability in mobility must break with the current routines and habits of daily travel.

Here are the seven themes to operationalize social sustainability in mobility arise :



- affordability of mobility (share of household net income),
- accessibility of key services,
- social equity ,meaning equal entrance to mobility,
- health conditions for households (air quality, noise, amenities),
- safety and security,
- social cohesion (related to the “sustainability of communities”- theme in the built environment sector)
- working conditions in the mobility sector

## **Chapter 3: Existing solutions in different locations :**

First we have to define two types of sharing mobility :

- Loop car-sharing is characterised by spaces reserved for each vehicle. In this system, the vehicle must be returned to its original location. Trips are generally of medium duration, half-day or full day, and billed by the hour.
- Direct route car-sharing is characterised by journeys from point A to point B. Offers can be deployed with a station or without a station (so-called “free-floating” offers). Users can spontaneously rent a vehicle and complete the rental by returning it to each operator's operational area. Trips are often short and billed by the minute.

### **a) European Region :**

Mobility is an indispensable part of everyday life, but traffic is still one of the main causes of greenhouse gases in Germany. To meet the challenges of the Parisian climate change agreement, it has to reduce its greenhouse emissions drastically in the upcoming years. Germany underlined the climate protection law, to get greenhouse gas neutral by 2045 (Treibhausgasminderung um 70 Prozent bis 2030, 2022). On the 8th of June 2022, the parliament of the European Union passed a new law that implies the ban of fuel-burning cars by 2035. The federal Minister of Transport Volker Wissing declines the offer. Fuel-burning cars should still be licensed for road traffic after 2035 if the use of Synfuel is produced carbon-neutrally. The German Minister for environment Steffi Lemke in Strassburg advocates Wissing's statement and adds that electro fuels are still useable outside of the EU fleet target, as in buses or fire engines. (Interview Tagesschau 08.06.2022) An alternative solution for a faster ecological traffic turn represents the use of hydrogen cars.

Hydrogen cars are electric cars. They differ from each other in the energy-saving process. Energy in Hydrogen cars is saved in a fuel cell, whereas the energy of conventional electric vehicles is stored in a lithium-ion battery. When both elements, hydrogen and oxygen, come in contact with each other, they react and result in an exothermic reaction. Fuel cell vehicles that have electric motors with hydrogen propulsion have advantages over battery-powered electric cars. (ADAC : Benzin, Diesel, Elektro & Co, 2022).

Since energy is produced immediately in the vehicle the enduring process of charging batteries is no longer required. It charges in between five to ten minutes and can last up to 100 km in 2 distance. Contrary to hydrogen cars, conventional electric cars need up to four hours until the battery has been filled. They have a 100 km less range (Solarenergie: Wasserstoffauto vs. Elektroauto, 2022). With those advantages, the hydrogen car could revolutionize the ecological traffic turn. Germany is an automobile industry nation, where the

freight transport runs over trucks. Trucks and other vehicles could profit from the named advantages. As they can be charged much faster and withstand long distances without a refilling. The extant available hydrogen in Germany is not really an alternative seen in a climate-conscious way. In order for hydrogen cars to run carbon-neutral, green hydrogen has to be provided. Germany can not provide enough renewable resources. If hydrogen vehicles have to fall back on energy sources where hydrogen gets produced as blue or grey it would lead to a bigger carbon dioxide emission than continuing to ride a fossil-burning car. Green hydrogen is produced most effectively, where renewable energy is available. In order to run water electrolysis, the federal ministry of education and research plans a strategic partnership with South- and West Africa as well as with Australia. Those areas form climatic conditions for gaining electricity out of renewable electric resources such as sun and wind on unused fields of land. (national hydrogen strategy, 2022). These two aspects provide only a few of the advantages for a vehicle run by hydrogen compared to a conventional electric car. Looking at the challenging change of making traffic more ecologically friendly in Germany hydrogen vehicles could be a milestone. But in order to reach the goal of traffic being emission-free by 2035, green hydrogen has to be provided. The demand for environmentally friendly energy leads to new cooperations. It opens a whole new economic relationship between countries.

### **Exemples in Germany**

#### **1) Car sharing :**

A private company provides such a service of car and van sharing. Several cars or van are placed in different places which can be accessed by any person. To access the car, user need to install an application in their phone and create an account into it. Every car or van offered by the company is connected with the internet and GPS. As soon as the user requests a car, the application shows the location of the nearest car. On user' request, cars get unlocked and then users can use automobiles according to their need. At the end of the journey, the user pays the bill by online payment method.

#### **2) Universal Travelling ticket:**

A single ticket is used to travel by train/bus or tram. Customers need to buy ticket which is valid for a certain time, rather than distance.

#### **3) Semester Tickets :**

Mobility offers can attract the younger generation to go for higher education. Along with semester fee, in university, students pay for semester ticket and can travel around the whole state in any bus, tram or regional trains.

### **Exemples in France :**

#### **1. Car sharing:**

Car sharing between individuals, with the Drivy service, is being deployed. The advantage of this service is that it is deployed in all areas, in particular not very densely populated.

There is also car-sharing between companies, which essentially consists of pooling company fleets, is an emerging solution (ex Ubeeqo, bemobi, Mobility Tech Green, etc.).

Cars shared in a loop (the car is brought back to its starting point after use) or “free floating” (the car is left at its point of arrival, in the street or in a station). Car sharing is more commonly used for journeys away from home and work

2. Carpooling: sharing of the vehicle where the driver chooses his destination and can be partially compensated for the costs of using the vehicle (and therefore unpaid), carpooling being intended mainly for Home to Work journeys

3. Self-service bikes or scooters, with stations (the bike is picked up and dropped off at a station) or without a station (the bike is left at its point of arrival)

4. The classic rental

5. Taxi or VTC,

6. Organized or financed largely by public actors. For example, self-service bicycles such as vélov or velib, car-sharing services such as Cityz

7. Organized by private actors and financed by users. For example, so-called “free floating” bicycles such as Mobike or Indigo Bikes, scooters with Cityscoot, which can be found in large cities or car sharing between individuals with Drivy.

## The exemple of Paris :

The Paris *metro* is one of the public transport systems serving the city of Paris and its agglomeration. It has sixteen mainly underground lines, totaling 226.9 kilometers and 308 stations. Having become one of the symbols of Paris, it is characterized by the density of its network in the heart of the city.

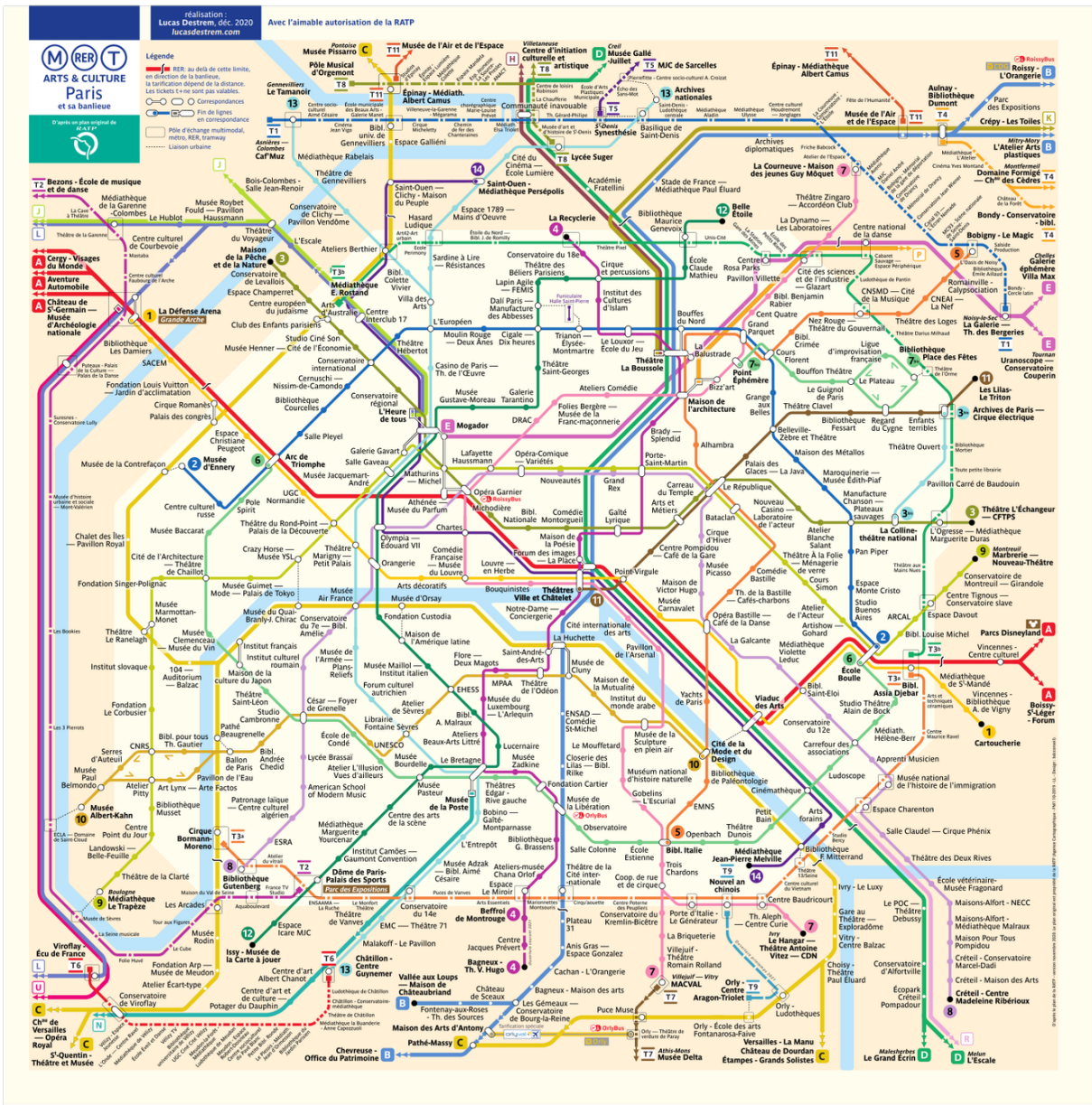
After a pause in the creation of new lines in the post-war period, most of the existing lines are extended to the inner suburbs. The choices made in its design limiting the

possibilities of extending the old lines (short distances between stations), these were supplemented from the 1970s by the regional express network (RER).

Line 14 was the first to launch the automation of the old lines.



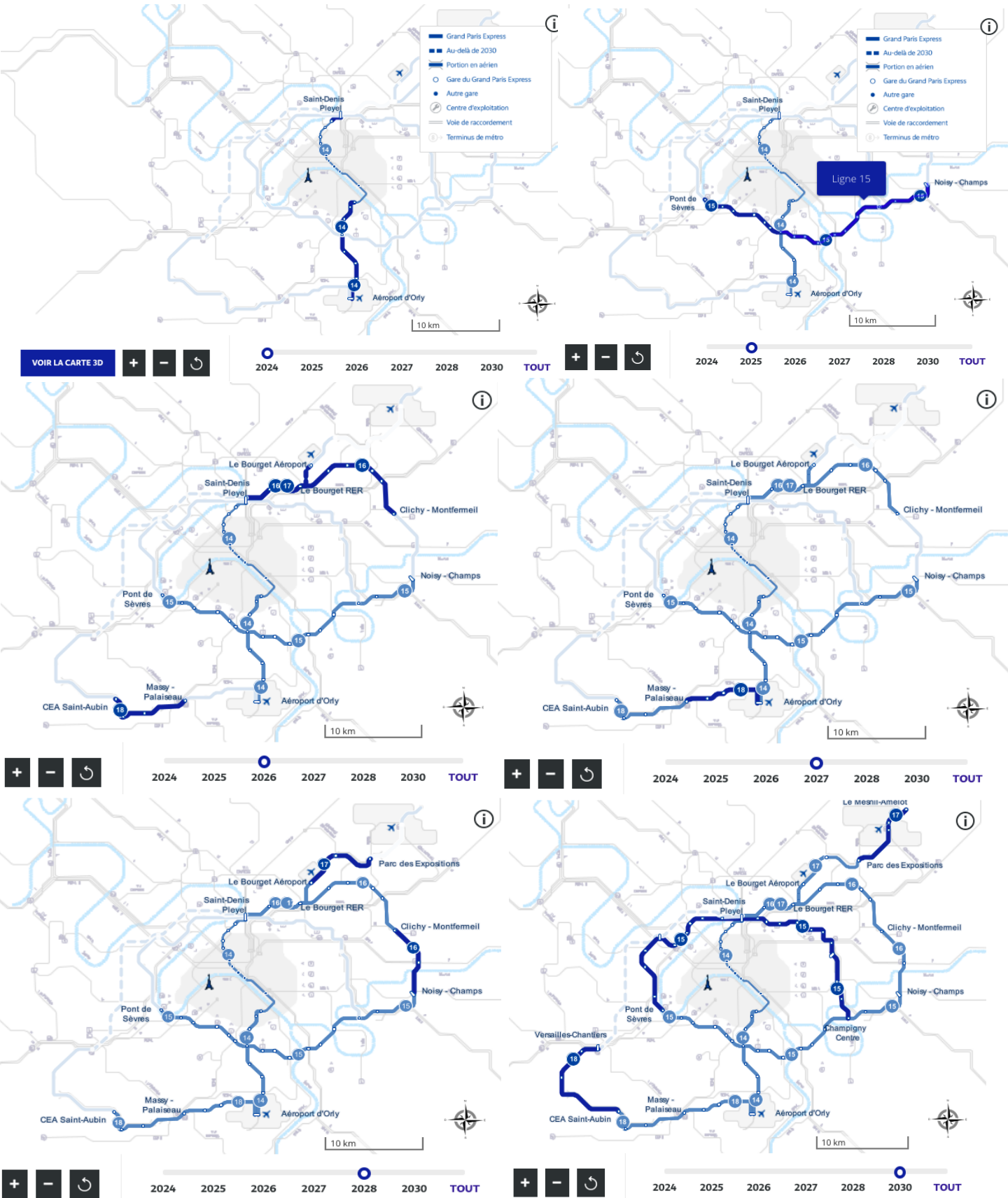
A major project, the Grand Paris Express, began in 2015 and provides for the construction of 200 km of four additional lines by 2030. The metro is also interconnected with other means of public transport which help serve Paris and its suburbs: five RER lines, eight additional lines on the Transilien network (commuter trains), eleven dedicated tram lines, several bus networks and three light metro lines (VAL) for local airport services. In fact, the suburbs are well interconnected thanks to the RER and transiliens and for several years now, travellers are no longer obliged to go through Paris.



Greater Paris projects



With the arrival of the Olympic Games, Greater Paris projects are accelerated. And the Here are the plans:



Materials



In order to limit its carbon footprint, the Grand Paris project encourages the production of rails made from recycled steel. Designed by the steelmaker Saarstahl Ascoval and the rail rolling mill Saarstahl Rail, the first rail of this type (18 meters long) has just been laid on a common section of lines 16 and 17 with the aim of reducing by at least minus 25% of our greenhouse gas emissions related to the construction of the new metro

Among the main sources of CO<sub>2</sub> emissions are concrete and steel. For the concrete, low carbon concrete was used (-40% carbon emissions compared to traditional concrete), or even ultra low carbon (-70% carbon emissions compared to traditional concrete, in progress of experimentation on line 18) and fiber-reinforced concrete (less steel-consuming than reinforced concrete) for the manufacture of the segments.

Finally, 90% of the concrete used on the construction sites of the new metro was low carbon at the end of 2021.



fiber-reinforced concrete



ultra low carbon 0% clinker ecological

*Also, how to limit the carbon emissions linked to the rails?*



Traditionally, rail steel is made in blast furnaces from an alloy of iron ore and coal. The material then obtained is cast iron. “But cast iron is brittle, a brittleness that comes from too

much carbon. A train could not run on a cast iron rail. To obtain steel, it is necessary to remove the carbon from the cast iron, thus releasing CO<sub>2</sub> into the atmosphere.

Alongside this classic circuit for manufacturing steel, there is another way, based on the recycling of scrap metal. Old rails or automobile wrecks are placed in an electric arc furnace where the very powerful electric current melts the steel into rails. We then obtain low-carbon steel, a term that refers to the low CO<sub>2</sub> emissions generated during its manufacture. This allows a carbon saving added to the fact that the scrap and the manufacturing are local (from the north-east of France or Belgium).

This process makes it possible to emit 60 to 90% less CO<sub>2</sub> (-1.4 tonnes of CO<sub>2</sub> per tonne of rails delivered to the site). This model is all the more relevant since in France, electricity production is largely carbon-free thanks to renewable and nuclear energies. This carbon gain would be much lower in a country where electricity comes from fossil fuels.

Remaining an economic challenge and the recyclable route costing more than that of a conventional route, to remove this obstacle, the Société du Grand Paris pays €100 for each ton of CO<sub>2</sub> saved. The greater the CO<sub>2</sub> gain, the greater the aid granted. Companies are thus encouraged to offer technical and logistical solutions, etc. that reduce carbon.

## Other shared mobility in Paris and suburbs

The metro and other trains in the suburbs have 4 to 5 million daily users, but it is far from being the only means of mobility in Île-de-France.

First of all, cycle paths are flourishing in the capital with 52 km of additional cycle paths created in the spring of 2020. With 1,093 kilometers at the end of 2020, compared to 742 in 2015 and 293 in 2004.

This increase in areas reserved for bicycles, allowing safer journeys, has led to an increase in the number of cyclists.

### Indice d'évolution du nombre de vélos



Indice établi à partir de comptages réalisés sur un échantillon de 6 sites (bd de Sébastopol, bd Saint-Germain, rue de Rivoli, bd Henri IV, avenue Daumesnil, quai de Jemmapes), deux mardis par mois pendant les périodes horaires 8h30-9h30 et 17h30-18h30.



Strong increase in bicycle use since 1997.

There has been a 60% increase in the number of bicycle journeys, according to the counters placed in the city (with a 30% increase in the use of bicycles, for the whole of France).

With a proportion of 26% of Velib in cycle traffic, the increase in the use of bicycles is also due to the establishment of Vélib in the capital.

Vélib's are free-floating rental bicycles accessible via terminals as shown below.



There are two types of subscriptions, the classic (green Velib) and the electrically assisted Blue Velib. Launched in 2018, electric Vélib's make travel easier : distances are shortened and users navigate the terrain effortlessly. They now represent more than half of the kilometers traveled on Vélib'.

**The subscription**

12 months commitment

V-LIBRE	V-PLUS	V-MAX
0 € / month	3.10 € / month	8.30 € / month
<div>✓ For occasional users</div> <div>✓ No subscription</div> <div>✓ Payment from the first minute</div>	<div>✓ For regular users (over 4 trips per month)</div> <div>✓ Includes 30 minutes on classic bikes</div> <div>✓ 12 months commitment</div> <div>✓ Bonus minutes: Active ?</div>	<div>✓ The Vélib' all-inclusive (regular and electric bike)</div> <div>✓ Includes 60 minutes on classic bikes</div> <div>✓ Includes 45 minutes on electric bikes</div> <div>✓ 12 months commitment</div> <div>✓ Bonus minutes: Active ?</div>
<div>Learn more</div>	<div>Learn more</div>	<div>Learn more</div>

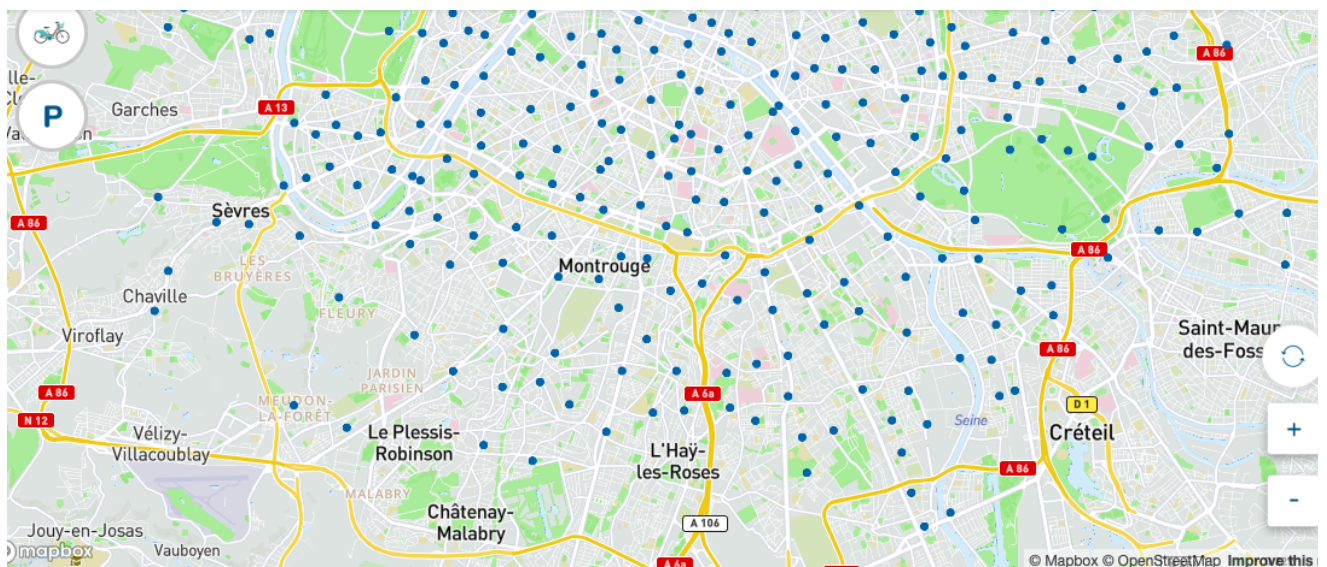
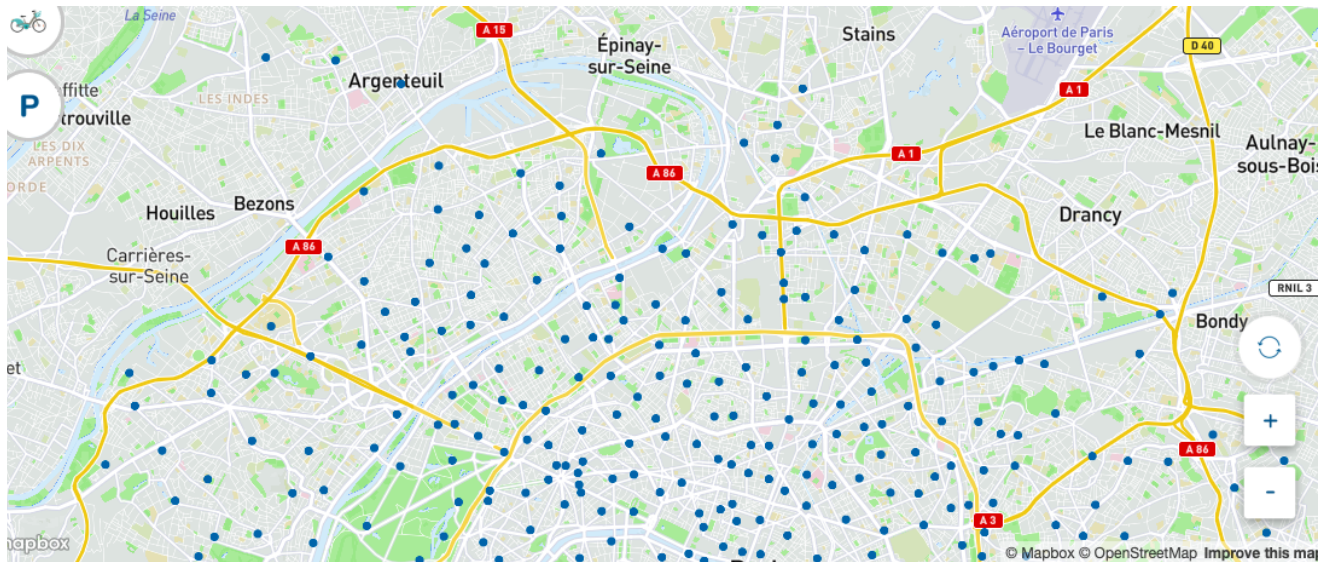
**SINGLE RIDE OR DAY PASS**

Bike around the city for a ride or a few days

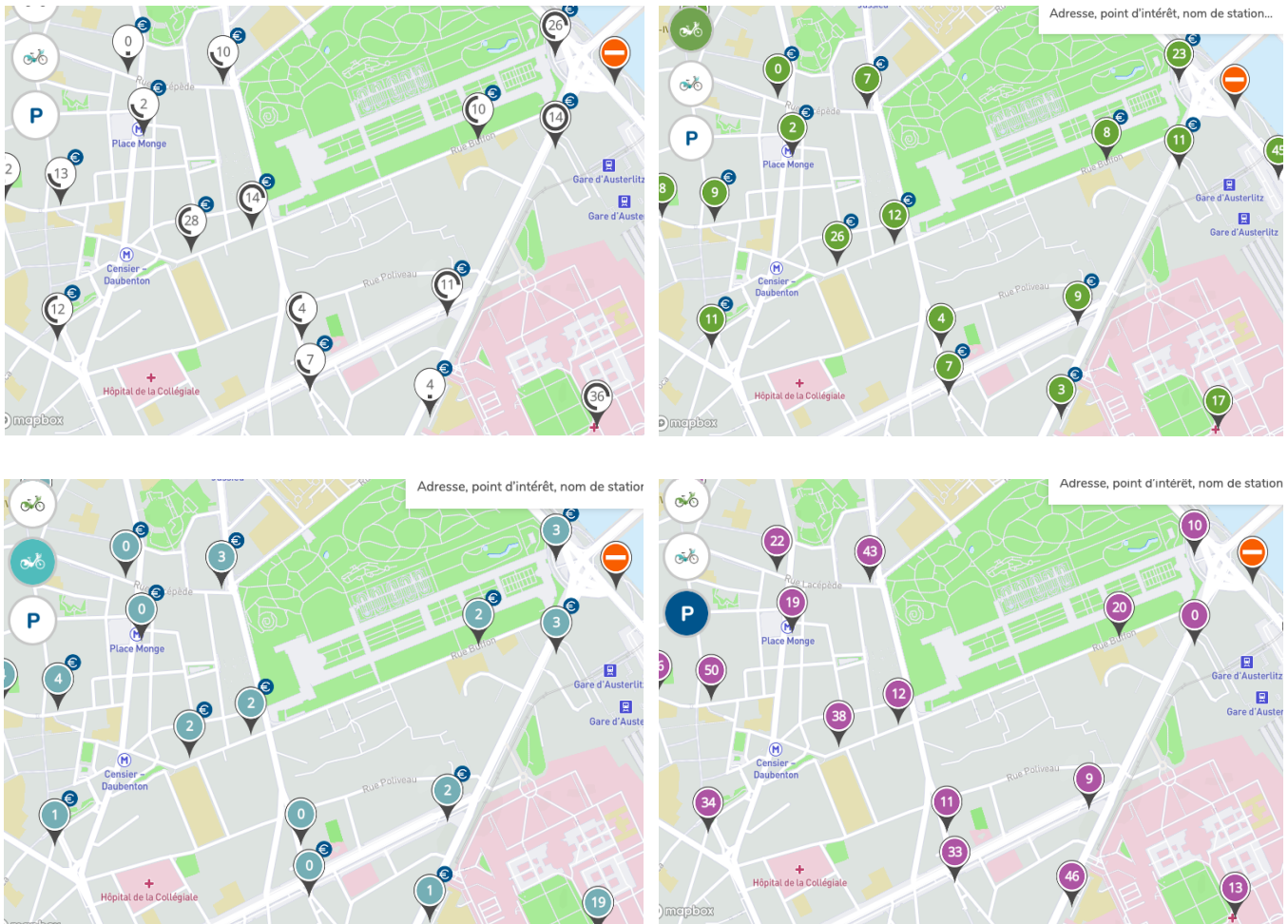
<div><b>TICKET-V</b></div> <div>3 €</div> <div><ul style="list-style-type: none"><li>✓ One-way trip on classic or electric bike (your choice)</li><li>✓ Includes 45 minutes</li></ul></div> <div>Learn more</div>	<div><b>24-HOUR PASS - CLASSIC</b></div> <div>5 €</div> <div><ul style="list-style-type: none"><li>✓ 24 hours with Vélib' (electric bikes extra)</li><li>✓ Includes 30 minutes on classic bikes</li><li>✓ Take up to 5 Vélib' at one time'</li></ul></div> <div>Learn more</div>
<div><b>24-HOUR PASS - ELECTRIC</b></div> <div>10 €</div> <div><ul style="list-style-type: none"><li>✓ 24 hours with Vélib' (electric bikes included)</li><li>✓ Includes 60 minutes on classic bikes</li><li>✓ Includes 45 minutes on electric bikes</li><li>✓ Take up to 5 Vélib' at one time</li></ul></div>	<div><b>3-DAY PASS</b></div> <div>20 €</div> <div><ul style="list-style-type: none"><li>✓ 72 hours with Vélib' (electric bikes included)</li><li>✓ Includes 60 minutes on classic bikes</li><li>✓ Includes 45 minutes on electric bikes</li><li>✓ Take up to 5 Vélib' at one time</li></ul></div>

The terminal network is very dense in Paris to allow a supplement to buses/metro/trains. It was also extended to near suburbs and it allows people leaving there to more easily reach the metro/bus/trains and mostly to gain time.





In the website and the application, we can see the closed stations, the number of available velib', their type and the number of empty places. In fact, this application is very complete and here is the link of the interactive map : <https://www.velib-metropole.fr/map#/>



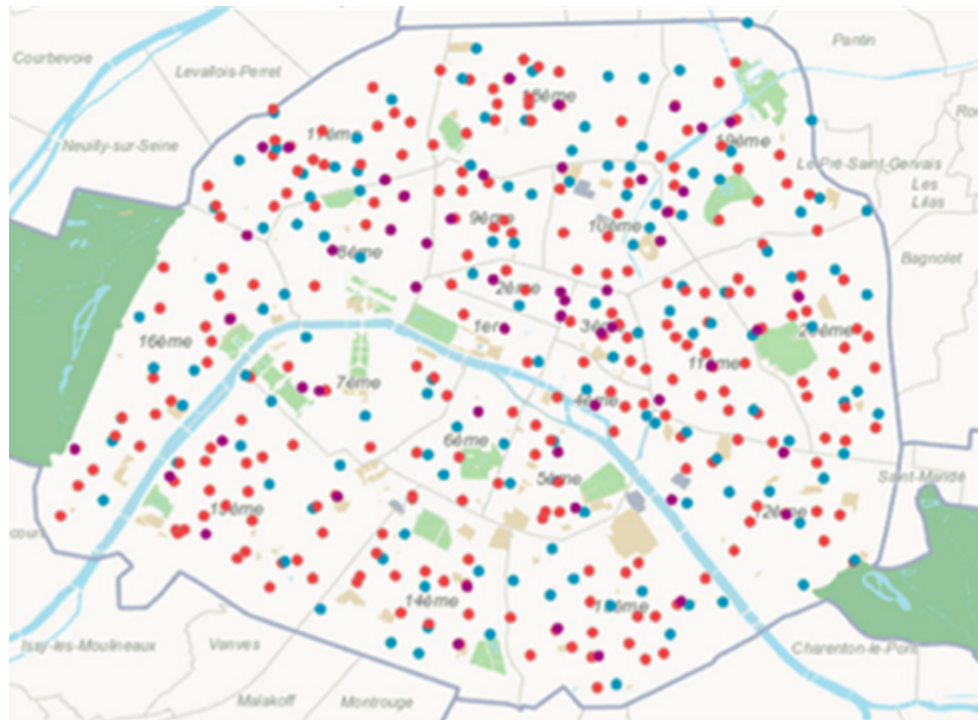
### Some numbers :

- 1400 stations in Paris and Ile-de-France
- 20,000 bicycles, 40% of which are electrically assisted
- 400,000 subscribers in 2020
- 5.5 million trips made in September 2020 (one-month record)
- 215,000 journeys made on September 11, 2020 (one-day record)

Direct track car-sharing is also represented by an authorization system to support the development of car-sharing in Paris after the end of the Autolib' service with 3 operators active in Paris in 2020: Free2Move, Sharenow, Moov'in Paris and 2,035 vehicles authorized in 2020 (1,895 in 2019), only for electric vehicles.

Another type of shared mobility in Paris: Loop carsharing with Mobilib'. There are 5 operators: Ada, Communauto, Getaround, Ubeeqo, Clem. There are 436 stations, 186 of which are equipped with electric charging stations. 1,434 vehicles including 1,177 hybrid or plug-in hybrid electric vehicles





Mobilib' stations:

- Thermal & hybrid
- Electric & plug-in hybrid
- Light commercial vehicle

Finally, there is a fleet of self-service machines in Paris and near suburbs. Self-service vehicle operators must declare their fleet to the City of Paris, and pay a fee for occupying the public domain.

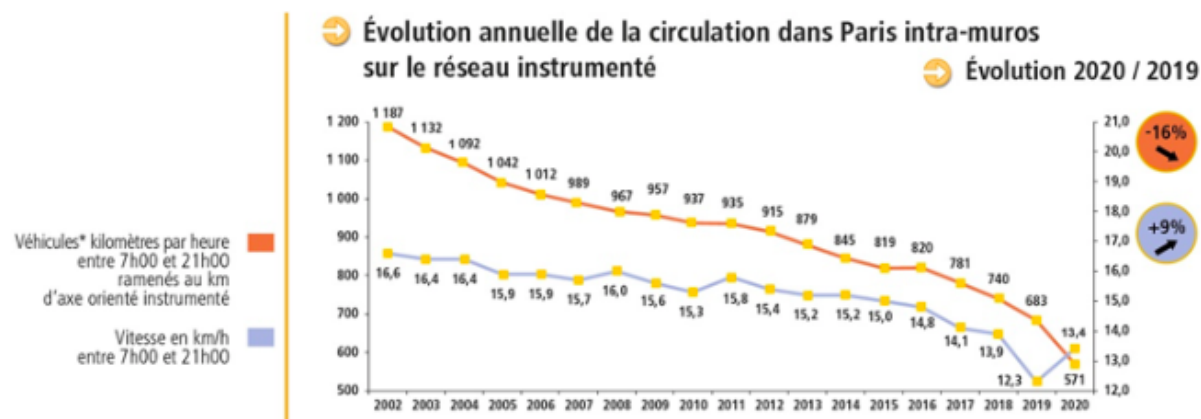
The Fleets declared during the year 2020:

- 13,999 bicycles (5 operators)
  - 2,980 electric 2/3WD (2 operators)
  - 16,690 scooters (8 operators) before September 2020, 15,000 thereafter (3 operators) •
- Total: 33,669 vehicles declared (39,572 in 2019).

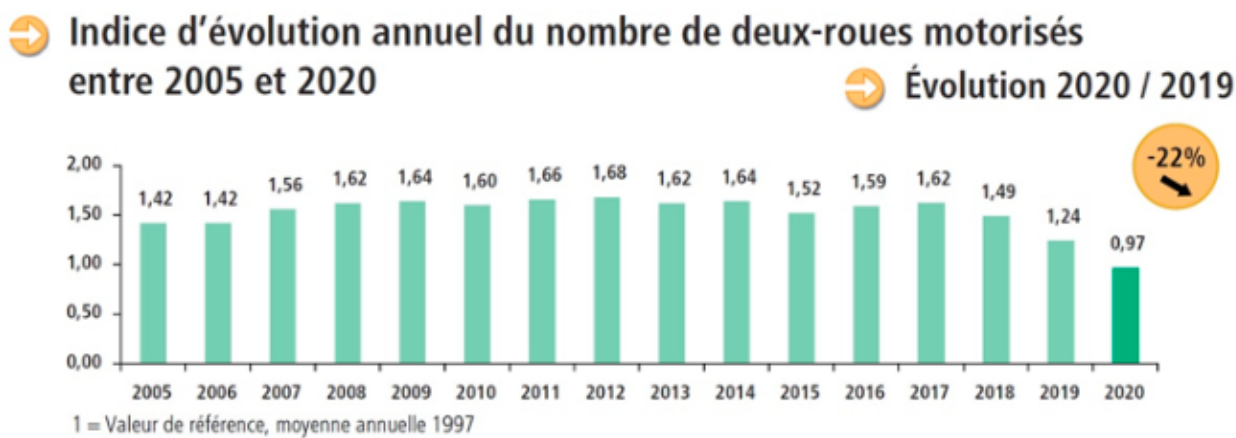
Since September 2020, only three scooter operators (Tier, Dott and Lime) can operate in Paris, for a total number of vehicles limited to 15,000. Scooters must park in one of the 2,500 parking spaces reserved for them .

The trot is also increasingly used, but the regulations are still fragile and do not allow safe sharing of the road.

Here two graphic for show the evolution of the different means of transport :



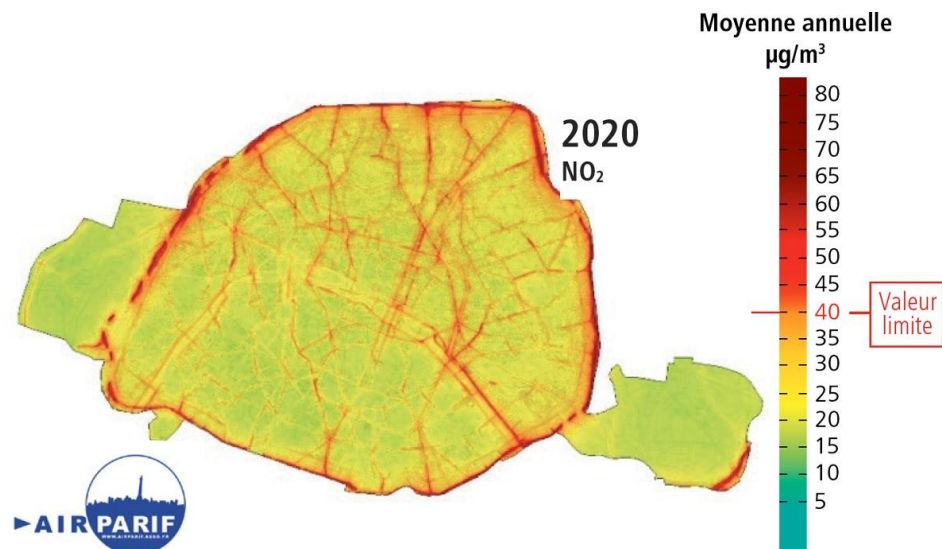
Annual evolution of traffic in Paris intra muros on the instrumented network



Annual evolution index of the number of motorized two-wheelers

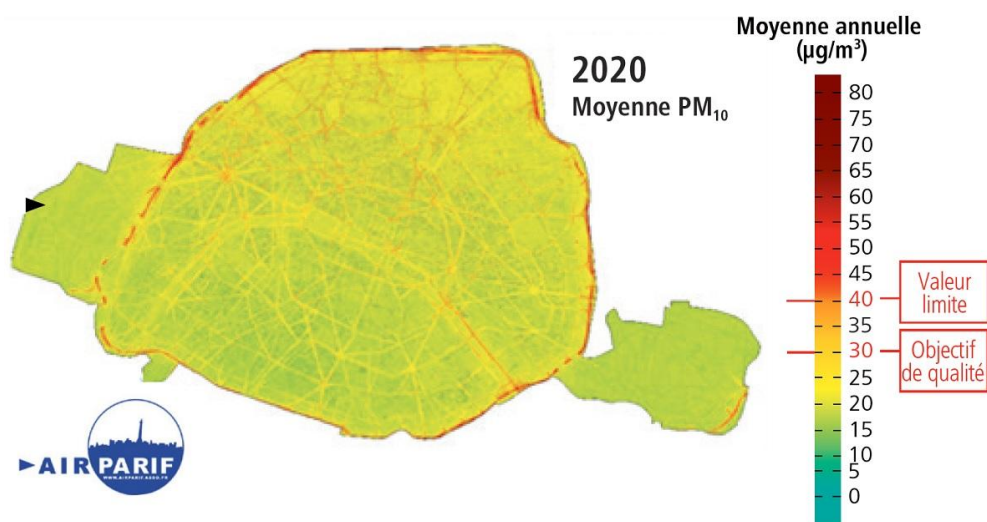
## Finally Air pollution in Paris

The basic downward trend in NO<sub>2</sub> and fine particle emissions continues:



Annual average NO<sub>2</sub> concentrations in the background have decreased by around 30%, of which 20% is attributable to the reduction in emissions linked to the health crisis, and 10% is due to trend changes and dispersive meteorological conditions during the year 2020.

Particle concentrations are down slightly, mainly due to the downward trend and the influence of weather conditions.



## **Nice :**

Nice Côte d'Azur's transport priority is to encourage soft or clean energy modes of transport. Today, of the 220,000 trips made daily on the Lignes d'Azur urban network, nearly 40% are made by tramway, a totally "clean" mode of transportation.

The transportation plan, which calls for the implementation of a real tramway network by 2030, will increase this percentage to 70%. In addition to the "tramway" offer, the Lignes d'Azur urban network has approximately 350 buses, 254 of which are owned by Nice Côte d'Azur:

96 run on gas (CNG): 78 standard buses and 18 articulated buses,

158 run on diesel fuel, of which approximately 40% are Euro 4 and EEV (equivalent to Euro 6) buses with very low emissions.

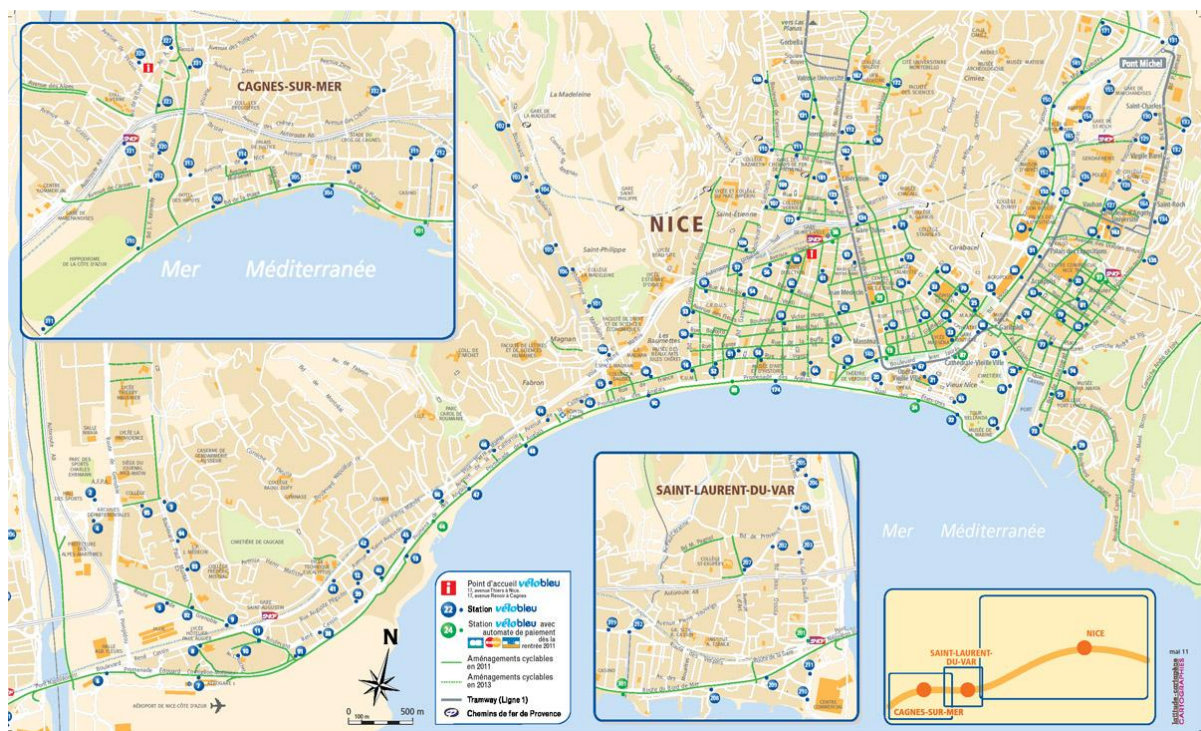
### **Les Vélobleu :**



Launched on July 18, 2009, Today about 1750 Vélobleu bicycles are available to users in 175 stations spread over the municipalities of Nice ( See the map below ), Saint-Laurent-du-Var and Cagnes-sur-Mer. That is to say a territory of 18km<sup>2</sup> regrouping 293 000 inhabitants including 128 600 active people. 8,500 subscribers, 80% of whom are year-round, about 2,000 rentals/day on average over the year.

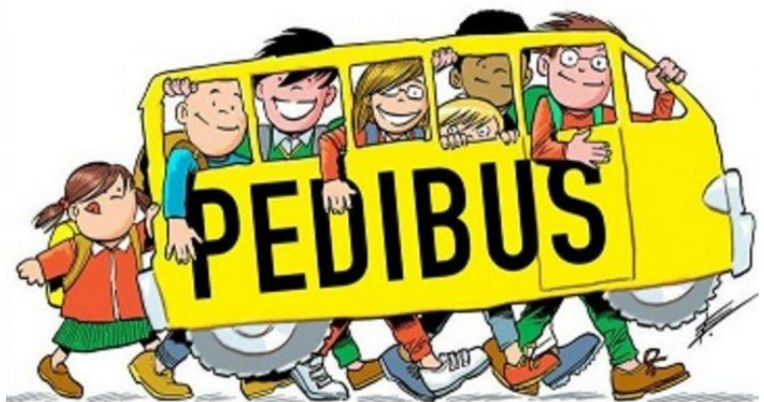
Nearly 1,500,000 rentals have been recorded since the launch which is an impressive number showing a real shift of bike usage for the citizens of the city mainly due to the immense number of bikes available and the availability of stations all around the city.





### ***PediBus :***

To encourage the development of clean transportation networks and the emergence of an eco-citizen conscience, the City of Nice and Nice Côte d'Azur are developing pedibus lines to bring children to school on foot.



The pedibus is a safe, ecological, economical and educational school transport.

It has all the characteristics of a school bus but it goes on foot! It follows a route with stops (marked on the side walks) and schedules, driven by adult volunteers guiding the children according to a defined route, it is 100% ecological and serves also to raise awareness for children about the dangers of the road and providing them with numerous trips.



### ***Subsidies for buying a bike , electrical scooter or electric car :***

The Metropolis of Nice encourages sustainable mobility by instituting a subsidy scheme for individuals whose main residence is in the metropolitan area to acquire a human-powered bicycle. A subsidy of 50% of the purchase price in € including tax, up to 100 €, is granted. In this way, you contribute to the preservation of the environment and public health by actively participating in the reduction of greenhouse gas emissions and the limitation of noise pollution, as desired by the Nice Côte d'Azur Metropolis.

The Metropolis encourages electric mobility by instituting a subsidy scheme for individuals whose main place of residence is in the metropolitan area in order to acquire an electric two-wheeler. (25% of the purchase price capped at 400€ ).

The Metropolis wishes to encourage the development of "clean" transport and to encourage residents living in the metropolitan area with reduced mobility and/or with specific characteristics that do not allow them to use a conventional two-wheeled bicycle, to acquire new adapted bicycles, by instituting a subsidy system that complements those already in place for the acquisition of an electric two-wheeler or a human-powered bicycle. An aid of 50% of the purchase price in € ttc, capped at 200 €.

The Nice Côte d'Azur Metropolis wishes to work in favor of the preservation of the environment and public health by actively participating in the reduction of greenhouse gas emissions as well as limiting noise pollution. With this in mind, the Metropolis wishes to encourage electric mobility by instituting a subsidy scheme for private individuals whose main



place of business is in the metropolitan area to acquire an electric vehicle. Since July 30, 2021, for any purchase of a 100% electric car, the Metropolis has strengthened its system by eliminating the obligation to scrap the thermal vehicle and by increasing its contribution once again. This can go up to 5 000€ according to a ceiling of resources defined in the agreement.

### ***Bike Sharing :***

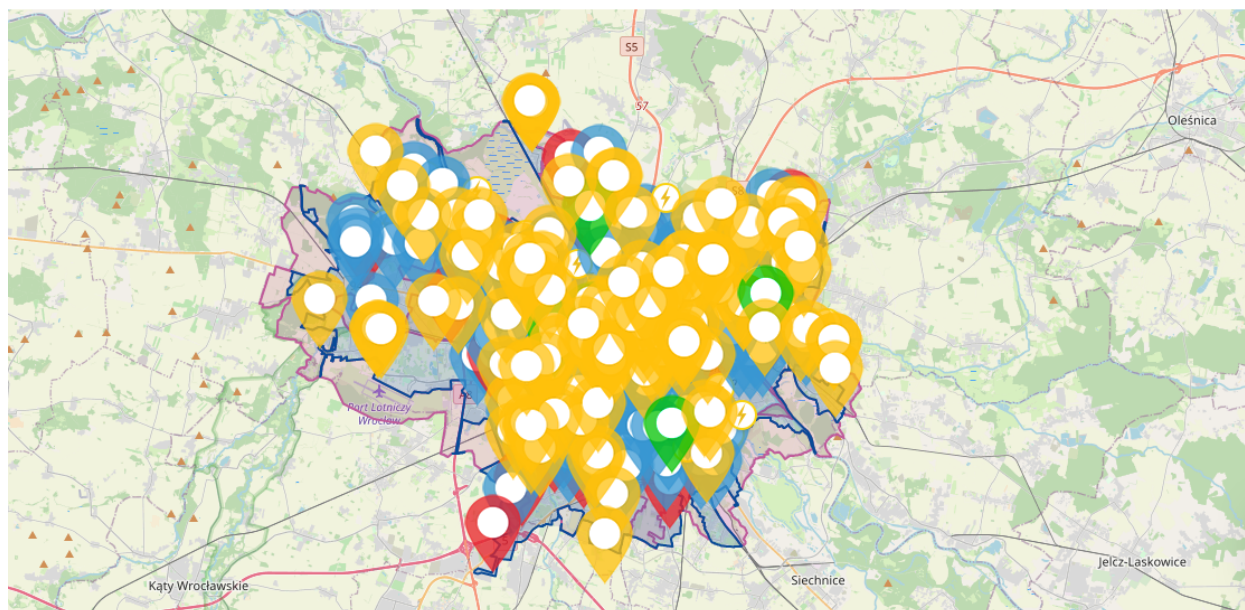
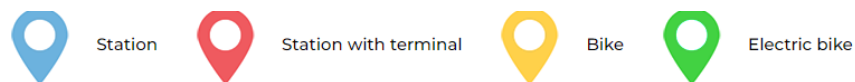


Those who regularly cycle through the city have a network of separated routes with contraflow lanes and bike boxes. This solution has civilized bike traffic in the city center and on access routes and has largely improved its safety.

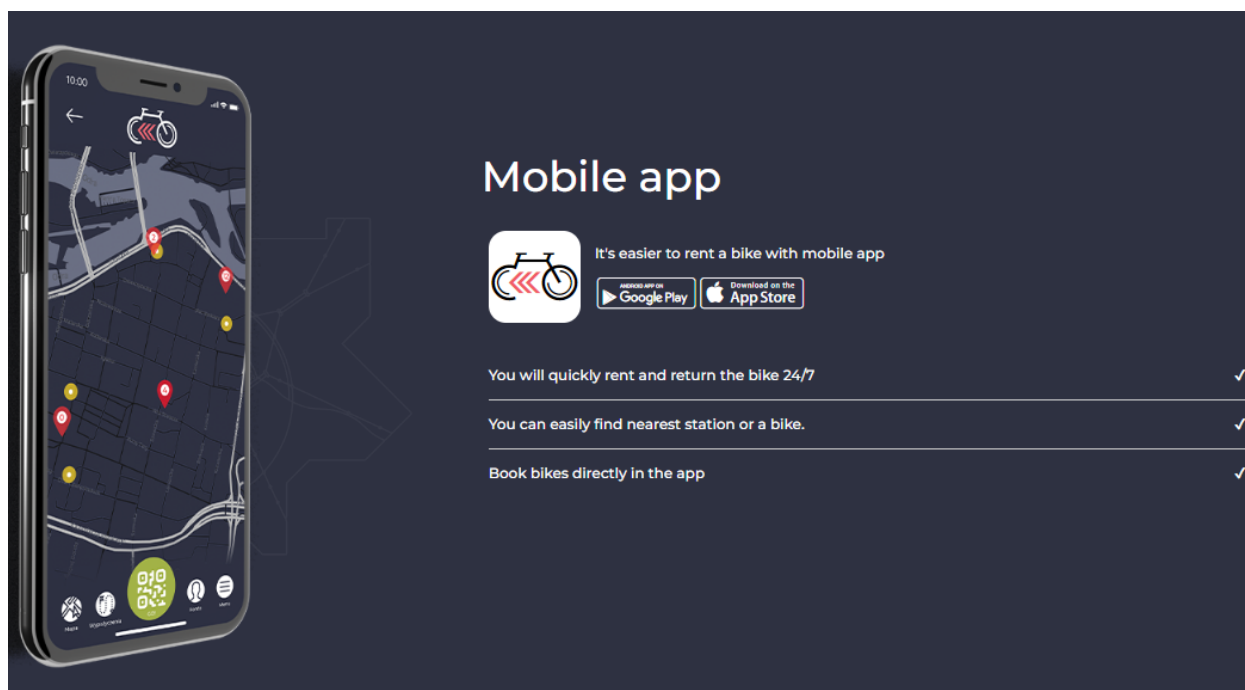
Passages under bridges are a large convenience (Wroclaw has most of them among Polish cities). This great solution allows cyclists to travel through intersections without collisions.

In Wroclaw, a city bike system Nextbike is active. It consists of stationary bike rental points. In a few dozen points of the city, you can take a comfortable city bike (against a small fee) and ride ahead. The first 20 minutes of ride under the Wroclaw City Bike are free of charge. even up to 30,000 inhabitants use bikes every day. Their number grows every year – people of every age, including families with children, switch to bikes largely due to the introduction of new conveniences for cyclists.

The most popular application for bike rental is Wrocławski Rower Miejski which provides a huge access as shown in the map below.



Wrocławski Rower Miejski is easily accessible through the mobile application.



### ***Scooter rental point (GoScooter) :***



Go Scooter is a scooter rental service by minute available in Wroclaw, over 100 scooters are around the city, very accessible as all you need is the app on your smartphone.

### ***Other existing solutions proposed by French start ups :***

#### **Urban loop :**



Urbanloop is a French company founded in 2019 developing an urban public transport system with low ecological impact, automated and on its own site. The objective is to decongest traffic by diverting part of the road traffic to its own transport system or to other existing public transport.



It is a point-to-point transport system without waiting or intermediate stops. an additional means of mobility finding its place in the last kilometers of a journey or in areas inaccessible to current transport methods (bus, metro, train, tram).

It is a partnership between several academic actors from the University of Lorraine (the National School of Mines of Nancy, Telecom Nancy, the NS of Geology and the NS of Electricity and Mechanics of Nancy), the city of Nancy and the Metropolis of Greater Nancy. The Grand-Est region financially supports this project to the tune of 500,000 euros.

Initiated in 2017, the first full-scale capsules are produced in 2019. They are 1 meter wide, 1.6 meters high and 3.2 meters long.

The concept proposed by Urbanloop is based on a network of rails made up of interconnected loops on which individual autonomous capsules circulate. These capsules are propelled by electric motors supplied by the rail with very low safety voltage (72 V). These capsules can accommodate one or two adult passengers, an adult with reduced mobility, an adult and two children, an adult and luggage, an adult and a bicycle or goods.

In May 2021, the capsule set the world record for the lowest power consumption for an autonomous vehicle on rails.

The company is selected in the Metropolitan Mobility Plan of Greater Nancy Metropolis to install a service to the future judicial city by 2024.

The system is intended to be energy frugal. The capsules require only a very small amount of electricity to move forward. This low consumption is certified by the world record of 2021.

In addition, the system, due to the lightness of its capsules, requires a much lighter infrastructure than other means of transport on rails (tramway, metro, train), which is both an economic and ecological advantage. This indeed requires less resources (concrete, steel) to install a system. The company estimates the cost of the kilometer of infrastructure between 1 and 4 million euros, where a tram costs around 20 million and 100 million for a metro.



So this is a perfect mobility to connect the areas where there is a lack of public transport.

## Space train :

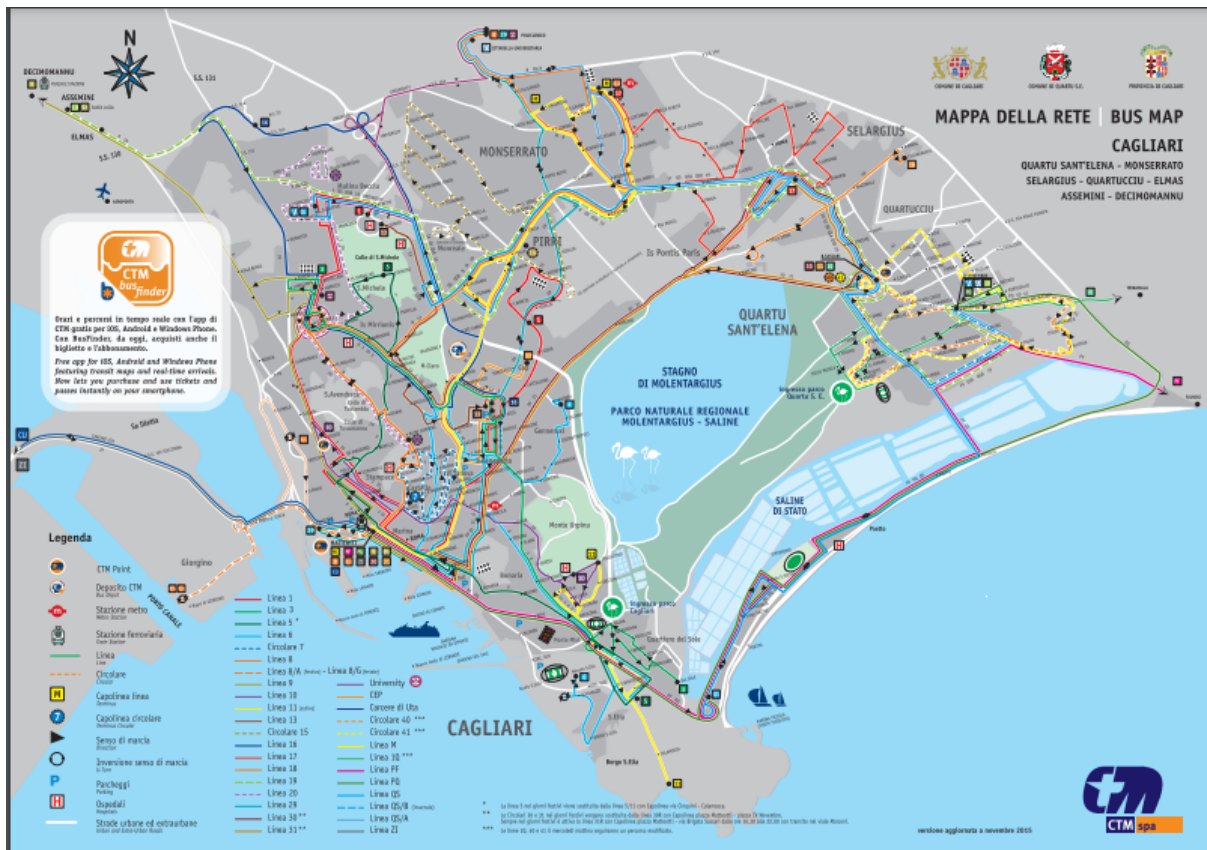


Also, many projects in the West of Europe are emerging for economic and environmental reasons. This is the case of SpaceTrain, a new type of train, developed by a French startup, created in 2017. Its ambition is to allow people to travel ever faster, beyond 500 km/h. SpaceTrain's technology is based on an abandoned 1970s project. The idea is to run a train that levitates on air cushions, with a T-shaped guide rail raised 6 meters high. The train is powered by electric motors. With this technology, it is possible to drive at an average speed of 540 km/h, even going up to 702 km/h at top speed. SpaceTrain has a maximum autonomy of 600 km allowing, for example in France, to connect the main major cities. This technology has the advantage of having a particularly low cost. Indeed, installing one kilometer of SpaceTrain line should cost 8 million euros, compared to triple for a TGV line.



## Cagliari :

It is possible to move through the hinterland of Cagliari, thanks to "metro" tramway lines as well as local buses. Public transport within Cagliari is assured by CTM, of which About 20% of the fleet is already electric. The aim is to increase the number of electric vehicles to 30% as soon as possible.

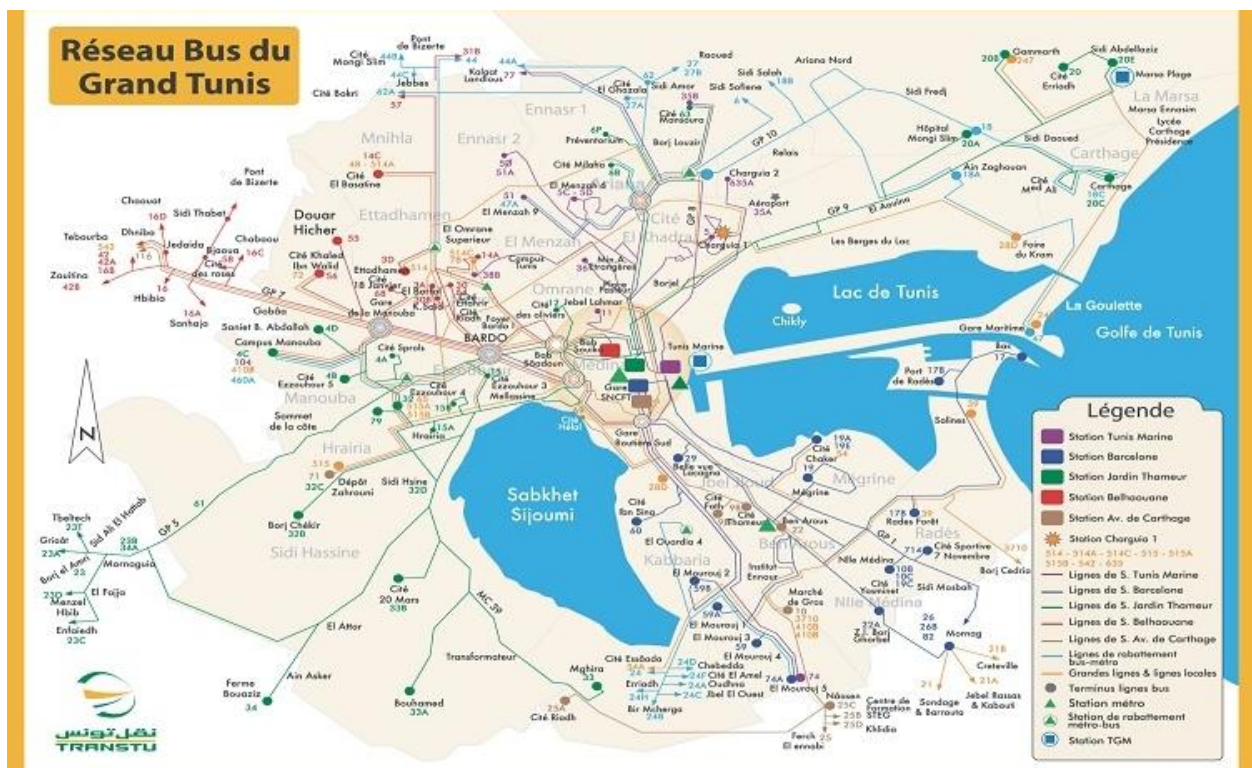




## Tunis :

In Tunisia, cities have experienced often uncontrolled growth from the 1960s, with a population explosion on the outskirts of the main Metropolises.

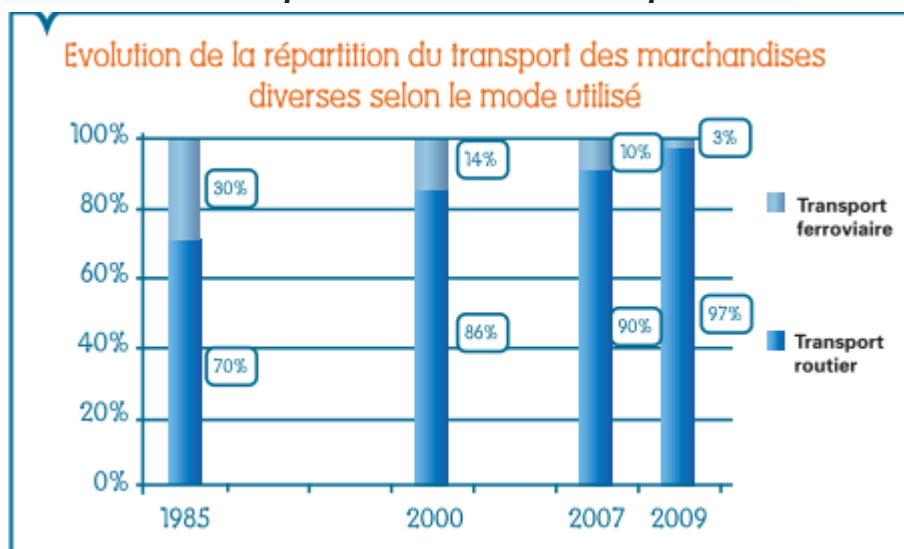
The natural and agricultural areas on the edge of towns have been absorbed by the new housing market. This growth ever further from city centers has only been possible by only one thing : our ability to travel by car. Indeed, these new outlying districts, planned or spontaneous, suffer from a common evil : a lack of reliable public transport. This is better explained by the maps below which highlights the limits of Bus / Tramway reach.





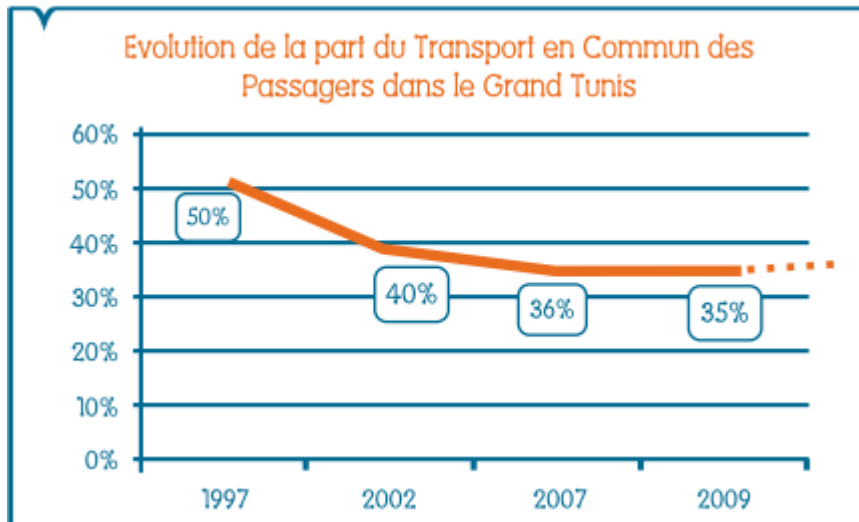
Integrating these neighborhoods into the urban fabric therefore relies solely on automobile transport. This is only applicable for transport of merchandises which is highlighted below. ( Figure 2 )

### Evolution of Transport of merchandises repartition :



Since the end of the 2000s, the development of means of public transport has slowed down. It has now become inefficient, no longer meeting the needs of citizens. This encouraged further the use of private cars which represents today about 70% of the transport market and we notice the huge decline in public transportation share which is 30% ( Figure 3 )

***Evolution of public transportation share in Tunis during the last decades :***



This is posing many threats as less than 35% of the population owns a private car and it makes the whole model unsustainable as a whole, one of the solutions that Tunisia is trying to implement is giving municipalities more funds and liberty of policies implementation to promote the usage of bikes for transportation within the city by implementing bike sharing options , bike parking spaces and bike circuits within the center.

Another policy adopted within the financial law of 2022 is the exemption of customs fees for electrical cars to promote the usage of electric cars for Tunisia although there is a lot of room available for development on this matter.

Also, the municipality of Tunisia is trying to reorganize the city in the long-run trying to move closer the habitation and work districts together to make it more reliable and easier for citizens to reach their work by public transportation.

## **Chapter 4: Mobility and Economy - Brno**

State-of-the-art:- The Brno City, <https://priprav.brno.cz/>

Geography: Terrain, Rivers and Population Distribution

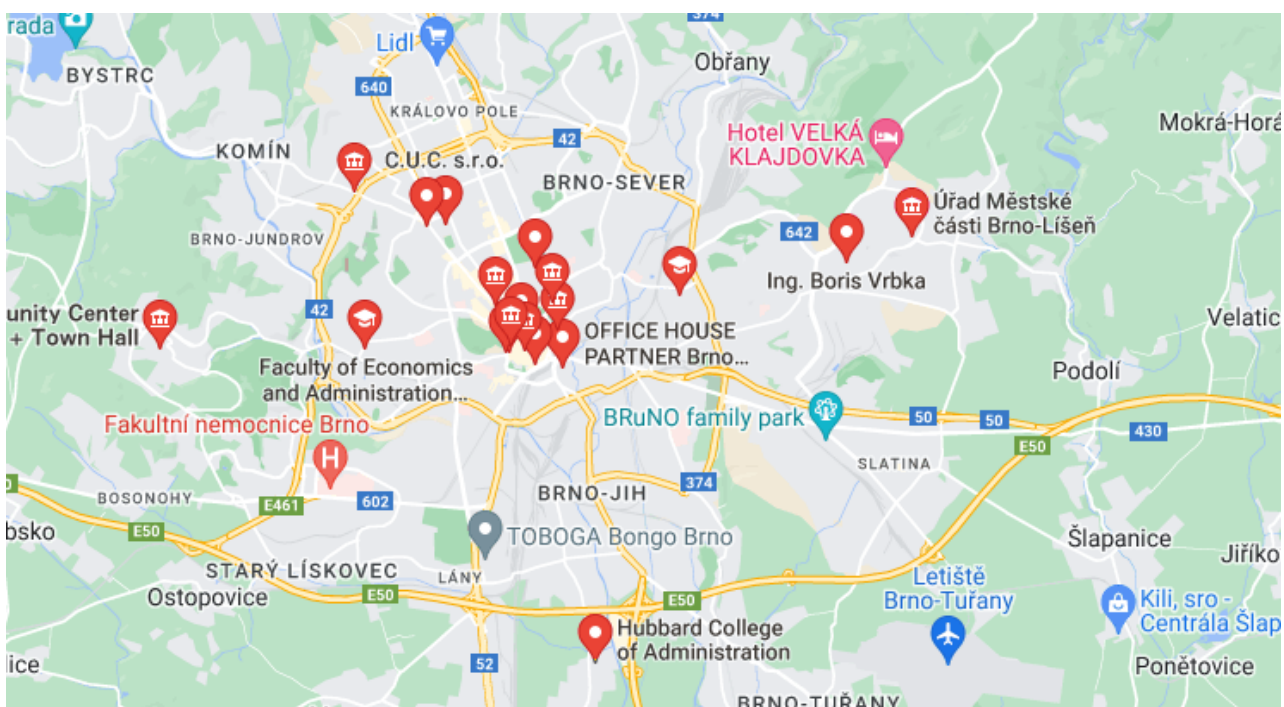
Mobility Network : Bus, Tram, Railway, Airport and Boat map

Power stations : Energy and Fuel - charging station for electric cars

### ***Geographical Aspect :***

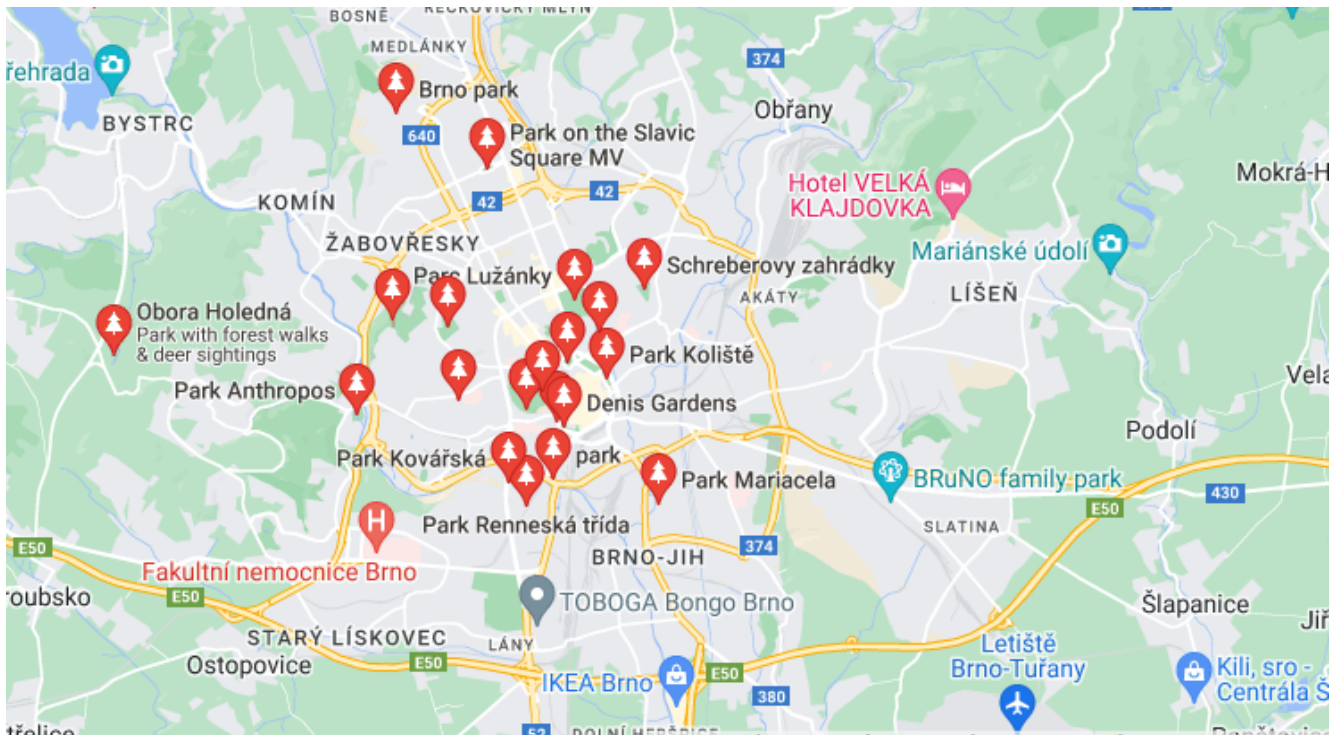
Brno is a city in the south-east of the Czech Republic, the most famous centre of excursion tourism, as well as the political, economic and cultural capital of the Moravian region. According to the latest data, the population of Brno was about 380 thousand people, a low birth rate gives a large population decline. Despite the current decline in the number of people living in Brno, it is the second largest city in the Czech Republic, its agglomeration is also one of the most densely populated. Climatic zone, in which Brno is located, belongs to a typical temperate continental climate. The city is characterised by a mild change of seasons, the off-season is distinctly expressed, with little rainfall. Winters are cool enough, but without severe frosts, precipitation in the form of snow is irregular, while summers are mostly warm, with a predominance of sunny days. Summer rains can be heavy and long, but this weather quickly gives way to warm and clear skies.

Administrations offices within the city of Brno are highly concentrated around the city centre with the exception of few administrations within the outskirts of the city. This is practical for citizens as they can get most of their administrative tasks done within a reasonable reach and without having to move around the city. (map below )

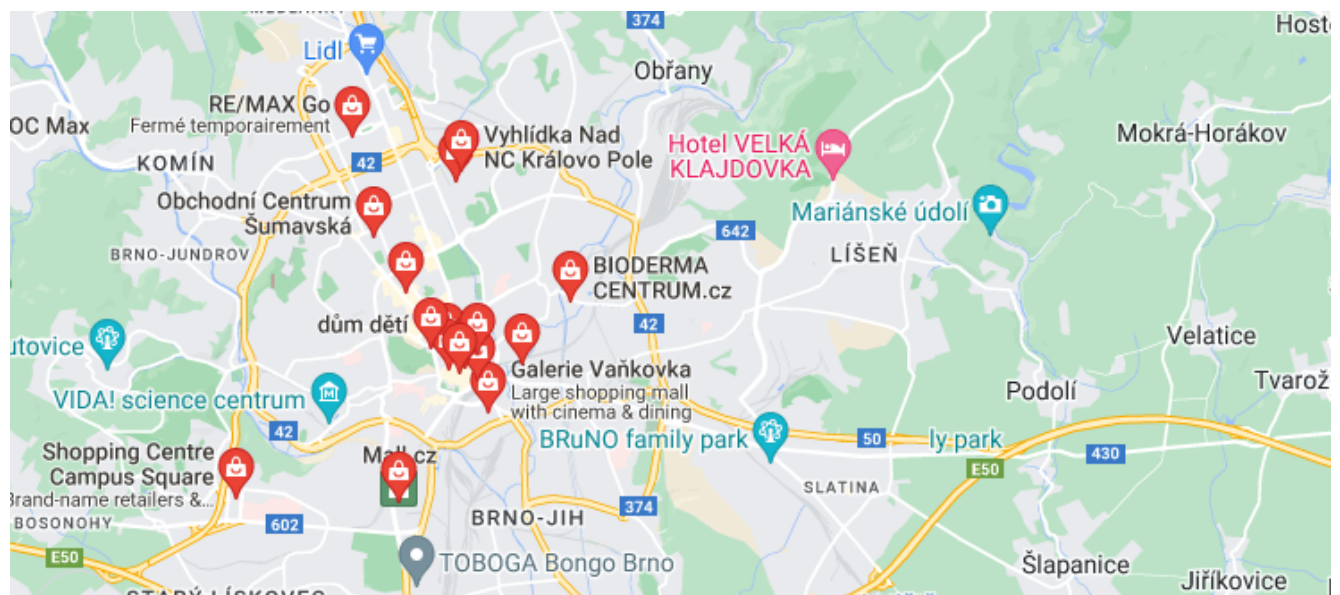




Most of the parks and Green areas of the city are also centred within a reasonable distance from the town centre ( with a few exceptions on the outskirts of the city ), This is once again beneficial for the citizens. (map below )

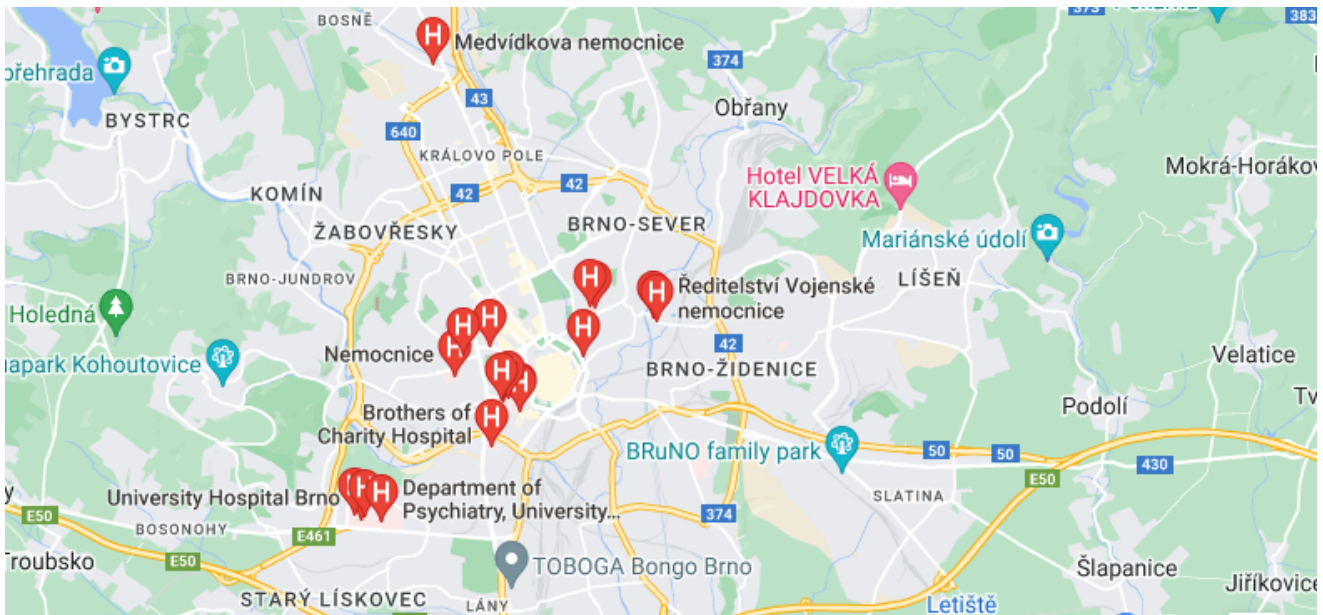


Shopping malls and main markets of the city of Brno are highly concentrated within a very small radius in the city centre with the exception of a few malls located north & south of the city. (map below )

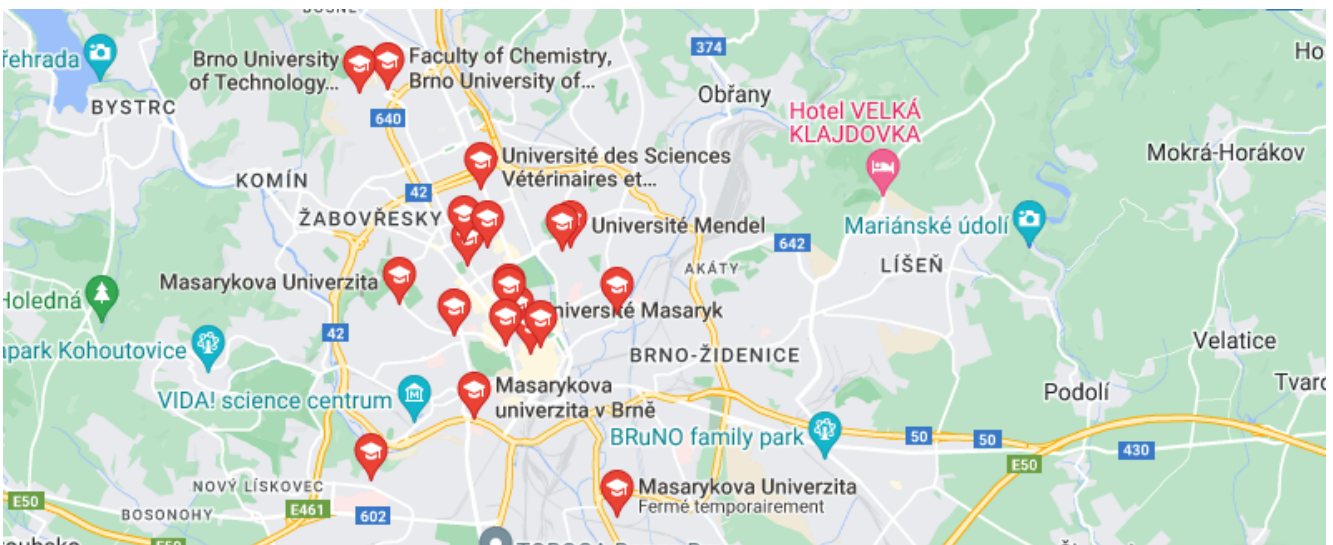


Hospital within the city of Brno are situated within the centre , east and south of the city ( it also depends on the specialisation of each hospital ) , this is may not be very practical for the citizens but it is still within a short amount of reach (map below).

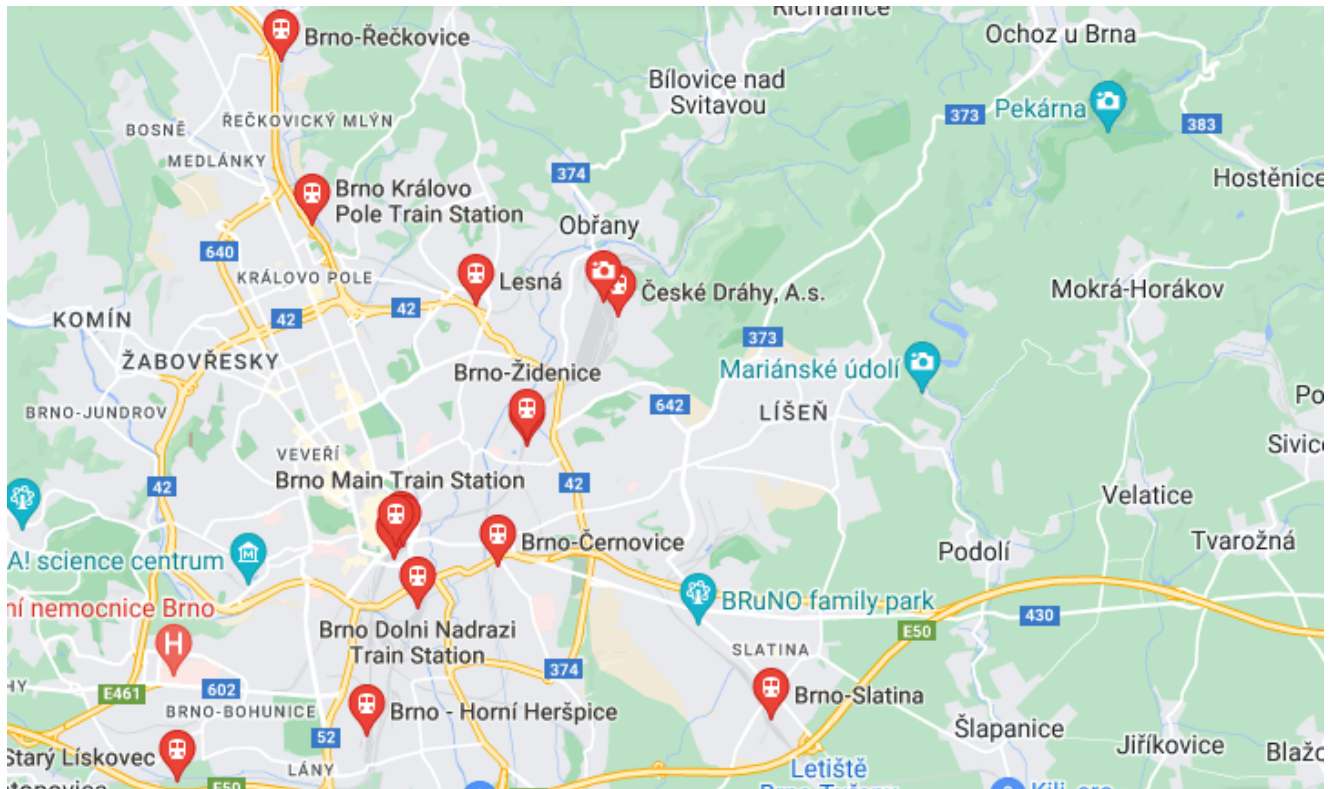




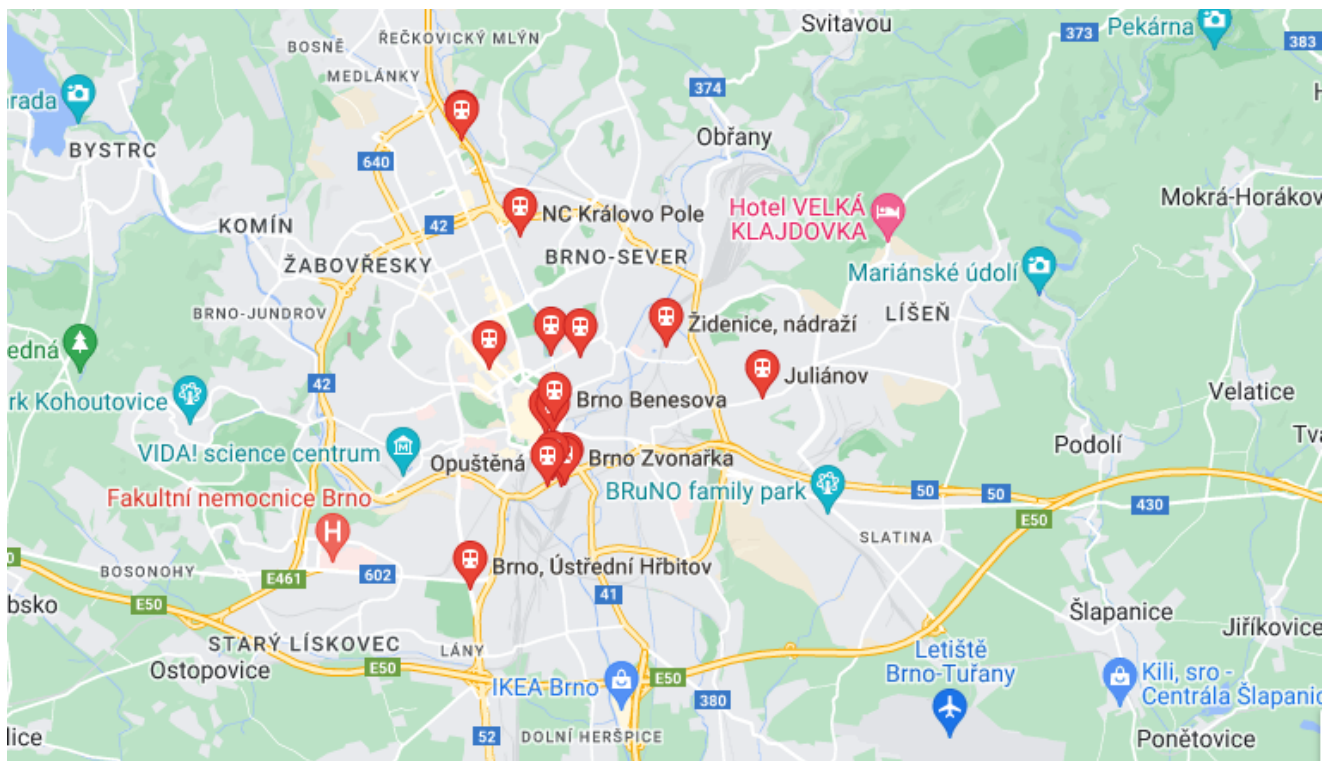
The universities of Brno are situated very close to the city centre with the exception of Brno university of technology & Faculty of chemistry situated in the extreme north of the city. (map below)



Train stations in Brno are located within each part of the city assuring a high mobility for the citizens ( North , east , west and south ), most of the stations are logically located within the centre of the city. (map below )



Bus stations in Brno are mainly located within the centre of the city with few stations on the outskirts. (map below )

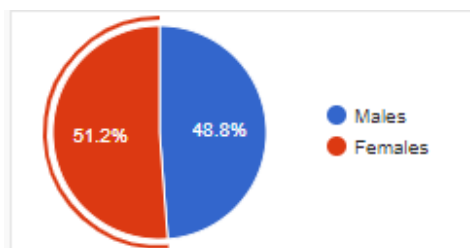
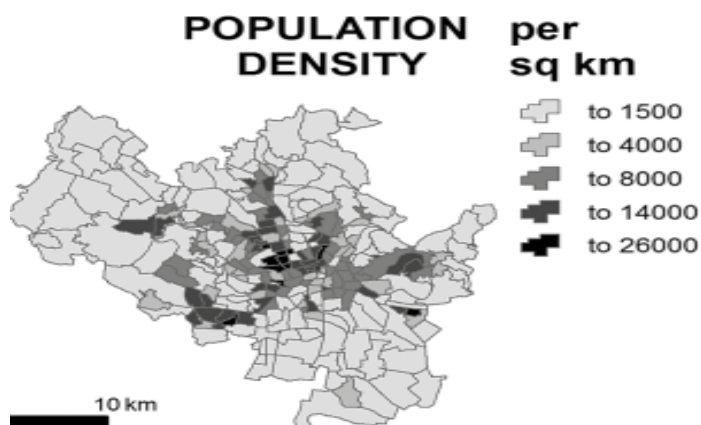


## Population Distribution :

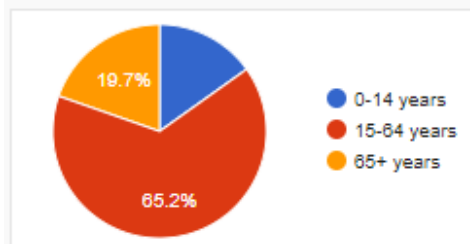
Population of Brno is approximately 390,000 inhabitants ( 2021 ) which consists of 51.2% females and 48.8% males, if we divide the population into three age groups ( 0-14 years , 15-64 years , 65+ years ) we see that the first group consists about 15% of the population , the second group which is the largest consists of about 65.2% and the last group 19.7%. (figure 2 )

Also when we analyse the population density in Brno, we can notice that the

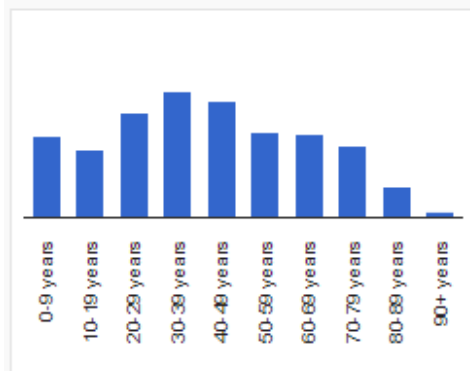
majority of the population is concentrated within the city centre with a high density surpassing 26000 inhabitants per sq km and that fades to about less than 1500 inhabitants per sq km when we move away from the city center (figure 1)



Gender (C 2021)	
Males	194,454
Females	204,056



Age Groups (C 2021)	
0-14 years	60,339
15-64 years	259,862
65+ years	78,309



Age Distribution (C 2021)	
0-9 years	41,585
10-19 years	34,760
20-29 years	54,028
30-39 years	64,656
40-49 years	60,339
50-59 years	44,332
60-69 years	42,554
70-79 years	37,422
80-89 years	15,610
90+ years	3,224

<https://datahub.brno.cz/pages/bin-transport>

<https://www.dopracenakole.cz/en>

<https://datahub.brno.cz/apps/public-transit-accessibility/explore>

<https://datahub.brno.cz/>

<https://datahub.brno.cz/pages/bin-transport>

## Chapter 5: Proposal for Green City

### *Public Sector*

- a. The application
- b. Solar Charging station
- c. Police using Horses / Bikes within the city centre
- d. Walk and get a bonus
- e. Rearranging Routes for transport
- f. Multi-ownership car contracts and Limit car ownership per house
- g. Hydrogen Fueled Buses
- h. Monthly tickets
- i. Free bikes for kids and sensibilisation
- j. Express bus/ train option

### *Private Sector - Car-pooling and social responsibility of entreprise*

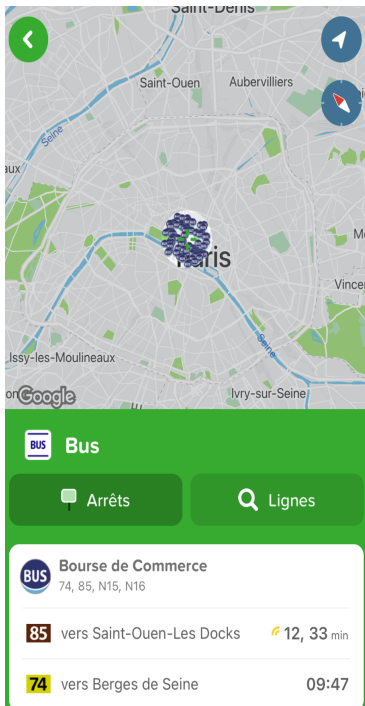
#### **A. The application**

The idea is to combine most of our proposals and the existing mobility in an application like City Mapper. In this application we could see all the way to travel in the city and in the hinterland.

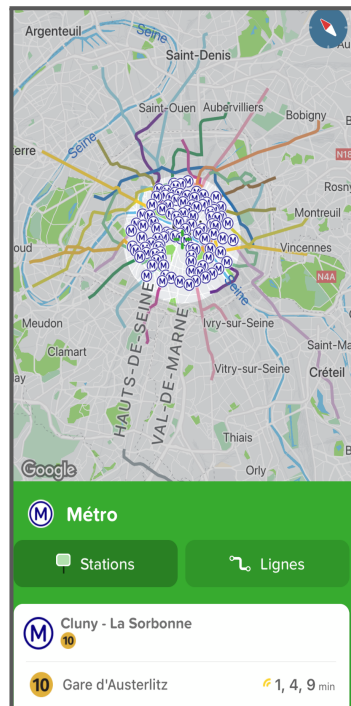
This is the exemple of city mapper as an inspiration and base for the Brno mobility application. Since this base, we can add to the existing tab, other tab for the next proposals.



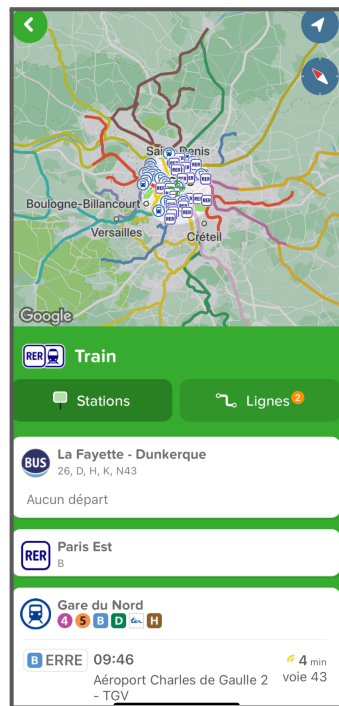




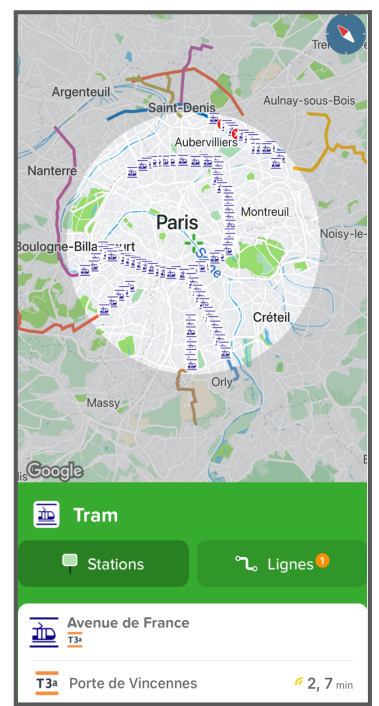
Bus tab



subway tab

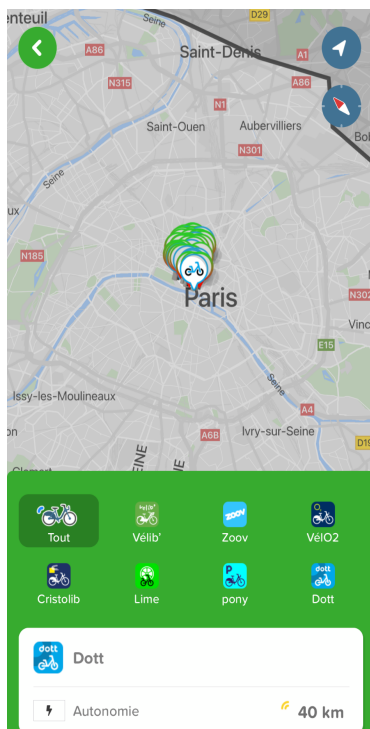


train tab



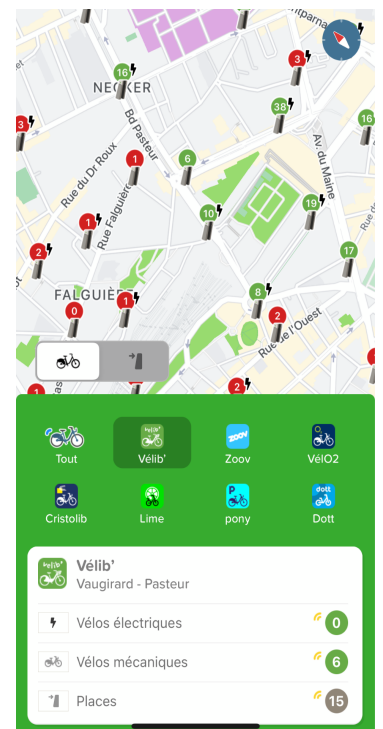
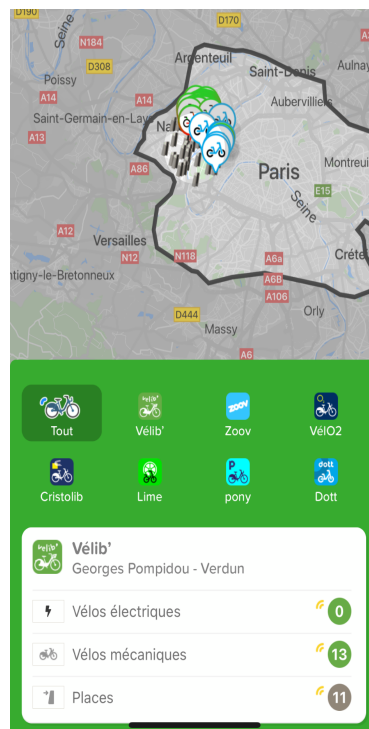
tramway tab

The bike tab, this is the same model for the trots, scooter and car sharing.



Select your station and see how many bikes of the 2 types and place to park are available

The operators



## B. Solar Charging station

### Solar charging stations for electric vehicles (EV's)

The combination of solar energy and **electric vehicle (EV) charging** is the key in drastically reducing our dependence on fossil fuels. Electricity comes from a variety of sources and it's crucial that electric vehicles will be powered by renewables. Electric cars are becoming immensely popular and coming years we expect nearly anyone who owns a solar energy system will install a **solar charging station** at its home. For this to happen we'll need a fundamental change in how we think about refueling our cars and a natural evolution of our energy infrastructure.



What is the change in thinking that we need?

Most people believe we need to be able to charge our **plug-in electric vehicle (PEV)** or **plug-in hybrid electric vehicle (PHEV)** within 2-4 minutes, similar to pulling over at a gas station and filling up your car with gas. Even though Tesla's super chargers are trying to do exactly that, electric charging is going to be different from what people are used to. From now on most people will charge their electric cars with their home solar charging station while they sleep or while they're at work. Solar charging stations will be used for **"topping off"** an electric car, giving the owner enough battery charge to return home where she can fully recharge the EV.

Fact: **Just 10 solar panels** should provide roughly enough electricity to power **21,000 kilometers** of electric driving each year. How's that?

## On-Grid solar charging stations

A grid-tied solar energy system is the most straight forward way to charge your electric car with solar energy. A grid-tied solar energy system will feed the power to the grid, regardless of whether your home needs the power at that moment or not. So when your solar energy system is feeding to the grid, and you are at your office, the electric power generated at home is sold to the utility company. You'll get that power back from the utility company in the form of a credit. When you come back from work and park your car at home, you can use that credit to re-charge your car at home.

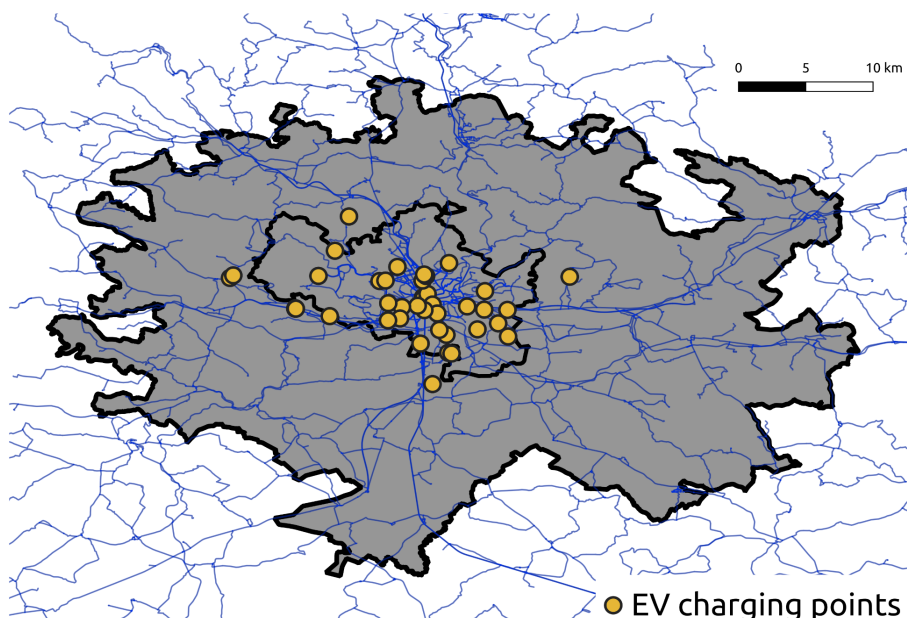
A conventional electric vehicle charger that is connected to the grid "will almost always be cheaper" than an Off-Grid charger that stores the power in batteries.

## Off-Grid Solar charging station

An Off-Grid electrical car charger can also be named "**Electric Vehicle Autonomous Renewable Charger**". There's no connection to local utilities required. The solar panel array will feed the battery energy storage system and the entire power needs are drawn from this storage system. Off-grid electrical car chargers can be placed virtually anywhere, as there's no need for a connection to the electrical grid. The independent solar array canopy catches quite some wind, and for that reason a solid foundation is required. Some off-grid solar energy chargers have a heavy steel base plate that functions as **ballast**. Those are extremely easy and quick to install, as no foundation or digging is required.

Most electric car owners will completely charge their EV batteries at night at their homes. Therefore for most solar charging stations, the objective is not to fully charge an electric car, but to allow several cars to "top off" their batteries.

Today, there are already some charging station for electric vehicles here in Brno but no solar charging station. Then we can transform some of those charging stations by adding solar panel infrastructure.



That are the existing electric charging points and the idea is to develop infrastructure in the hinterland so people don't need to go back to Brno if they want to do a hinterland-hinterland travel.



### C. Police using Horses / Bikes within the city centre



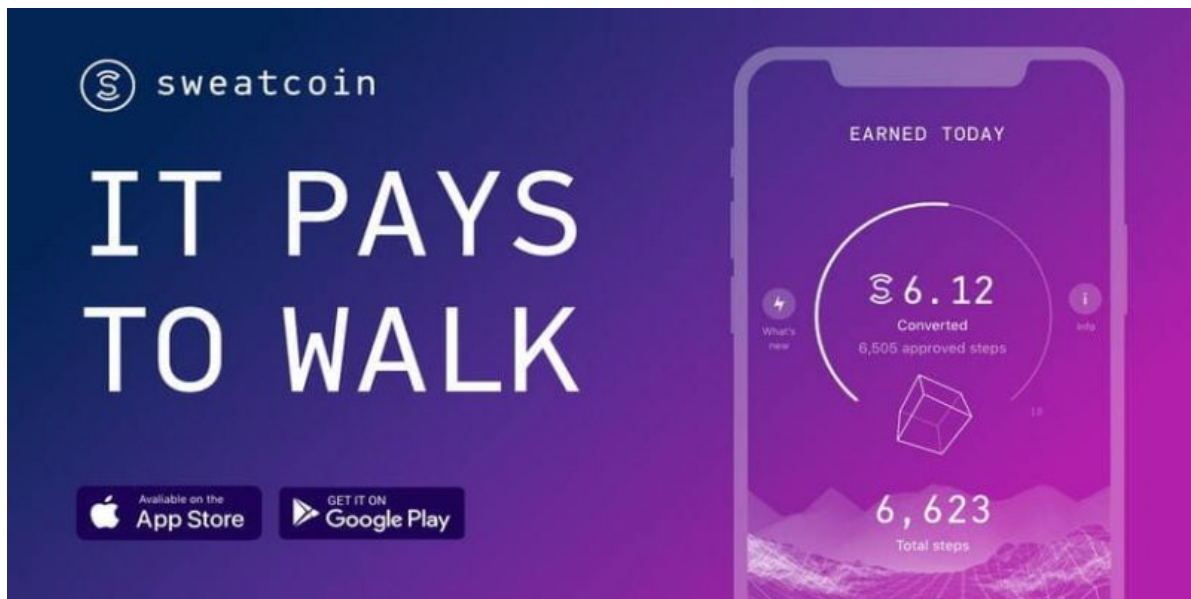
One of solutions that we do propose is for the Police department to decrease the usage of cars within the hinterland & city centre by at least 20% and try to limit it even further unless for extreme situations. When patrolling, horses are extremely mobile and do offer great visibility which makes it perfect for crowd control for example, it also improves public relations with the citizens breaking the wall between police and people as most probably Policemen on a horseback would feel much more approachable than policemen in a car.

For the bikes however, in an urban area the bikes will get to calls much faster than police cars, bike could also be very silent and without giving prior notice in case needed compared to a patrolling car, Bike are much cheaper to maintain ( maintenance costs ) and uses no fuel or any sort of polluting energy, it would also send a message that the municipality is fully engaged with the objective of attaining a green city and Police department are playing their role too.





## D. Walk and get a bonus



You may have heard of SweatCoin, it is a popular app with a very simple concept. It pays you to walk, Yes as simple as that. In fact you get SweatCoins based on the distance you are covering and when the Coin gets officially launched in the Crypto Market you will be able to trade it. In fact there are many applications that do offer this concept, but SweatCoin is now the more trendy one.

And this gets us to our idea, in fact we are proposing that the municipality of Brno would launch a similar application ( We suggest “ Brnalk ” as a name , a combination of Brno & Walk ) that would track the citizens using the application on their smartphone while activating location services and it would keep recording each step they take during the day ( Please note that Indoor steps would not be counted as we are trying to make it as an incentive for people to walk more and use less their private means of transportation ), this would only apply when your are riding a bike for example as the sole purpose of the application is to encourage people to use more eco-friendly means of transportation. In fact the more distance you cover, the more coins you would get, these coins would then be used to exchange for goods at the municipality. This idea would help motivate the people of Brno to walk more often thus having a positive impact on the environment by using less cars and it would be a great way to improve their health as walking is one of the easiest and most practical sports that there is. In the long run we do expect a noticeable change in the environmental impact ( Less pollution ) and a healthier population. To make things even better, the compensation system would be heavily related to our main purpose & focus, the coins acquired by walking or cycling would then be used to exchange for :

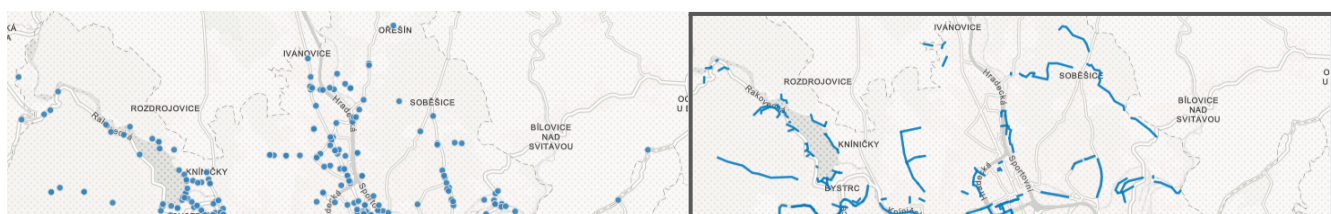
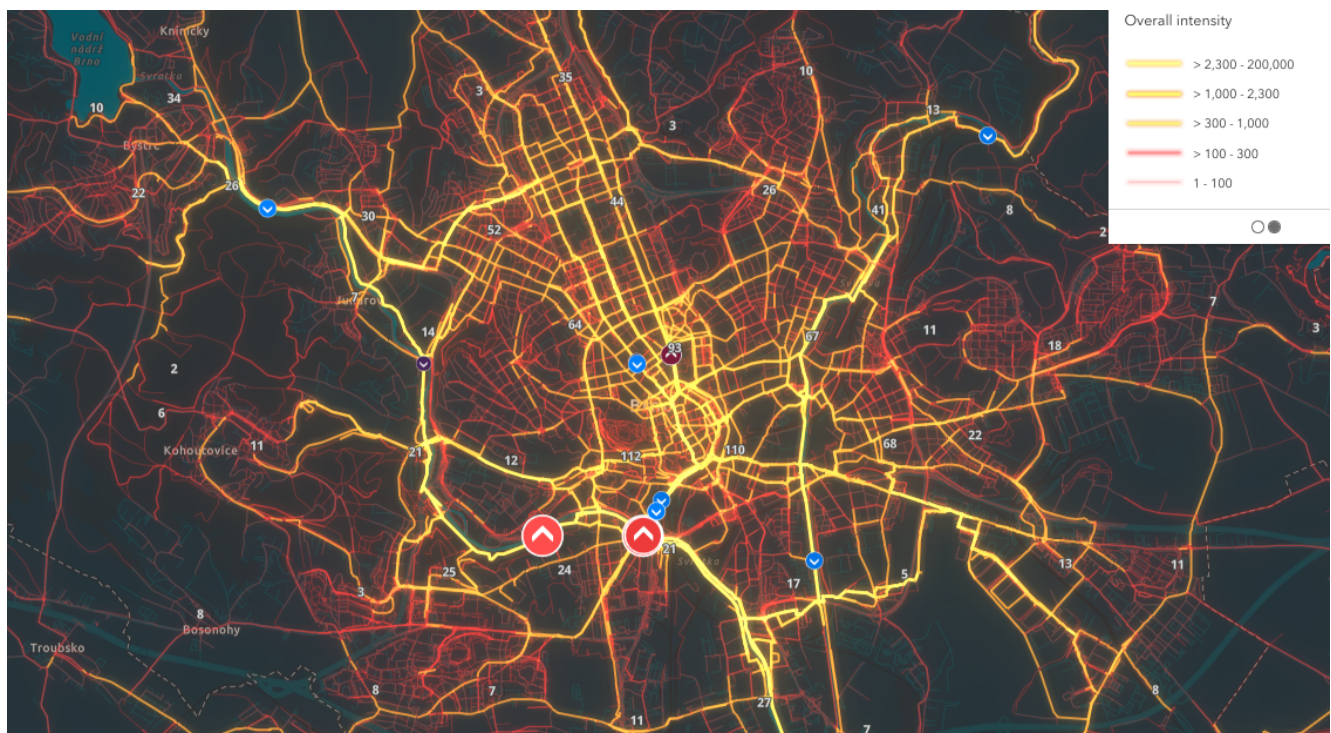
- A free monthly public transportation Pass
- A free Bike
- A certain amount of usable coupons for Carpooling apps ( Partnered with the municipality of Brno )

- Solar Panel system to install at home
- And much more ..

Of course that would have to be financed by the municipality but in the long run the benefits would outrun the costs and in the end of the day a reward system might be the perfect incentive so that people would think more about their city and also people might be just thrilled to earn as much points as they can get.

## E. Rearranging Routes for transport

We do propose rearranging the routes connecting the hinterland to the city centre where it has been shown that the intensity of traffic is at its maximum within the city of Brno, this solution is being adapted in cities in Germany such as Dusseldorf. The cost would vary depending on the rearranging and possible routes that could be created but such solution may be adequate to diminish car traffic and car usage as having routes adapted for public transportation such as buses would create a smoother flow and optimise the efficiency of public transportation thus making it a great alternative for using the car.





Example of rearrangement



**F. Multi-ownership car contracts and limit car ownership per house**

We propose limiting car ownership per house by providing a city tax deduction as an incentive for family household members to own less cars and probably share one car to get a financial incentive from the city of Brno. This would eventually lead to less cars within the city and would further implement the idea of car sharing within the community.

Shared Costs:

1 person: 100 % cost

2 people: ~50% cost

3 people: ~33% cost

Add to that the city tax deduction, this could be an interesting financial incentive for the residents of the city.

## **G. Hydrogen Fueled Buses :**

Fuel cell electric buses which are powered with hydrogen are an excellent zero emission solution and are now used throughout Europe in many cities such as Cagliari , London, Stuttgart ...

These buses which are in operation have proved to be an excellent and environment friendly solution, how do they function?

The fuel cell provides all of the energy for the vehicle operation, whilst the batteries/capacitors are able to provide peak power to the motors to meet rapid acceleration and gradients. By using a fuel cell in conjunction with a battery, the size of each can be optimized for a given route. A fuel cell electric bus does not require any additional city infrastructure work or permits other than a centralized hydrogen refuelling station (HRS) at the bus depot. Because the fuel cell generates only water as an emission it will always be a zero emission bus. Due to the perfect designed balance between battery power drive, fuel cell drive and combined drive, the FCE buses have an autonomy of a 16 hour service day.

## **H. Monthly tickets (National level) :**



Germany's initiative in response to inflation and rise of fuel & Gas prices.

9 Euro ticket transportation that is valid for one month, and could be bought for the entirety of summer season. It is available for everyone ( Locals & Tourists ). For 9 euros, you can travel throughout Germany on local / regional trains.

The main focus :

The problem we should focus on is not the scarcity of shared mobility solutions but the actual incentive behind it. The majority of people are not aware of the environmental impact we are causing to our planet on a daily basis and the results of it, although we are witnessing it right now. ( All time high records of temperature , unstable weather , deforestation ... )

The financial aspect to each solution is the most important aspect to focus on at least in the start so people get used to more efficient and environment friendly solutions. Germany's 9 Euro ticket idea is the perfect example of simplicity & reliability in offering a real incentive towards people. It applies to a simple marketing concept of penetrating the market offering a service for such a low price that would eventually attract people to try public transportation as a replacement for cars for example. Although the model may not be sustainable in the long run in terms of costs, it is the government's responsibility to divert funds to subsidy even further the public transportation and put environmental issues as one of the most important issues to tackle. The same could be done for the majority of other mobility solutions within Czech republic and Brno as a whole.

## **I. Free bikes and new tracks for kids and sensibilisation**

We propose that the municipality of Brno would invest in offering bikes to children of Brno and the suburbs and in developing specific bike tracks that extends from the city center/surroundings to schools, this would promote using bicycles among kids and youth on a daily basis to get to the school and thus having the younger generation more committed in using greener ways of transportation ( bikes) and developing it into a natural habit.

In fact, this is a way for the kids to learn by doing. It could be completed by some lessons of sensibilisation to the environment in schools.

Plus, schools can give more awareness campaigns about the environmental impact and dangers of car usage :

There could be more serious and direct campaigns to raise awareness among the people about climate change and this could be injected at a young age starting school by providing a course about

### ***J. Express Bus / Train Option :***

One of the main reasons that people do argue about not taking public transportation is that it generally takes some time to get from point A to point B and it would be much faster using their private cars ( which taking into account the traffic may turn out to be the opposite ).

One classical and yet very functional solution for this might be the Express Train or Express Bus which are most commonly used to get from the Airport to the City. ( Navette Shuttle ).

These Buses & Trains would stop at a maximum of the 3 stations through their route, where it will be the most condensed for services & establishments.

(Work , Hospitals and Universities for example ). This would allow the Tram/Bus to reach the destination at a faster rate without stopping at each station. These special Buses & Trains will cover the route at the peak time of need ( For example 7 AM - 9 AM & 5:00 PM 7:00 PM ).

### **Private Sector - Car-pooling and social responsibility of enterprise :**

Municipality can make in place tax deductions for startups or enterprises committed for proposing sustainable urban mobility transports :

We propose that startups that are proposing sustainable urban mobility transports such as carpooling/ car sharing, Bike and scooter rental would benefit from a city tax deduction as an incentive for such projects.

In an other aspect, we can encourage companies within the city of Brno to propose their own network/ channels of CarPooling for employees like on (FaceBook / Whatsapp Group).

Benefit the companies who commit to this initiative by a city tax discount (based on a certain percentage).



The mobility of the future is in fact an integral part of our present, car-sharing and free-floating modes are just one example. Travel solutions are evolving at an impressive speed and although they are an obvious and increasingly important issue for manufacturers and politicians, the main actors in these changes will be users and their habits. For mobility to be intelligent, fluid, responsible and accessible, all players in urban life have a role to play, together, and now.

We want to thank you for your attention and your application to act for a more sustainable world.



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## Mobilités Et Transports Durables : Des Enjeux Sécuritaires Et De Santé