



BERLIN

Inhabitants	3,711,930 (as of 31st December 2017)
Size	892 km ²

Current situation

Since 2007, the population of Berlin has grown by approximately 363,000 (+11%). According to the median variant of the current population forecast, there will be a further increase of approximately 266,000 people by 2030. Moreover, in the areas surrounding Berlin, a consistent but more moderate rate of increase in population numbers is expected up to around 2027.

The number of commuters has also been rising consistently for years. In 2016, more than 295,000 working people commuted daily to Berlin, whilst the number of commuters travelling daily in the opposite direction rose to almost 174,000. Because of an increase in population in Brandenburg, particularly in those areas close to Berlin, a further increase in commuter numbers is forecast.

Modal split of the resident population of Berlin (2013)

Public transport	Private car	Bicycle	On foot
27	30	13	31

On average, all inhabitants in Berlin complete 3.5 one-way journeys a day, and the average Berlin one-way journey is six kilometres long. So, the average overall journey length is almost 21 km per working day, whilst the average time spent travelling every day by the population is approximately 81 minutes. A car journey, with an average length of 8.8 km, is significantly longer than the average Berlin journey. The average number of persons per car per journey is 1.3.

Berlin is characterised by very low levels of motorisation (326 cars per 1,000 inhabitants in 2016). Berlin is also a pioneer when it comes to the availability of car sharing. In addition to a growing number of e-scooters, more than 3,000 cars are available for sharing.

Levels of particulate matter (PM 10) in the air have fallen sharply in Berlin, from more than 100 µg/m³ in the 1980s to the current level of 27 µg/m³. A particular contributory factor here has been the introduction of the city's environment zone, which ensures that diesel vehicles without a particulate matter filter are forbidden from driving into the inner city. However, the annual average values for NO₂ pollution measured along arterial roads with heavy traffic were between 39 and 63 µg/m³ – in part, therefore, significantly higher than the EU's annual limit value of 40 µg/m³.

In 2017, there were more than 143,000 road traffic accidents in Berlin. Previously, the number of road traffic accidents was in decline. However, given the growth of the city and its population, and the resultant increase in traffic volumes, this is no longer the case. In 2017, 17,415 persons were hurt on Berlin's roads, of whom 2,317 were seriously injured and 36 killed. 75% of the people seriously or fatally injured are pedestrians, cyclists and motorcyclists. The number of fatalities – in relation to the number of inhabitants - is the lowest compared with other German cities (2017: 10 per 1 million inhabitants).



Key areas of focus

In summer 2018, the **Berlin Mobility Act** came into force. This legislation was developed in a wide-ranging process of dialogue with the participation of political groups, associations and representatives of civil society. The primary aim of the act is to increase road traffic safety to the point of “vision zero”, which means that there would be no road traffic accidents in Berlin with seriously or fatally injured persons. The other main aim of the act is to promote eco-mobility (public transport, cycling and walking) in order to achieve a shift towards sustainable and city-compatible mobility. The Berlin Mobility Act requires that eco-mobility be given priority over transport by private car. The act consists of five parts, which are being created in succession: general transport policy goals, public transport and cycling (all in force), pedestrians (2019) and intelligent mobility / commercial traffic (2020).

The existing **strategy for pedestrians** from 2011 contains various measures with the aim of transforming Berlin into a pedestrian-friendly city. It is intended that the expansion of pedestrian crossings and pedestrian-friendly traffic light systems will enable people to cross the road quickly and safely. Moreover, with the construction of so-called meeting zones, the city is looking at improving the pedestrian experience of main roads. This strategy will be replaced in the Berlin Mobility Act with the section on pedestrians in 2019.

Berlin is adopting several **measures to support cycling**. It plans to create a bicycle network with seamless connections by 2030. Features of this network will be safe areas for cycling along arterial roads, cycle lanes or paths along minor roads and high-speed cycle paths as well as long-distance cycle paths. The plan is to create 100 km of high-speed cycle paths by 2030 and 100,000 additional storage places for bicycles, including lockable bicycle boxes and large bicycle parking facilities. Following an extensive tendering process, *nextbike* has been developing a **public bicycle hire system** on behalf of Berlin since 2016. It is planned to work step-by-step to offer 5,500 bicycles for hire at 725 stations.

Berlin is expanding the tram network hugely over the next few years in an effort to make **public transport** more attractive. Of greatest importance are routes with high demand, on which the service provided by buses is no longer sufficient, and routes that provide public transport links to new residential areas. It is also intended to expand the network and the number of stations on the regional and city train network as well as the underground. All stations will be made barrier-free. Moreover, public transport plans to become significantly more attractive by offering improved fares to various target groups, e.g. pupils and working people.

In order to promote **e-mobility**, Berlin supports the expansion of charging posts in public spaces. Up to the end of September 2018, around 485 charging posts had been created. It is planned to increase this number to over 1,000 by the middle of 2020. With its support programme “business-friendly e-mobility”, Berlin is helping to drive the electrification of commercial vehicle fleets in the city.

In addition to these measures, Berlin is making further efforts to improve **air quality**. There has been an environmental zone since 2008 with access restrictions for vehicles emitting high levels of pollutants. At the moment, a test is underway with a speed limit of 30 km/h along five arterial roads. The aim is to prevent the need for acceleration, which is the cause of particularly high NO_x emissions from diesel vehicles.



BRUSSELS

Inhabitants	1.2 million (2018)
Size	161 km ²

Current situation

Since the turn of the century, Brussels has been growing. However, population growth in Brussels is a relatively recent phenomenon because the city had been contracting in size continuously since 1970. Compared with the year 2000, Brussels has grown by 19% to its current size of approximately 1.2 million inhabitants.

Every day, 700,000 people work in Brussels, of whom 365,000 come to work by car. The consequence of this is that the city has huge problems with traffic jams, particularly on the inner ring road. Of the numerous commuters who travel to Brussels daily, 63% use a car.

Modal split of the resident population of Brussels (2010)

Public transport	Private car	Bicycle	On foot
25,3	42,6	2,5	27,9

The number of road traffic accidents has remained relatively stable over the past ten years: in 2006 there were 3,966 accidents and in 2017 3,846. The number of fatalities in road traffic accidents is falling continuously. However, the number of road traffic accidents involving cyclists has risen.

Key areas of focus

Because of air pollution caused by particulate matter and NO_x gases, Brussels introduced a so-called "Priority Air Action Zone" in 2013 that has been made even more strict in 2018. On certain days on which pollution levels in the air are particularly high, speed limits are in force and public transport is free of charge. This zone also makes it possible for the city to impose both temporary and permanent driving bans. Since 2018, a "Low Emission Zone" has been introduced, and gradually diesel-powered vehicles will be excluded. Until this time, certain types of vehicles will be banned successively depending on the euronorm.

In 2017, approximately 400 million journeys were completed using the city's public transport operators STIB-MIVB - an increase of 35% compared with 2006. In Brussels, public transport currently consists of four underground lines, 22 tram lines and 49 bus routes. The overall capability of the public transport system has been increased by 12% by expanding the network and by deploying vehicles with a greater capacity. A night bus network has also been created. In addition, there are 12 city train lines extending up to 30 km beyond the city. By 2025, STIB-MIVB wants to invest up to EUR 5.2 billion in developing the public transport network. It plans to build new tram lines and also to procure new vehicles. The most significant project is the construction of a new underground line which will link the north of Brussels to the North Station [*Gare du Nord*] and thereby to the inner-city transport network.



Furthermore, the new **Belgian Rail Transport Plan** came into force in December 2017. According to this plan, the supply of rail services is set to increase by 5% up to 2020 for the whole of Belgium. It is also planned that the regional express network will be fully operational around Brussels by 2025.

E-mobility is also receiving support. There are already several hybrid buses in the public transport system as well as four pilot routes on which purely electric buses run. Brussels will build 300 charging posts by 2020. Moreover, for ten years now there has been a bonus system in place for companies that replace their old petrol-driven vehicles with electric vehicles.

Speed limits of 30 km/h have been introduced in the city centre and in all residential areas. Another stated goal of the city is to support **car sharing**. Currently five car sharing operators in Brussels offer around 1200 shared cars, 50% for round trips and 50% free floating, on top of the support for initiatives for sharing private cars.

The public **bike sharing** system Villo operates over 4.000 shared bikes and 360 docking stations spread over the full Brussels territory. 40.000 people have a long term subscription at a cost of 34€ per year and every first half an hour free. Brussels has recently adopted a full legal framework for the dockless sharing of bikes, scooters, steps and all other vehicles that offer an alternative to car usage. Private investment in shared alternatives to car usage is being stimulated by providing an open framework with low costs, but operators are held responsible for their impact on public space and police measures are available to put a halt to bad practices. Currently 6 operators are active in Brussels, with a similar number planning to become active in 2019 when the framework enters into full force.

Brussels has also developed a comprehensive approach to the management of **parking**. The aim of this approach is to reduce the number of parking spaces, to increase charges for parking and to introduce maximum parking times. Ten Park & Rides are being developed at intersections between the city ring and busy metro and tram lines.



LONDON

Inhabitants	8.8 million (2015)
Size	1,572 km ²

Initial situation

Since 2001, London's population has grown by 1.5 million people. Long-term forecasts assume that the population will increase to around 10.8 million people by 2041. One million additional jobs are expected as well.

The population growth has led to an increased overall demand for transport. On an average day in London there are nearly 27 million trips. London's population growth is expected to generate about six million additional trips by 2041.

The share of the environmental association in the journeys has increased continually in recent years, which coincided with a reduction of the share of private cars. Clear differences are evident between the inner and the outer city.

Modal Split of the residential population of London (2016)

Public transport	Private car	Bicycle	Walking
37	36	2	24

Traffic is one of the main emitters and the cause of 28% of the CO₂ emissions, 51% of the NO_x emissions and 50% of the PM₁₀ emissions. Between 2008 and 2013, the PM₁₀ emissions reduced by 20%, which means that London now complies with the EU threshold (50 µg/m³ on the daily average with a permitted 35 days on which the threshold is exceeded per year). Nevertheless, there are still some individual days on which the values are exceeded too far. The annual threshold of 40 µg/m³ for NO₂ is exceeded nearly in the entire inner city. In some streets, the value is as high as 97 µg/m³. The main cause for this is road traffic, in particular through diesel vehicles.

Traffic safety has improved a substantially. Taking 2005-2009 as a base line, in 2016 total fatalities on London's roads fell by 45 per cent. Nevertheless, the Mayor, working through TfL and London's boroughs (municipal districts) has adopted a "Vision Zero" for road danger. The Mayor's aim is for no one to be killed in or by a London bus by 2030, and for all deaths and serious injuries from road collisions to be eliminated from London's streets by 2041.

Focuses

Transport for London (TfL) is the integrated body responsible for London's transport system. Its Board is chaired by the Mayor, Sadiq Khan, and is responsible for implementing his Transport Strategy. TfL manages London's buses, trams, Underground services, the Docklands Light Railway,



London Overground suburban train services, river services, London's taxis, a public cycle scheme known as Santander Cycles, the Emirates Air Line cable car and it promotes walking and cycling initiatives. It is also responsible for London's major highways, all of its traffic signals, the Congestion Charge and the Low Emission Zone. TfL's objective is to keep London moving, working and growing and make life in London better.

Earlier this year Mayor Khan published his **Transport Strategy**. Three key themes lie at its heart: Healthy Streets and healthy people with streets that encourage walking, cycling and public transport, reducing car dependency and the health problems it creates; a good public transport experience; new homes and jobs, planning the city around walking, cycling and public transport to unlock growth in new areas and ensure that London grows in a way that benefits everyone.

London has imposed increasingly strict regulations within its Low Emission Zone the **environmental zone** that was introduced in 2008. Vehicles over 3.5 tones which don't meet the strict emission limits must pay a daily charge to enter the zone which covers the whole London area and operates 24 hours a day, seven days a week. Emission standards will be further tightened in October 2020. In April 2019, the "Ultra-Low-Emission-Zone" (ULEZ) is to be introduced in the centre of the city, initially only covering the current Congestion Charge zone. It is expected to increase in coverage progressively thereafter. The ULEZ standards are Euro 3 for motorcycles; Euro 4 (NOx) for petrol cars, vans and minibuses; Euro 6 (NOx and PM) for diesel cars, vans and minibuses; Euro VI (NOx and PM) for lorries, buses and coaches. London wants to reduce the NO₂ values in the inner city by 20% by introducing the ULEZ

Development of the rail network is seen as a key way to improve the capacity of the **public transport offer**. One of the most important infrastructure project is the new Elizabeth line, a 136 km railway passing through the centre of the city reaching out to the east and west. It will serve 41 stations and is expected to be fully open in the second half of 2019. It would clearly reduce the travelling times for commuters who come to the inner city from the East or West and reduce congestion on the existing Tube (metro) network.

Another focus is on promoting cycling in London. London's Cycle Superhighways aim to provide protected space for cycling on some of London's busiest roads. They connect stations, town centres and key destinations, making them more accessible and easier for people to cycle to. London currently has eight Cycle Superhighway routes completed and more are planned. In parallel to this, London has a network of "Quietways" which are continuous and convenient cycle routes on less-busy backstreets across the city.

Mayor Khan has introduced a number of innovative and bold measures to combat poor air quality and promote zero emission vehicles. Since January 2018 all taxis (the traditional black cab) being licensed for the first time must be zero emission capable. Other taxis, known as private hire vehicles being licensed for the first time must have a Euro 6 petrol or diesel engine, or a Euro 4 petrol-hybrid engine. The Mayor is also cleaning London's bus fleet: in central London, all double-deck buses will be hybrid by 2019 and all single-deck buses will emit zero exhaust emissions by 2020. By 2037 at the latest, all 9,500 buses across London will be zero emission.



LOS ANGELES

Inhabitants	4.042.000 (2017)
Size	1,290 km ²

Initial situation

The city of Los Angeles currently has about 4 million residents on an area of 1212 km². By 2035, the population is expected to grow to 4.3 million residents. The LA County region houses 10.2 million people on an area of 12,308 km². In the next decades, the region may grow by another two million residents.

In Los Angeles, you can reach twelve times as many jobs in an hour by car as by transit, which makes a car an essential tool for economic mobility, particularly for low-income workers and women. Los Angeles does not have a single dominant employment center – it is a set of urban cores separated by long distances. As a metro region in the United States, Los Angeles is quite dense, but its sheer size and lack of affordable housing near jobs make it challenging to serve efficiently by public transit. Like many American cities, Los Angeles dismantled its streetcar system in the 1940s and 50s in favor of highway construction. As a result of both land use and infrastructure decisions, people spend over 100 hours annually in traffic, and in spite of significant gains in air quality, Los Angeles recently experienced the longest stretch of unhealthy air since the 70s.

Currently, the Metro system serves predominantly low and very low income people. Although the bus system has lost 20% of its riders over the last five years, it continues to be a lifeline service for its customers, including older adults and people with disabilities who cannot drive. The rail system, meanwhile, has continued to outperform ridership estimates.

Cycling and pedestrian traffic also play a rather marginal role so far, though there is an enormous growth potential. 47% of the journeys travelled in the LA County region are less than five kilometres, but 84% of these are travelled by car. The shares of the means of transport on the way to work reflect the need for improved street designs: 70% drive to work by car alone, 9% use car-pooling, 9% use public transport and 1% cycle, 3% walk and 6% work from home. At the same time, the share of cycling in travelling increased by 56% between 2000 and 2010.

Every year, 250 people in Los Angeles die in traffic crashes and thousands more are injured. Forty-eight percent of those killed are people walking or biking.

Focuses

Los Angeles is in the midst of an infrastructure boom. In 2016, the voters in the county passed **Measure M**, an evergreen one cent sales tax that will generate \$120 billion over the next 40 years. The majority of this funding is dedicated to the buildout of a regional rail and bus rapid transit system, along with some highway improvements (mostly diamond lanes for carpools and tolling), complete streets construction, and other mobility investments. The full construction of the high capacity network will be transformative for the county.



In addition to the voter passage of **Measure M**, Los Angeles passed "**Mobility Plan 2035**" in 2016. The plan envisions a robust network of protected bikeways, bus only lanes, and pedestrian zones. In 2017, the city undertook the first update of its dozens of community plans for the first time in decades. Each of these plans lays out the transportation infrastructure by neighborhood and sets critical rules for new development, including the removal of parking minimum requirements and allowance for increases in residential density around high capacity transit zones.

When Los Angeles won the 2028 Olympic and Paralympic Summer Games, implementation picked up even more speed. The program "**Twenty-eight by '28**" includes 28 high-priority infrastructure projects to be completed by 2028. Most of the projects are already part of the Measure M program; their implementation is to be partially advanced considerably.

The **metro grid** currently comprises subterranean underground trains and above-ground trams on a length of 160 kilometers. Due to the risk of earthquakes, the focus was mostly on developing the above-ground lines in the last years, since the costs for underground construction seemed too high. The Measure M program now makes the underground development pick up speed again as well. The most important projects at the moment are the "Regional Connector" line in order to better link the existing metro system and permit longer travels without having to switch trains; the extension of the Crenshaw line to the airport; and the extension of the Purple Line to the University of California Los Angeles. These projects will open between 2020 and 2024. In the long run, the currently 80 stops of the Metro are to be increased to reach 116 in 2035.

The settlement structure of Los Angeles is so generous that the metro stations are difficult to reach for many residents. Therefore, the **bus grid** is the actual backbone of public transport. In addition to bus lines that mostly access the residential quarters at short distances, there are also several fast bus lines that are counted among the metro system. The bus system is to be massively developed in the next few years. The long-term goal by 2035 is that 90% of the households in Los Angeles have access to the public transport network at a distance of less than one mile (about 1.6 km).

The Mobility Plan also includes **promotion of cycling**. The goal is producing a bicycle network spanning 1200 km, made up of "protected bike lanes" and quarter-connecting bicycle paths, including an area-comprehensive signpost installation, by 2035. By construction of the bicycle traffic facilities as a way to reach the stops, connection to public transport is to be improved as well. Development of bicycle parking places at public transport changing points is planned as well.

Pedestrian traffic mostly is to be promoted by better ability to cross streets. The green phases are to be changed for pedestrians and crossing aids are to be built. By 2035, 100 "school slow zones" are to be built in an area of 800 meters around schools. It is important that the infrastructure is adjusted to the speed level, e.g. by narrowing the lanes. In order to promote pedestrian and bicycle traffic, the share of investments from the Measure M program to be invested in bicycle and pedestrian traffic is to be increased to 20%. Los Angeles has the target of "Vision Zero", according to which the death rate from traffic accidents is to be lowered to zero by 2024.



Los Angeles is also in the midst of a comprehensive strategy to prepare for digital disruption in transportation. **Urban Mobility in a Digital Age** lays out specific actions for the city to undertake in order to maintain its role of protection and active management of the public realm for the public good. Early projects include a public-private partnership to provide EV carsharing fleets in low income areas, a new metric for measuring mobility called transportation happiness, and a strategy to build out digital infrastructure to better adapt to changing business models in mobility enabled by smart phones.



PARIS

Inhabitants	2.2 million (2015)
Size	105.4 km ²

Initial situation

Paris currently has 2.2 million residents. After a continuous increase of the resident numbers until 2013, Paris is expected to lose residents until the Mid-2020s in spite of a higher birth ratio. Forecasts assume that the population will stabilise on the level of 2013 again in the long run until 2050. At the same time, the metropolitan region (Île-de-France) will grow from the current 12 million residents (including Paris) to 13.5 million residents.

Most from the Île-de-France region commute to the city of Paris every day, which is settled four times as densely as London, on an area of 105.4 km².

Inside Paris, 8 million journeys are travelled every day, including more than 60% on foot. Additionally, there are 4.3 million journeys beyond city borders; public transport, making up 67% of the journeys, is of outstanding relevance here. Taking the Modal Split of the Paris conurbation, the share of the environmental association is 61% as compared to 39% for car use. Within the inner city of Paris, car traffic has reduced by 33% since the turn of the century.

Modal Split of the residential population of Paris (2010)

Public near-distance transport	MIV	Bicycle	Walking
27	8	3	61

In spite of reduced air pollution in the last years, in particular the nitrogen dioxide load remains problematic. At 66%, traffic is an essential cause of NO_x emissions. The highest load occurs in the inner city and in quarters with large main traffic routes and the street axes into the region. In 2016, 1.1 million residents were affected by exceeding the annual EU threshold of 40 µg/m³, which means half of the Parisian city population. The annual thresholds for fine dust (PM₁₀ and PM_{2.5}), in contrast, were complied with at all measuring points in 2016. The number of residents affected by exceptional exceeding of the threshold therefore is negligible.

The number of traffic accidents in Paris is continually reducing; the number of people severely injured and killed in traffic, however, remains nearly stable (on a low level). The number of injured and killed cyclists, however, increased by nearly 50% from 2006 to 2016.



Focuses

Improvement of the air quality is a central target of Paris. The air quality plan stipulates comprehensive measures, e.g. the introduction of speed limits or the prohibition of vehicles with high pollutant emissions. Since the end of 2015, trucks with high pollutant emissions have not been allowed to enter the city. In 2016, the prohibition was expanded to span comparable passenger cars from 8 am to 8 pm on working days. After the Olympic Games in 2024, diesel vehicles are to be banned throughout Paris; from 2030 onwards, the prohibition is to apply to petrol-powered cars as well. At the same time, Paris supports residents who sell their private car by benefits in public transport and carsharing. There are also subsidies if replacing a car with an electrical or natural gas powered vehicle.

The "**Paris Piéton**" strategy is targeted at clearly increasing pedestrian traffic and the quality of a stay. Seven large Parisian squares are turned from strictly functional traffic areas into pedestrian zones. Pedestrian paths are to be made wider and safer, and new pedestrian connections are to be created. One important project is closing the two Seine banks in the inner city to car traffic. The quality of a stay was clearly increased with different elements such as small green areas, playing and sports offers, cafés or floating gardens, which turned the public space from a strictly functional traffic area into an attractive area for everyone.

The bicycle traffic share in Paris currently is below 5%. This is to be increased to a path share of 15% by 2020. The following measures are intended, among other things, to promote **bicycle traffic**:

- Doubling of the bicycle network from 700 km to 1,400 km
- Construction of a 80 km-long fast bicycle path network, comprising six connections along the river Seine and in the North-South direction,
- Development of municipality-comprehensive bicycle path connections,
- Creation of another 10,000 bicycle parking places by re-dedication of parking areas; construction of bicycle parking houses and lockable bicycle boxes in large public transport switching points.

Paris also took the **public bicycle lending system** "Vélib" into operation in 2007 already. Vélib currently offers nearly 25,000 bikes in 1,600 stations in the conurbation of Paris. After a new invitation for tender in 2016, E-Bikes are part of the offer now as well.

The **public transport** system of Paris currently comprises 16 underground lines (metro), five regional express lines (RER), ten tram lines and 350 bus lines. The passenger numbers have been increasing continually across all near-distance means of transport for years. The most important large public transport infrastructure project is construction of the "**Grand Paris Express**", which is to support the polycentric development of the region and connect quarters and municipalities not previously connected to the rail bound public transport. New, fast underground lines are to be built in the region by 2030. The project comprises extension of two existing underground lines and construction of four new underground lines on the fringes of Paris. One of the lines is designed as a ring around the city, to run at a distance of approx. 5 km from the city's edge. The first part is to be put into



operation in 2020. The underground lines are to be automated and run to 90% underground. All in all, 200 km of new underground lines are to be built with 72 new stations.

Another measure is that of **tram development**. At the moment, many new tram lines are being planned or already under construction. Again, a ring tram is planned for the future. Parts of it were taken into operation in 2006 and 2012.

The **car-sharing** provider "Autolib Métropole" has been publicly owned since 2011; the company belongs to the city of Paris and 86 municipalities from the area. At the moment, nearly 4,000 vehicles are offered in 1,050 stations, including about 2,500 electrical vehicles.



BEIJING

Inhabitants	21.7 million (end of 2017)
Size	16,400 km ²

Initial situation

The population of Beijing has grown a lot in the last decades. Beijing had 13.8 million residents in 2000. Today, 21.7 million residents live in Beijing, including approximately 8 million residents who only have their secondary place of residence in Beijing (the "migrant workers"). An annual population growth of 4.1% is assumed.

The number of cars across China will increase. By comparison with the western industrialised countries, the degree of motorisation in China, at about 22 vehicles per 100 resident (310 million vehicles with a population of 1.39 billion, end of 2017) is relatively low. However, the motorization rate is much higher in the strongly urbanised regions. In 2000, only 1.5 million motor vehicles were registered in Beijing. In 2010, there were 4.81 million already. Today, it is assumed that there are far in excess of 6 million vehicles.

Focuses

Beijing has already taken a number of measures to improve **air quality** in light of organisation of the Olympic Games in 2008. Among other things, older motor vehicles were banned from road traffic. In the high-load winter of 2017/2018, Beijing enforced closing of particularly environmentally harmful factories, closed construction sites and confiscated coal-fired ovens.

Beijing massively limits the possession and use of **private vehicles** and topped the number of new vehicles licensed every year. Beijing only licenses 150,000 vehicle per year, in spite of license applications in the millions. Financial tax instruments are also gaining in importance. Beijing is currently considering introducing congestion pricing.

In order to promote **electromobility**, Beijing does not include electric vehicles in licensing restrictions and driving prohibitions. About 40% of the annually approved vehicles are reserved for electric ones. The entire taxi fleet (approx. 70,000 taxis) is to be replaced by electric vehicles in the future. According to the requirements of the state, non-fossil fuel vehicles should be added or updated every year in the taxi and other transportation industries. Taxi and bus companies are obligated to purchase electric vehicles. The purchase is comprehensively subsidised by Beijing, though this subsidy will be discontinued gradually.

The most important alternative to motorised individual traffic in Beijing is public transport as well. There are some ambitious programs to strengthen public near-distance transport, in particular by comprehensive **development of the underground network**. The underground network of Beijing



transports over 10 million passengers every day and comprises more than 608 km with 370 stations; therefore, it is the second-largest underground train network in the world (following Shanghai). By 2020, the grid is to be developed further to 900 km. The bus fleet is undergoing significant transformation in Beijing. In addition to the underground trains they are the actual backbone of public transport. 70% - about 18900 buses - were powered by electricity and natural gas in 2017. This share will continue to rise in the future. Beijing will host the Olympic Winter Games in 2022. By then, public transport in the Olympic region is to be mostly electric based.

The state council initiated the development of city clusters in 2014 with the national "**New Type Urbanisation Plan**". The goal is guiding future urbanisation of the country and promoting in particular the growth of small and medium-sized cities with up to 5 million residents. Several cities are to plan their traffic development together. The Jing-Jin-Ji city cluster comprises the two cities of Beijing and Tianjin as well as the surrounding province of Hebei with a total of 130 million residents. In the already strongly developed Jing-Jin-Ji region, further agglomerations can therefore be planned "on the drawing table", connected traffic concepts can be tried out and measures for traffic avoidance and traffic relocation can be tested. In 2015, the Jing-Jin-Jin Intercity Railway Investment Company was founded to develop regional traffic. The management comprises representatives of the region and the cities. By 2020, about 1,000 kilometres of the regional train network are to be built in and around Beijing.

The bicycle has historically been a highly popular means of transport in Beijing. However, with increasing wealth, bicycle use has been replaced by cars. By now, Beijing is trying to make **cycling** more attractive again by building systems for bicycles for rent without stations.



MOSCOW

Population	12.5 million (2018)
------------	---------------------

Area	2,511 km ²
------	-----------------------

Overview

With a population of about 12.5 million people in the city and 20 million people in the agglomeration, it is the largest agglomeration in Europe. In 2010, the population was only 11.5 million people. Now population growth continues, although the growth rate has declined slightly.

The number of cars in the Moscow region is also constantly growing, since 2010 it has added 2 million cars.

Focus

Moscow has a highly efficient metro system consisting of 14 lines with a total length of 440 km and 259 stations. The daily passenger traffic is up to 9 million passengers. The headway during peak hours is 90 seconds.

Ground city transport is the second most popular type of public transport after the metro. There are about 1,000 bus, tram and trolleybus routes in Moscow, which are used by more than 7 million passengers a day. Since 2010, the park has been renewed by 90% - about 9,500 buses, trams and trolley buses have been purchased. The intercity and intracity routes are complemented by commuter trains and Aeroexpress.

Moscow is actively developing the system of underground and light rail metro; by 2023, the length of the tracks will be 1,000 km.

In 2016, the Moscow Central Circle (MCC) was launched, which is part of the Moscow Metro system. The MCC connects the districts distant from the city center. In 2017, in Montreal, UITP gave the first place to Moscow for the integrated development of the transport system, noting with particular recognition the MCC project. The second underground ring line, the Large Circle Line, should be completed in 2023. The length of the LCL will be 70 kilometers, the number of stations: 31. With the LCL it will be possible to transfer to all existing metro lines.

Another large-scale project is the construction of the new fast transit network, the Moscow Central Diameter. The system will be integrated into urban transport and will consist of several diametrical suburban railway routes, the first of which will appear in late 2019 - early 2020. So, the suburbs will be connected directly to the center of Moscow. New routes are designed to improve the convenience of travelling for residents of Moscow and the Moscow region.



In 2018, Moscow began to switch to electric buses, and from 2021, the city government plans to buy only electric buses instead of diesel buses. The city also has more than 300 kilometers of dedicated lanes for land transport and taxis.

In recent years, new urban mobility models have been actively developed in Moscow: car sharing, as well as bike sharing and electric kick-scooter rental systems. Moscow bike-sharing, launched in 2013, consists of 430 rental stations and 4,300 bicycles. Among them, there are 130 electric bicycles. In total, in 2018 more than 4.2 million trips were made. By 2020, it is planned to add 100 stations and 1,000 bicycles annually. In 2018, a system of urban electric kick-scooters was organized, for the first year of operation, the scooters in the city were rented about 150 thousand times.

With the support of the Moscow Government, the city car sharing system operates in the city – 9 car-sharing companies, whose total fleet is 12 thousand cars, are a very popular city service. Approximately 450,000 trips per week are made by car sharing.

Moscow taxi has become an important part of the transport system. The city has 55 thousand legal taxi cars. The cost has decreased by 30-40% since 2010, and the number of daily trips has exceeded 760 thousand. The average time for finding a taxi is 5-7 minutes (30 minutes in 2010).

Convenient and comfortable space is created for pedestrians. Since 2016, 372 streets, squares, highways and public spaces in Moscow have been organized, reconstructed and landscaped. Thanks to the improvement program, the number of pedestrians in Moscow increased 2-7 times.

In Moscow, the Moscow Parking project was implemented, thanks to which chaotic parking was eliminated, the turnover of parking spaces increased by 3.5 times. A safe and favorable environment for pedestrians, urban transport and motorists was created. The Moscow paid parking system is based on per-minute payment and provides benefits to local residents - they have the opportunity to issue a residential permit.

One can pay for parking not only through parking machines. 98% of users pay for parking using a mobile application or SMS. As a result, the project was highly appreciated by the world community. In 2017, the Moscow Government received the first place in the world for the quality of the organization of parking space from TomTom. In terms of ease of use and payment, Moscow is one of the most modern cities in the world.

An Intelligent Transport System (ITS) introduced in Moscow covers 100% of the city. In the round-the-clock mode of operation, the Traffic management Center allows to coordinate the work of all elements of ITS, linking them into a single system.

Based on the collected data, the work of traffic lights is corrected, changes are made to the organization of traffic at public transport routes. Thanks to ITS and the work of the Traffic Management Center, the average speed of traffic has increased by 16%. Since 2010, it has been possible to reduce the number of accidents by 59%, by 30% - the number of accidents with urban transport.



A new ticket menu has been created, introducing the Troika smart card. 22 million of such cards have been issued since 2013, almost 90% of all trips by Moscow Transport are made with its help. A new modern ticketing system is being developed, with the possibility of Troika's personal binding and integration with third-party mobile applications, instantaneous (by air) replenishment of the card's balance, integration with ticketing systems in other cities of Russia. One can pay for travelling using Apple Pay and Samsung Pay contactless payment systems and other modern technologies, as well as a contactless credit card. A total of 9 ways to pay for transportation are available in Moscow Transport.

The Moscow transport system received high marks from passengers during the World Cup in summer 2018. During the tournament, guests made 5 million free trips by Moscow Transport. About 90% of spectators used it when they came or left the stadiums.