BETTER URBAN MOBILITY
Playbook

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We would like **to thank all of the UITP members** who have provided case studies and shared insights into their successful practices.

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Welcome
— WORDS —

The common awareness of the limits of private, individual mobility comes now as the detrimental impacts of air pollution and traffic congestion reach drastic levels. Cities and decision makers must now face the results of 70 years of urban developments around the car and deal with the huge challenge of changing behaviours, slowing down urban sprawl, improving air quality and making sure that investments taking place today will bring positive effects in 30 years time.

This movement has started in many cities around the world with the growing awareness of climate change issues and countries are tackling their greenhouse gas emissions. In addition, cities have had to address an increasing range of challenges. These include an acceleration of trends, from urban growth to digitalisation, inclusiveness, active and shared mobility and densifying without expanding. If that was not complex enough, the COVID-19 pandemic has placed public transport systems under severe pressure and financial instability.

On a positive note, many city administrations have reviewed and revisited their urban and mobility plans to make sure their urban and infrastructural developments will advance towards climate targets, while maintaining their economic and social dynamism and preserving green spaces. This is the first step towards better sustainable urban mobility.

Coming back from COP26 in Glasgow, I realised that huge efforts still need to be made. Currently only 30% of national strategies feature public transport in their plans and this is not ambitious enough. The most ambitious climate plans for cities rely on public transport and active mobility. We must continue to look ahead and raise awareness of the important role that sustainable mobility plays in delivering the Paris Agreement.

This playbook is an advocacy tool for cities. We plan to make it a living document, updating it on a regular basis with case studies from our members.

MOHAMED MEZGHANI
UITP SECRETARY GENERAL

Introduction

National and urban policy makers must now face the consequences of more than 70 years of urban development around unsustainable, private and individual mobility: Urban sprawl, traffic congestion, air and noise pollution, road accidents, social segregation and much more. Despite awareness of the challenges facing the world today and the growing urgency to tackle the climate crisis, these problems are only getting worse.

Cities are the epicentre for innovation, economic growth and social wellbeing. Successful cities are those with high interactions, where people have an easy access to basic services, jobs, schools, leisure activities and businesses. Moving towards sustainable cities is a huge collective effort that can only be achieved with strong political leadership and courage.

Despite awareness of the challenges facing the world today and the growing urgency to tackle the climate crisis, these problems are only getting worse.

This playbook is an update of the UITP report "Better Mobility in Urban Areas", published 20 years ago. It highlights the various challenges cities are facing and offers solutions with concrete steps that can be applied to redeveloping more sustainable liveable, healthy and inclusive cities.

Looking back over the last two decades, many positive changes have occurred. Investments in public transport systems have been massive: Since 2000, 86 new metros have opened and around 150 bus rapid transit systems worldwide, pedestrians and cyclists are taking back the streets, mobility governing bodies such as transport authorities are being created to implement the right mechanisms to plan, support and manage the mobility system, and many cities are now integrating land-use and mobility planning[1].

But changes are not happening fast enough to reach international climate agreements. We believe this playbook will be a useful tool to support cities in reaching the Sustainable Development Goals with clear guidance on better urban mobility.

BACKGROUND

Congestion, pollution, health problems, road dangers and social exclusion. Many of the challenges that cities face today are a result of an overdependence of cars.

To address this issue, cities need to focus on improving the alternatives to the car and giving more space to walking, cycling and public transport, while disincentivising all aspects of car use. This approach is win-win, as less cars in urban areas means more space for the public realm, business and more sustainable mobility.

The following section provides an overview of where we are now, to better understand the context of the challenges, solutions and best practices presented later. Of course, these changes are related and intertwined with one another, and should be noted that this is not an exhaustive list.

SOCIETAL CHANGES

❯ **Growing urbanisation**: By 2050, 70% of the world's population will be living in urban areas, **amounting to 6.8 billion people.**

❯ **An ageing population**: The world's population is ageing globally. This is specifically the case in Europe, the Americas, China and Japan, with some discrepancies in South-East Asia, Africa and India. **In China, 39.6% of the population will be over the age of 60 by 2050.**

❯ **Rising inequalities**: Approximately 8% of the world's population own 82 % of global wealth and more than 1 billion people are living in extreme poverty[2]. Extreme wealth has led to new lifestyles with higher consumption per capita and subsequent environmental degradation, with developing countries trying to reach similar levels of development.

❯ **Rising awareness of climate change and the need for healthier cities**: Poor air quality, congestion, global warming, greenhouse gas (GHG) emissions, health pandemics are a rising concern as they are more evident.

❯ **Boom in e-commerce**: More orders online means increasing the number of delivery vehicles, adding to congestion, road danger and pollution. It puts additional pressure on infrastructure and increases competition for space.

❯ **A highly connected society**: Citizens want digitalised, personalised door-to-door services. From a mobility perspective, this means seamless travel and a variety of modes to choose from (public transport, shared vehicles, micromobility).

❯ **Flexible working patterns**: In service economies, **40-70% of jobs can be performed from home** which changes mobility patterns and commercial activities in business centres. Transport demand is spreading throughout the day and not solely related to commuting hours. Working from home conditions will push parts of the population to move outside of cities.

❯ **Faster development of road connectivity in fast-growing cities** rather than public transport systems, and **strong lobbying** from the car industry is considered a major contributor to economic development. This has led to higher consumption and higher emissions.

TECHNOLOGICAL CHANGES

- **Connected, autonomous, shared and electric mobility**: The use of technological solutions is improving the management and efficiency of the urban areas with the smart city concept.

- **Improved telecommunication systems:** 4G, 5G and artificial intelligence are accelerating innovation and technologies as well as the sharing economy. The digitalisation of services and the breakthrough of mobile applications fosters the development of connected vehicles, predictive traffic signaling systems, curb side management, Mobility as a Service (MaaS) as well as on-demand transport and contactless ticketing. It also enables **better management** by analysing and understanding mobility behaviour and mobility patterns to adapt transport offers to the actual needs.

- **Cyber security:** Data governance is becoming an additional challenge for the transport industry which must find ways to protect data systems from attacks as well as to fulfil obligations to customers.

ECONOMIC CHANGES

- **Regular economic crises:** Health pandemics and financial slumps directly impact public transport. Most notably, the ongoing COVID-19 pandemic.

- **High investments in tech values:** Digitalisation and automation trends require investments in both hardware and software, leading to a wide variety of costs, needs and requirements which impact companies and their structure. Tech investments are characterised by their initial sunk costs, requiring upfront investment for the installation of infrastructure and systems able to perform such tasks, then followed then by variable costs addressing mostly operations and maintenance of the system.

- **Instability in fuel prices:** Fuel prices have been fluctuating in the recent years as a result of significant demand in the United States, China, Middle East, and Latin America. This, combined with market uncertainty in world supply, contributed to the run-up in oil prices leading to record-high prices in 2008.

- **Extreme weather costs to society:** Impact of climate change and costs through infrastructure degradation and operational management. In the last 20 years, North America has sustained 308 weather and climate disasters where **overall damages/costs reached or exceeded $1 billion.** The total cost of these events exceeded $2.085 trillion.

- **Crowding out of public budgets:** For instance, through an increase in health care costs, leading to fewer resources for public transport.

- **Growing gig economy**: Short-term jobs linked to digitalisation and urbanisation offer flexible solutions but do not offer financial security to employees.

- **Diverse levels of infrastructure finance:** This can be seen in middle- and low-income economies which show a gap or missing infrastructure. Ageing infrastructure is prevalent in more mature economies, due to low levels of infrastructure investment which threatens growth and the environment.

CHALLENGES

The world is facing a multitude of challenges. This chapter identifies them on various scales: Global, city and societal, highlighted with key information, statistics and advocacy messages.

🌍 GLOBAL CHALLENGES

CLIMATE CHANGE

Man-made climate change is hitting our planet hard. Heat waves, flooding, displacement, extinction of species, to name but a few. If we are to limit the rise in global temperature to 1.5°C as per the Paris Agreement, **we must cut global emissions by 7.6% every year for the next decade.**

/ AT A GLANCE

- The transport sector is the largest consumer of oil.

- Cities account for 70% of carbon emissions, the majority of which come from the transport and energy sector. Road vehicles account for around 75% of transport emissions[3].

- By 2030, the share of carbon dioxide emissions from transport could reach 40% of the global total.

- There are one billion cars worldwide (excluding trucks), and motorised transport is still increasing. If no measures are taken, total motorised mobility in cities may increase by 94% between 2015-2050, which would lead to 26% global increase in CO_2 emissions resulting from urban mobility growth.

- The economic costs of air pollution from fossil fuels are estimated at $2.9 trillion in 2018, or 3.3% of global GDP, far exceeding the likely costs of rapid reductions in fossil fuel use[4].

- According to the European Environmental Agency, buses are twice, and rail is four times more energy-efficient than cars.

- The built environment and lack of vegetation creates urban heat islands where the heat accumulated in concrete, buildings, vehicles is released into the atmosphere. Worldwide, the number of days in which inhabitants are exposed to extreme heat and humidity has tripled since the 1980s, now affecting nearly a quarter of the world's population[5].

SOURCES OF **AIR POLLUTION**

FARMS
AGRICULTURE & FARMING

BUILDINGS
CONSTRUCTION & BUILDING SITES

FACTORIES
INDUSTRIAL PROCESSES & ENERGY GENERATION

DOMESTIC
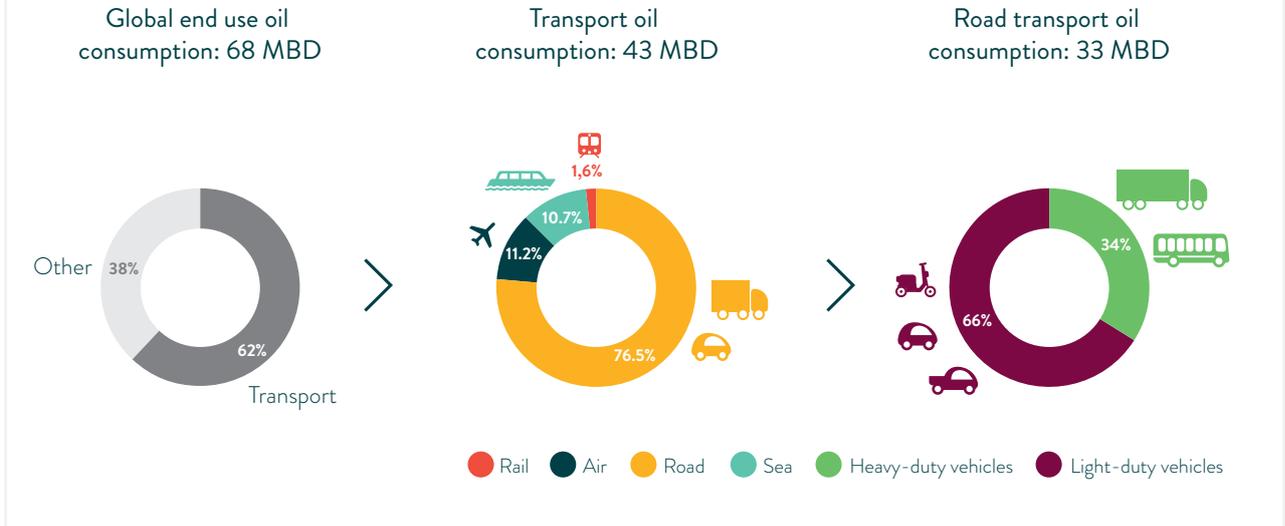ENERGY CONSUMPTION FOR HEATING, COOLING & COOKING

CARS&VANS
ROAD TRANSPORT

BOATS&RAIL
TRANSPORT SHIPPING

Source: cleanairhub.org.uk

The transportation sector - The largest consumer of oil (Million Barrels per Day)

Global end use oil
consumption: 68 MBD

Transport oil
consumption: 43 MBD

Road transport oil
consumption: 33 MBD

Other 38%

62%

Transport

1,6%

10.7%

11.2%

76.5%

34%

66%

⬤ Rail   ⬤ Air   ⬤ Road   ⬤ Sea   ⬤ Heavy-duty vehicles   ⬤ Light-duty vehicles

Source : International Energy Agency, 2011

/ KEY MESSAGES

To reach the SDGs, it is important to decarbonise the transport sector and invest in sustainable technologies. But **decarbonising individual private transport is not enough. These vehicles will still consume three times more energy per passenger-km than public transport and produce three times more CO_2 per passenger.** Only a reduction policy for car journeys will reduce pollution, health risks and global GHG emissions.

A modal shift to collective public transport and active mobility is needed and can be achieved over a shorter period of time.
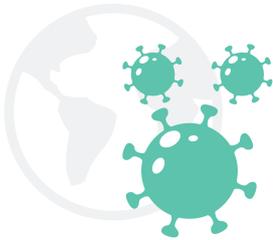

If we are to limit the rise in global temperature to 1.5°C as per the Paris Agreement, we must cut global emissions by 7.6% every year for the next decade.

THE COVID-19 PANDEMIC

From late 2019, the COVID-19 pandemic has had enormous repercussions on mobility.
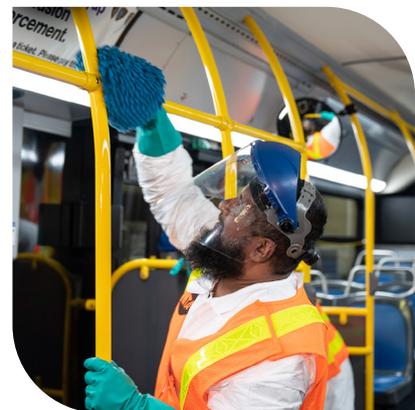
/ AT A GLANCE

- **Public transport systems lost up to 80% of ridership** due to lockdown measures and loss of trust in public transport as a safe environment, leading to a rise in private transport.

- **Behavioural changes** as a result of the pandemic have resulted in new habits such as teleworking and increasing e-commerce traffic, which has affected operations and passenger flows.

- The pandemic may **influence urban sprawl** due to changes in habits, for instance, people moving further out of city centres.

- **Lack of governmental funds** to finance public transport because of the global economic crisis.

/ KEY MESSAGES

Despite the devastating loss caused by the COVID-19 pandemic and the stigma from governments and media, **the public transport sector remained a critical service for cities, especially for vulnerable people and essential workers.** Following mass vaccination rollouts and campaigns, **ridership recovered to some extent** despite spikes in cases.

The crisis also offers opportunities for governments to take action and reduce carbon emissions linked to transport. Although lockdowns and teleworking reduced the need to move, urban space can be reallocated to improve public transport systems and provide infrastructure for cycling and walking.

CITYWIDE CHALLENGES

URBAN GROWTH AND URBAN SPRAWL

Urban growth means additional mobility needs and pressure on the transport network. At the same time, urban sprawl as a result of poor land management and a dependence on private cars is a major challenge. Only **integrated approaches to land-use and transport planning** can help reach the goal of sustainable, healthy and inclusive cities.
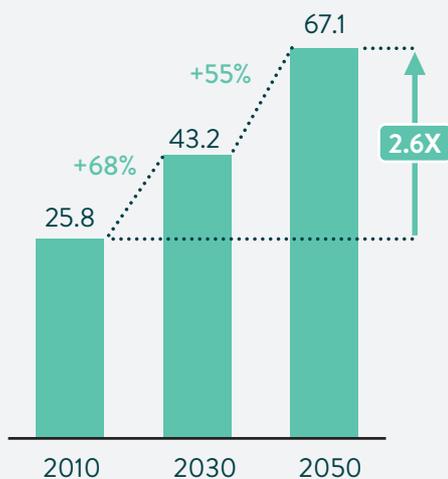
/ AT A GLANCE

- There is no uniformity in global urban growth: Some cities are increasing at a fast pace, while others are shrinking.

- Urban growth is a fact. As a consequence, **urban passenger transport is projected to grow by 60-70% by 2050**[6], which means a growth in traffic if no effective measures are taken.

- Sub-Saharan countries will have the highest urban growth and will be home to **20% of the world's population**.

- Africa and Asia will see the largest increase in urban populations. **By 2030, Africa will have 41 megacities and the continent is projected to double its population by 2050, reaching 2.5 billion**[7]. One out of two Africans will live in a city. Most of the growth in the African urban population will occur in small cities.

URBAN GROWTH IS BOOMING...

URBAN MOBILITY DEMAND EXPLODES

Urban mobility demand
2012-2050 (trillions person-km p.a.%)

25.8 (2010)   +68%   43.2 (2030)   +55%   67.1 (2050)   2.6X

CITIES ARE CONFRONTED WITH NEW CHALLENGES

PLANET
- Air pollution
- CO_2 emissions
- Noise
- Increasing ecological footprint

PEOPLE
- Traffic chaos
- Traffic security
- Congestion
- Decreasing quality of life and inconvenience
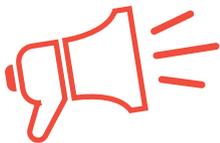
PROFIT
- Overloaded infrastructures
- Insufficient public transport capacities
- Increasing motorisation
- Limited parking places

...BUT URBAN SPRAWL IS STILL A MAJOR CHALLENGE

/ AT A GLANCE

▸ Urbanisation is not uniformed around the world: Some cities are densifying while others are expanding through urban sprawl.

▸ Between 1990 and 2014, **the total artificial land in urban areas included in an OECD study increased by 27.7%**[8].

▸ The total cost of urban journeys is related to density; the lower the density the higher the cost. **In North American cities, this varies from 5% of the GDP in dense cities to 15% for low density.**

/ KEY MESSAGES

Actions must be taken to limit urban sprawl as it brings traffic congestion, pollution and high transport cost for the community. Conversely, compact cities bring social and economic wellbeing and reduce pollution linked to car traffic.

Cities must put measures in place to limit urban sprawl:

▸ Fast-growing cities: Focus on integrating transport policies and land-use planning.

▸ Shrinking cities: Focus on encouraging a shift to sustainable modes of transport.

Only integrated approaches to land-use and transport planning can help reach the goal of sustainable, healthy and inclusive cities.

TRAFFIC CONGESTION

Traffic congestion is the result of an overreliance and increasing use of private motorised transport for all mobility needs. This, combined with poor land-use management, dispersed areas with specific functions, poor public transport infrastructures and lack of last-mile connectivity to public transport, and the absence of active mobility infrastructures.
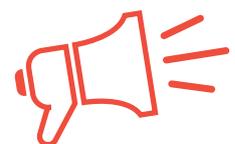
/ AT A GLANCE

❯ Traffic congestion is increasing worldwide, and passenger transport activity will more than double between 2015-2050.

❯ Stationary or near stationary cars with engines running give out the highest levels of exhaust emissions.

❯ The quality of life for those living along congested roads is reduced due to poor air quality and sound pollution, which leads to further mental and physical health issues.

❯ Traffic congestion is not only a nuisance, it also has huge economic impacts:

- Europe's economic impact of traffic congestion is estimated at €100 billion, or 1% of the EU's GDP.

- Between Britain, Germany and the United States, the cost of traffic congestion totaled $461bn in 2019, or $975 per person[9].

239 —CITIES— TRAFFIC INCREASED (since 2018)

63 —CITIES— TRAFFIC DECREASED (since 2018)

❯ *The annual TomTom Traffic Index provides live and historic road congestion levels from 416 countries in 57 countries. The data is based on their 2020 edition, before COVID-19 became a global issue. Reference: TomTom Traffic Index, 2020.*

/ KEY MESSAGES

Investment in urban public transport should be prioritised because people are living in cities where congestion is a daily occurrence. In fast-growing cities, investments in road development have historically been between two to three times higher than investments in public transport systems and infrastructures. Now, a greater emphasis is on the development of public transport, walking and cycling. But, with the infrastructure developed around private motorised transport, investment should be prioritised to move towards healthier and more sustainable mobility.
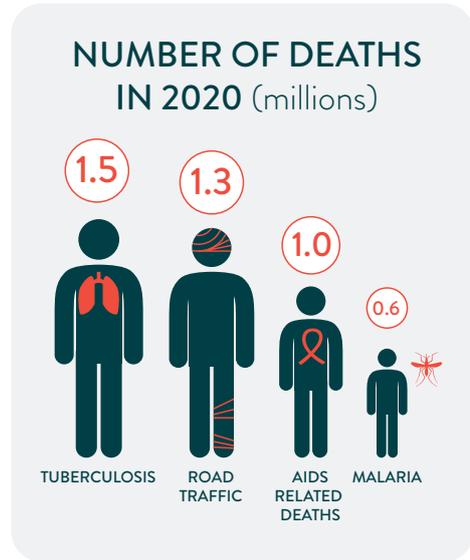
ROAD DANGER

Road danger is the direct consequence of a dominance in road transport and poor street design. Similar to traffic congestion, integrated public transport infrastructure, street design techniques and regulation of traffic will help.
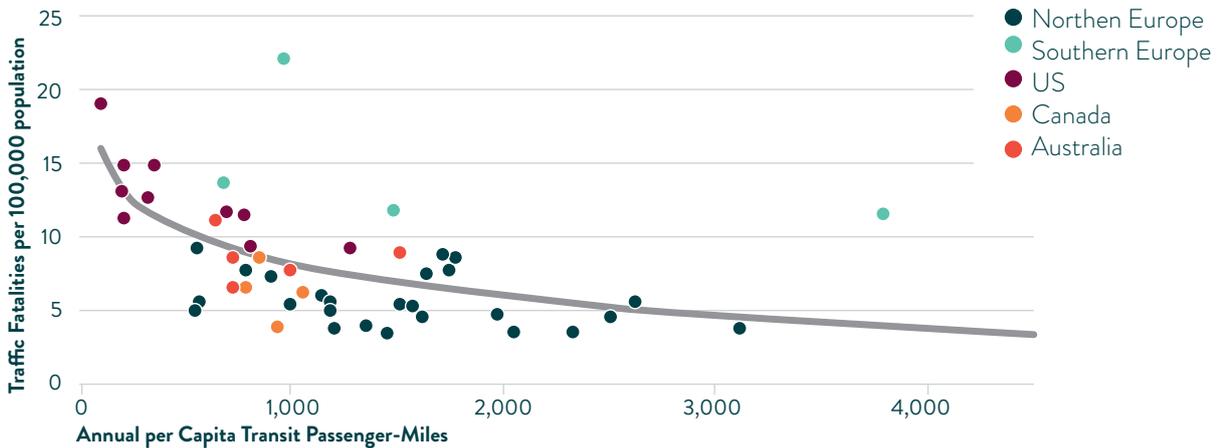
/ AT A GLANCE

> Each year, **over 50 million people are injured worldwide on roads at a 3% cost of GDP[10]**, and over 1.3 million fatalities.

> Road traffic is the leading cause of death worldwide for children and young adults[11].

> **Around 93% of road traffic deaths occur in low- and middle-income countries**, and road traffic death rates are highest in the African region.

> Over 50% of all road traffic deaths are among vulnerable road users: Pedestrians, cyclists, and motorcyclists.

NUMBER OF DEATHS IN 2020 (millions)

1.5

1.3

1.0

0.6

TUBERCULOSIS   ROAD TRAFFIC   AIDS RELATED DEATHS   MALARIA

In places where public transport ridership is high, traffic fatalities are low

- Northen Europe
- Southern Europe
- US
- Canada
- Australia

Y-axis: Traffic Fatalities per 100,000 population (0 to 25)
X-axis: Annual per Capita Transit Passenger-Miles (0 to 4,000)

/ KEY MESSAGES

In places where public transport ridership is high, traffic fatalities are low. There is a direct relation between the number of people killed on the roads in towns and the number of journeys made by car. **In towns where there are well developed public transport systems, the number of deaths is half as many as in towns where almost all journeys are made by car.**
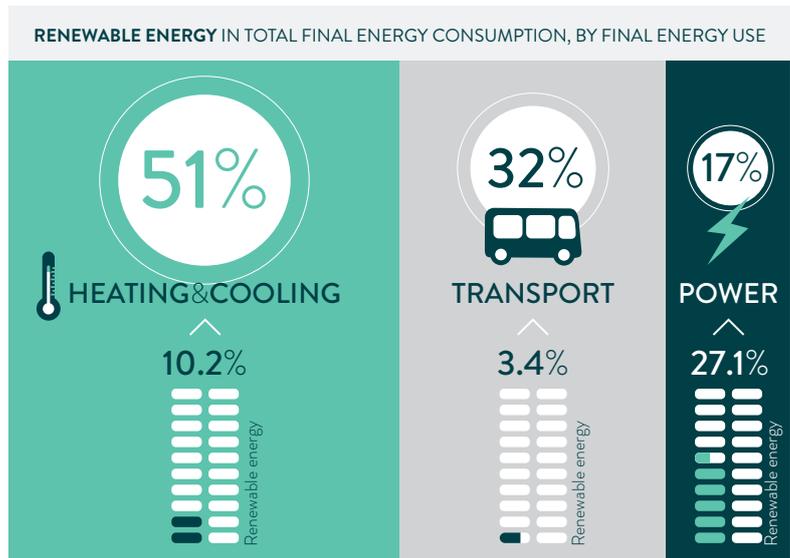
TRANSITION TO SUSTAINABLE ENERGY

Transitioning to sustainable forms of energy in the urban transport sector means **switching to producing clean and green sources of energy for mobility, adapting cities and building the infrastructure to match supply and demand** as well as finding new ways of **regulating the new energy sector and reducing energy consumption** in the transport sector.

The sector's high dependence on oil puts it at the forefront for the fight against climate change and forces it to find solutions to reduce CO_2 emissions and emissions linked to harmful particulate matters. But building resilient transport system not solely dependent on petrol with its **global prices fluctuation and uncertain resources** is an additional challenge for the sector.

/ AT A GLANCE

- There has been no sign of a change in the growing emissions trend from the transport sector because of this high reliance on fossil fuels and increased demand of transport and car usage[12].

- **The transport sector still represents 65% of global oil consumption.**

- The production of renewable energy is costly, energy consuming and not always CO_2 neutral. The whole life cycle cost of the technology, from production to technological developments and operations must be measured to ensure the transition is sustainable.

- The global transport sector accounts for around one-third of final energy consumption and one-quarter of energy-related CO_2 emissions.

- Deploying a fully integrated and interoperable charging infrastructure remains a big challenge.

RENEWABLE ENERGY IN TOTAL FINAL ENERGY CONSUMPTION, BY FINAL ENERGY USE

51%	32%	17%
HEATING&COOLING	TRANSPORT	POWER
10.2%	3.4%	27.1%
Renewable energy	Renewable energy	Renewable energy

/ KEY MESSAGES

The transport sector needs to find sustainable solutions that will not displace the source of pollution, decreasing pollution at the local level but increasing it overall.

Transitioning to sustainable energy is a challenge for cities, industries and transport operators who must **invest in research, technological developments and developing the expertise.** Each of them has a role to play in this transition, from the regulation and policy frameworks and strategies set up by the cities to the solutions development from the industry sector and its implementation on the ground at the operational level.

A clear policy framework is needed to push for the transition as well as funding mechanisms to help operators make the shift, industries developing the products and to build expertise to implement the transition.

Investing in decarbonisation is costly but these **investments will create new jobs, lower health-care costs, protect biodiversity and reduce CO_2 emissions.** Savings from prioritising public transport over private cars are likely to exceed costs[13].
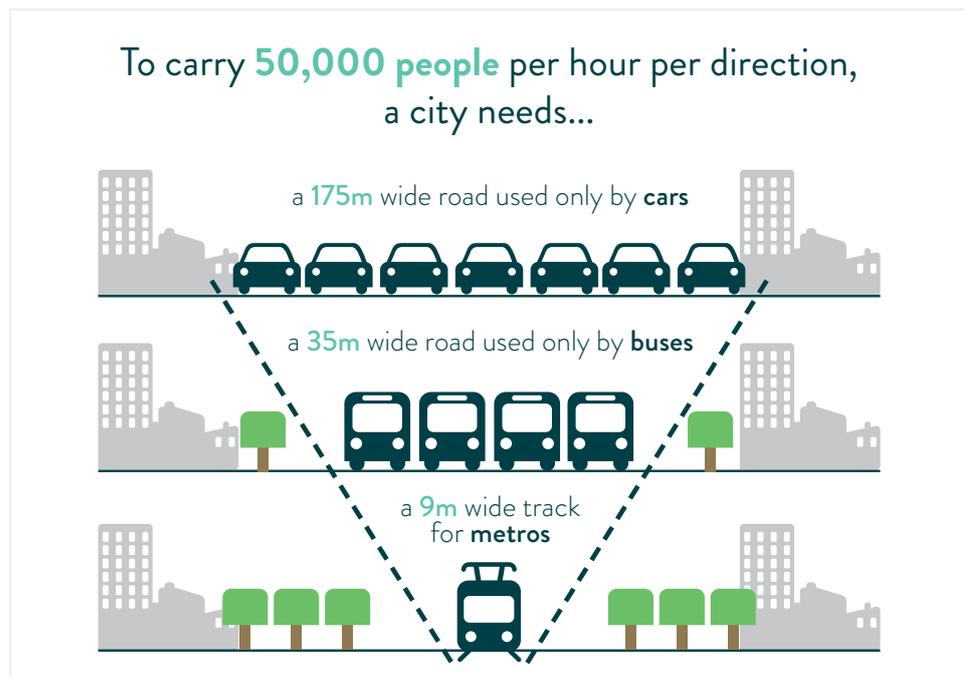
URBAN SPACE SCARCITY

Physical space in cities is limited due to the built environment for housing, business, commercial activities, public spaces, streets and parking needs. This creates **competition between mobility users to access adequate space to move efficiently.** In addition, the digital revolution has triggered changes in travel behaviours and new actors have entered the market, impacting how people move and street management to accommodate for the growing number of modes.
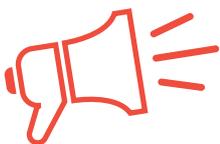
/ AT A GLANCE

- Even parked cars take up valuable space. On average, they are parked 95% of the day.

- A journey between home and work by car consumes **90 times more space** than if the same journey was taken by metro and 20 times more if it was taken by bus or tram.

- In Paris, 50% of public space is dedicated to motorised transport but the car is used for only 13% of those trips. In central London, around 14% of road space is used for on-street parking.

1 BIKE
PARKING
2M²

1 CAR
PARKING
20M²

To carry **50,000 people** per hour per direction, a city needs...

a **175m** wide road used only by **cars**

a **35m** wide road used only by **buses**

a **9m** wide track for **metros**

/ KEY MESSAGES

Cities must adapt and find solutions to integrate the new services efficiently while still meeting passenger needs. **When rethinking the streetscape, it is important to align the allocation of the space with the mobility policy in place and develop a sort of hierarchy amongst the different modes.** The reallocation of public space to public transport, cycling and walking improves mobility efficiency.

In addition, it is important for cities to be aware of new types of disruptive services and modes, such as autonomous vehicles (AVs), drone delivery and robotaxis which will require adapting the streetscape and its management.

GOVERNANCE & FUNDING

THE GOVERNANCE CHALLENGE

Governance challenges are very different from one country to another, depending on the governmental institutions in place and the level of regulations to manage the mobility system of a city. Below outlines some common challenges that cities face worldwide.

/ AT A GLANCE

- In general, there is a **lack of strategic vision with regards to urban mobility**, which leads to fragmented and poorly integrated decision making and planning.

- Developing cities often lack institutions to organise the mobility system or, on the contrary, have a multiplicity of authorities without efficient coordination.

- **Mayors can lack power in the development of fast-growing cities**, resulting in fragmented or 'siloed' decision making and planning.

- There is a lack of coherence between public transport and mobility policies and urban planning: Street design and management policies, land-use planning.

- A lack of coordination between traditional transport systems and new mobility services: Integration of services, fare and information, regulating new mobility services which do not fall under any legal framework or authority.

- **Low resilience and preparedness to changes** such as new mobility gameplayers, with new business models, new travel habits, and crises.

- Poor cooperation between stakeholders involved in transport, be it informal or formal, public or private.

- Poor access and understanding of data to better understand mobility needs and solutions.

/ KEY MESSAGES

The lack of empowered institutions, trust and cooperation between stakeholders (public and private bodies) creates challenges in building a mobility strategy with clear goals and tools. It becomes extremely complex to efficiently manage the mobility ecosystem.

Strong political back-up and strong governance are needed to build the mobility vision and the strategy to implement it. This does not go without some healthy tensions between regulators, service providers and users.

THE FUNDING CHALLENGE

The sector is often vulnerable when going through social and economic crises. There is a span of region-specific reasons that are linked to insufficient funding sources and an overreliance of single stream of income and/or direct fare revenues.
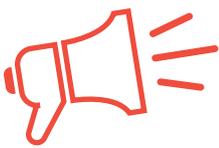
/ AT A GLANCE

❯ In general, the main income for public transport comes from:

- Passenger fares.

- Contributions from authorities.

- Local taxes.

- Levies such as congestion charging, revision of parking policies, and land-value capture mechanisms.

- Commercial revenues can vary from 5-40% of revenues, such as advertising, retail, development of digital services and naming rights of stations.

❯ Prior to the COVID-19 crisis, the public transport sector was characterised as a growing market. **But since** the beginning of 2020, it has become one of the hardest hit due to the loss of passengers and increasing operational costs.

❯ The coverage ratio, depending on the region, used to vary between 30-50% in countries with a high level of support from authorities. In less mature markets, or where there is less governmental support, there is a higher reliance on fares. **The impacts of COVID-19 have had bigger repercussions on networks largely relying on fare revenues.**

❯ Networks with a high coverage ratio or no support from authorities, were among the worst affected by the pandemic because of their reliance on fare revenues.

/ KEY MESSAGES

Diverse sources of funding are needed to be economically resilient. Businesses and people benefitting from the public transport networks for their activities can contribute to its funding, through taxation for instance.

It is essential to **secure a diversified funding model**, especially considering the lower demand and changed mobility habits since the COVID-19 pandemic started, changing lifestyles and mobility patterns within a competitive transport market.

INFORMAL TRANSPORT

Informal transport emerges in a context where there is minimal investment in public services and utilities because of a lack of institutions and governmental interest. In these instances, the population relies onsmall private operators. The public realm and infrastructures are car-oriented with increasing urban sprawl. The supply of vehicles makes it easy to organise shared transport. Public transport is considered as a non-governmental business and not as a public utility although it plays a vital role for millions of city dwellers.

In the long-term, informal transport will continue to be part of the mobility landscape. To ensure the sector comes out stronger and more resilient, it is key to reflect on its transformation. **This could mean the coexistence of regulated and informal transport in one efficient mobility system.**

SOCIETAL CHALLENGES

HEALTH PROBLEMS LINKED TO POLLUTION AND INACTIVITY

Excessive motorised traffic in cities is impacting people's health by producing air and noise pollution and encouraging less physical activity.
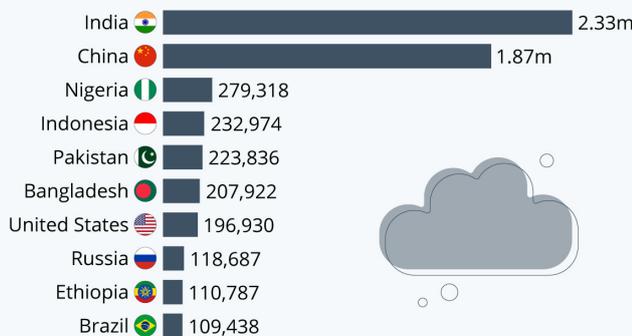
AIR POLLUTION

/ AT A GLANCE

❯ Air pollution causes premature deaths from non-communicable disease such as strokes, lung cancer and heart attacks. It is now estimated to be on par with other health risks such as unhealthy diets and smoking, and recognised as **the single biggest environmental threat to human health**[14].

❯ Globally, there are **eight million premature deaths due to air pollution, half of which occur in China and India.**

❯ **90% of urban inhabitants across the world breathe air containing pollutants exceeding the WHO recommendation.** In the EU, some 85% of the urban population is exposed to fine particulate matter (PM2.5) at levels deemed harmful to health.

❯ In 2018, the **exposure to fine particulate matter was responsible for four million new cases of child asthma and two million premature births**, among other health impacts that affect healthcare costs, economic productivity and welfare[15].

❯ In developing countries, **90% of air pollution is attributed to vehicle emissions.**

❯ Public transport produces far fewer quantities of air pollutant per passenger per kilometre than individual private motorised mobility.

Study: Pollution Kills 8.3 Million People Annually

Estimated number of premature pollution-related deaths per year*

Country	Deaths
India	2.33m
China	1.87m
Nigeria	279,318
Indonesia	232,974
Pakistan	223,836
Bangladesh	207,922
United States	196,930
Russia	118,687
Ethiopia	110,787
Brazil	109,438

* Exposure to toxic air, water, soil, and chemical pollution
Source: Global Alliance On Health And Pollution

statista ◢

NOISE POLLUTION

/ AT A GLANCE

- Noise is one of the biggest risks to physical and mental health and is a growing problem in urban communities.

- Most noise emitted in cities is linked to motorised transport.

- According to WHO, 360 million people worldwide have disabling hearing loss due to constant and excessive noise exposure, of which 32 million are children. 30% of EU citizens are exposed to noise levels which disturbs sleep and this figure is much higher in developing cities.

- According to studies, the top five quietest cities in the world are Zurich, Vienna, Oslo, Munich and Stockholm, all of which have efficient public transport systems.

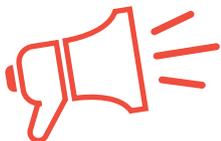## PHYSICAL INACTIVITY AND MENTAL HEALTH ISSUES

/ AT A GLANCE

- The lack of physical activity leads to higher risks of developing cardiovascular diseases, diabetes, cancers, obesity as well as depression and anxiety.

- Obesity in both adults and children is increasing everywhere, especially in fast-growing cities, with one adult out of two and one child out of six in the world being overweight or obese.

- Active mobility diminishes health care costs for cities and for people.

AMOUNT OF TIME SPENT BEING **PHYSICALLY ACTIVE**
- during an average journey -

-1 MIN	**8-15** MIN	**17** MIN	**22** MIN

30 MINUTES OF **DAILY PHYSICAL ACTIVITY** IS **RECOMMENDED**

A person who is physically active everyday reduces their risk of:

35-50%	Type 2 diabetes
20-30%	Depression
20-35%	Coronary heart disease
20-35%	Alzheimer's disease
20%	Breast cancer
30-50%	Colon cancer

TRAIN COMMUTERS

— **WALK** —

+30% STEPS

THAN
CAR COMMUTERS

/ KEY MESSAGES

Air and noise quality, physical activity and mental health can all be improved by developing walking and cycling facilities and mass public transport systems.

UNIVERSAL INCLUSION

Put simply, universal inclusion means providing access to mobility for all of the population. The availability of transport options is crucial to access employment and basic services related to everyday life as well as to maintain social ties. **The lack of transport access can feed a vicious cycle of social exclusion and economic deprivation**. Disadvantaged groups can include people with temporarily or permanent reduced mobility, children, elderly, pregnant women, migrants, ethnic minorities, low income and unemployed.

ACCESSIBILITY

/ AT A GLANCE

- About 15% of the world's population, or one billion people, suffers from a **disability**[16] and disability prevalence is higher in developing countries.

- By 2030, more than 46% of people aged 60 years and over will have disabilities[17].

- More than **one billion people live in extreme poverty**.

- According to the UN, **10-20% of the world's population are minorities and need special measures for the protection of their rights.**

- Women use public transport more often than men. In France, two-thirds of public transport users are women, and in the US cities of Philadelphia and Chicago they represent over 62%.

- The public transport sector is amongst the largest employers at local level, employing 2 million people in the EU, i.e. **20% of the 10 million people employed in the overall transport industry**[18].

- Investing in universal access transport systems and streets demands high investments.

SAFE ENVIRONMENTS

Physical and verbal harassment incidents are very common in all parts of the world and greatly affect user's travel choices, especially women.

/ AT A GLANCE

- In London **more than half of women have been subjected to unwanted sexual behaviour while travelling on public transport but only 2% of cases are reported.**

- Research shows that **safety, access, reliability, convenience and comfort**, are the most important aspects that women consider when using public transport[19]
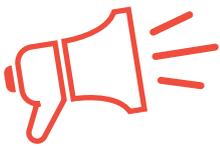
IN LONDON,

MORE THAN
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2%

UNWANTED SEXUAL
BEHAVIOUR CASES
ARE REPORTED

/ KEY MESSAGES

To respond to the needs of all users and enable equal access to economic and social opportunities, **public transport should be affordable, accessible, safe and secure.**

Put simply, universal inclusion means providing access to mobility for all of the population.

Enhancing the mobility experience, for women, children, the elderly and disabled with enhance the experience for a greater majority.

Investing in public transport fosters economic and social cohesion by including citizens in economic, political, social and cultural life.[20]

Universal design and accessibility of streets and public transport is a requirement to respond to mobility needs as the lack of access to mobility will only exacerbate socio-economic divides.

SOLUTIONS

Since the last Better Mobility Report, published 20 years ago, solutions to global, citywide and societal challenges have adapted to the changing times. What UITP sees is three interconnected paths based largely around governance, land use and innovation to reach the end goal of sustainable urban mobility systems. Each path provides various solutions, and this Playbook offers guidance and concrete steps on each to reach the end goal.

SUSTAINABLE URBAN MOBILITY SYSTEM

DESIGN CITIES AROUND MASS PUBLIC TRANSPORT, AND ACTIVE MOBILITY

- Governance & planning
- Densification
- Mobility regulations
- Funding

OPTIMISE ROAD AND STREET MANAGEMENT

- Space regulation
- Active mobilty
- Private car charges
- Parking policies

INNOVATIVE AND EFFICIENT PUBLIC TRANSPORT SYSTEMS

- Accessibility & inclusiveness
- Quality & attractiveness
- Multimodal alternatives
- Integrated mobility
- Mobility hubs
- Clean energy modes
- Data sharing & digitalisation

/ DESIGN CITIES AROUND PUBLIC TRANSPORT AND ACTIVE MOBILITY

To create healthy, inclusive, economically competitive, zero-carbon urban areas, cities need to have an **integrated approach to land-use and transport planning**. This means establishing cross-party political support and commitment, strengthening city visions and policies. To do so, cities must build strong institutions that will work together to deliver the vision, make sure urban and mobility planning work hand in hand to control urban sprawl, regulate the mobility market and stabilise long-term funding to make sure the objectives are reached.

BUILD SOUND AND SUPPORTIVE GOVERNANCE AND PLANNING

Today, many cities around the world still do not have the regulation in place and a central authority for transport planning that coordinates the mobility strategy. For efficient transport and urban planning, **sound and supportive governance is needed**, either through a good cooperation between the different bodies involved, a public transport authority or a regulating agency. Its geographical boundary should ideally cover the full metropolitan area, including peripheral areas and **coordinate with the regional authorities.**

Creating institutions responsible for transport such as an integrated city and public transport authority (PTA) is one efficient solution because:

- ❯ **They act in the public interest** and ensure a well-functioning and integrated transport system within their territory with the overarching goal of a car-lite city and environment.

- ❯ **They provide a holistic approach and vision of the mobility system** based on clear responsibilities such as regulation, planning and integration.

- ❯ **They ensure the funding tools for the public transport system**, for development, maintenance and operation.

- ❯ **They ensure the delivery of the transport and mobility services** and work around the integration and regulation of the public transport network, promote network planning, and provide infrastructures and systems that enable operators and mobility providers to supply beneficial services to customers and society.

- ❯ **They can make decisions independently**, innovate and cooperate with non-transport stakeholders and work in close cooperation with land-use planning departments and developments.

To move towards their mobility goals, cities can create a strong vision strategy and leadership for the city. This can be done through **building a planning approach based on sustainable urban management and development**, using integrated mobility plans or transit-oriented plans to deliver the vision.

Having an **integrated planning process and a reinforced cooperation between** the public and private bodies, having **coherence between land-use plans and transportation plans** as well as good **integrated processes**, and having **structures at the planning and execution levels** are also efficient mechanisms that can be put in place to achieve sustainable mobility goals.

HOWEVER, CREATING AN INTEGRATED TRANSPORT AUTHORITY IS NOT THE ONLY SOLUTION...

SETTING UP AN INNOVATIVE GOVERNANCE TOOL IN CASABLANCA, MOROCCO

Since 2009, Casa Transport's role has been to implement the recommendations of the city's urban mobility plan. The plan's objective is to foster sustainable urban development by favouring mass public transport through an ambitious transformation of the mobility system and its infrastructure. Considered an innovative governance tool, Casa Transport is a private limited company financed and managed by different public stakeholders, ensuring a vertical intergovernmental coordination and a stable financial commitment to mobility projects. A fund was also created to cover investments of public transport projects and support the operating deficit for the first years.

The structure ensures a true interface between the city and the various local and international partners in the implementation of a tramway line extension, the creation of a new tramway line and BRT lines, and the restructuration of the bus network. It also made possible the investments needed to implement such large-scale transport infrastructures. Implementing the multimodal strategy of the city, Casa Transport will support the better integration of different sustainable transport modes, with a contactless ticketing system and mobility hubs by the horizon 2024.

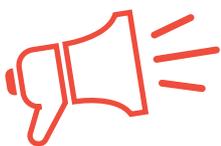*Casa Transport will support the better integration of different sustainable transport modes.*

Toronto's Business Case Guidance is applicable to any mobility project in the city.

GUIDANCE FOR BUSINESS CASES IN TORONTO, CANADA

In Toronto, a Business Case Guidance has been created, integrating business cases into decision making for any capital transport request. Business cases collect evidence in a logical and coherent way, explain the contribution of a proposed investments to organisational objectives and help ensure that an investment is a good use of public funds. Five different cases have to be informed: Strategic, economic, financial, deliverability and operations. The project benefits and performance are tracked through a stage-case process.

The initiative has been used for instance with the Go Rail expansion. The expansion project aims to improve travel time, make roads safer and less congested and reduce emissions. As calculated in the business case, for every dollar invested in the project, the region will benefit by $2.40.

/ IN SUMMARY

- Create a unified planning process through efficient cooperation between public bodies and, when possible, an integrated public transport authority covering the whole area and all the transport functions within it.

- PTAs act in the public interest and ensure a well-functioning and integrated transport system with the overarching goal of a car-lite city and environment.

DENSIFY AROUND PUBLIC TRANSPORT INFRASTRUCTURE

Urban sprawl is still on the rise in many urban areas worldwide and represents a high cost to society in terms of socio-economic issues and environmental damages. Reforming land-use policies that fuel urban sprawl can counteract the growing trend. Concretely, this means:

❯ **Influence the location of developments, promote transit-oriented developments (TODs) and new buildings where there are or could be good connections** by public transport and active mobility and discouraging developments where it is difficult to provide mass transport.

- Conduct mobility impact assessments on any new development.

- Promote TODs within 800m of a rail station, and other areas with a good public transport connectivity, links to active mobility and provide complimentary services such as bike-sharing.

- Favor active modes for short/local trips and public transport for longer trips such as commuting trips.

- Apply land-value capture around transport facilities.

❯ **Influence the type of development and promote mixed-used developments to reduce distances people need to travel**, for example by avoiding zoning different areas as residential, commercial, business districts, which necessitates travel between the two.

- Locate offices and shopping facilities around transport hubs.

- Densify the peripheral areas and connect them with good public transport, Park & Ride solutions, Mobility Hubs so that there is an impact on public transport ridership and a decrease in car use.

Density improves...

Economic productivity

Productivity is far higher in dense urban areas than elsewhere due to the benefits of businesses in proximity. The higher the density of employment, the higher the productivity.

Quality of life

In high density areas, the lengths of trips are shorter, people walk and cycle more and use public transport. Dense areas are associated with more sustainable travel and reduced need for cars.

Social inclusion

Education, employment, health, shopping and leisure activities are easier to access in denser areas.
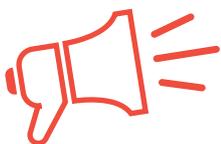
> *Bern is providing faster routes between the centre and periphery.*

COORDINATION OF SETTLEMENTS AND TRANSPORT DEVELOPMENT IN BERN, SWITZERLAND

The rail and tram networks in the region are being developed to better connect the city centre with the periphery. This offers commuters direct and faster routes to and from their workplaces and relieves the pressure on the central networks. Most of the transfer stations are at focal points of spatial development, complementing land-use and traffic developments. As a result, jobs are easier to access by public transport and, as part of the next steps, these transfer points will be further developed into mobility hubs with regional bus lines, rental bicycles, e-scooters and other service offers.

/ IN SUMMARY

> The denser and more compact a city is, the more sustainable and innovative.

> Avoid urban sprawl, densify, influence the type and location of new developments and concentrate them around public transport infrastructures.

REGULATE THE MOBILITY SYSTEM AND SERVICES

The mobility sector has a wide variety of actors, ranging from traditional public transport operators to providers boosted by technological developments and digitalisation such as automated vehicles, car- and bike-sharing services, ride-sharing, ride-hailing, and the **micro-mobility** sector. **Authorities are encouraged to regulate these innovations to foster sustainable business models and ensure they cater for the public good.**

For authorities will firstly require **a legal basis and framework** within the national law. Governments then need to **provide the capacity and resources to these authoritie**s, so that they can:

- **Set the regulatory framework and the right internal organisation, capacities, and culture** to liaise with these new stakeholders. This is important to adapt to new expectations and remain open to changing societal needs.

- **Liaise with the transport and mobility ecosystem.** This means engaging with all actors.

- **Set up a framework for cooperation** between transport authorities and operators, through contractual relations or any other dialogue.

Authorities can set up rules or regulations to comply with the type of service they wish to implement and the quality and safety standards they should meet. As a minimum, those regulations will cover:

- **Safety:** Services comply with the safety standards defined in terms of vehicles, drivers training, operations.

- **Environment:** Emissions and energy efficiency

- **Equal rights:** Discrimination of employees and users based on ethnicity, age, gender. Employee rights are in accordance with the national laws.

- **Economic**: Fair competition

- **Reliability**

- **Comfort and convenience**

CONTRACTING AND TENDERING

Furthermore, contracting and tendering are instruments that influence and measure public transport quality and performance. Having well-defined contracts and clear tendering documents that are defined in cooperation with the mobility stakeholders are efficient tools to influence the quality of the public transport network and the connection between the stakeholders. They are also a way to promote clean mobility and consider the integration of all sustainable mobility services.

P+R in AMB: Common apps in different municipalities has simplified the experience for citizens and delivery companies.

AN INTEGRATED MOBILITY PLAN FOR BARCELONA'S METROPOLITAN AREA (AMB), SPAIN

Approved in 2020, Barcelona's Urban Mobility Metropolitan Plan (UMMP) promotes and integrates more than 100 measures to be rolled out within the next five years across the 36 municipalities, an area with high interdependent mobility. It is a mandatory plan, stated by law, and is expected to reduce the number of citizens exposed to poor air quality and road danger.

The UMMP focuses on six strategic areas regarding urban and metropolitan mobility networks, quality in life and urban spaces, public transport system, flexibility and efficiency in governance or changing habits and mobility management. It integrates, for instance, the implementation of Low Emissions Zones (LEZs) on different scales, the metropolitan coordination and management of parking, the improvement of the metropolitan bus and metro services and the development of the bike metropolitan network, Bicivia.

Aparcament d'intercanvi

P+R

Espai reservat per a usuaris

SMART WAYS IN ANTWERP, BELGIUM: SUSTAINABLE STAFF COMMUTES

The region of Antwerp has not just been encouraging people to shift towards sustainable modes but shift their travel times as well. In the Antwerp Transport Region 2030 Roadmap, ambitious goals have been set with a variety of regional actors to target groups who are travelling more often (universities, hospitals, schools and business-es).

Within its "Smart Ways of Antwerp programme", the region is ac-tively collaborating with employers and mobility service providers. The programme supports employers in building their company mo-bility policy, understanding employee travel behaviours and encour-aging the use of more sustainable transport modes. Working closely with mobility providers and the public transport operator, different mobility offers can be made available including public transport, al-lowing employees to lease a bike, use car-sharing and car-pooling.

Commuters can get to work easily and comfortably with a smart combination of various transport options.

26%
OF THE **COMPANIES' EMPLOYEES**

LEAVE THEIR CAR AT **HOME**

AND **COMMUTE** WITH **SUSTAINABLE MODES**[21]

/ IN SUMMARY

⊙ Regulating new mobility services and innovations fosters sustainable business models but also ensures these services respond to mobility demands, are sustain-able and cater for the public good.

⊙ Through regulations, cities can ensure that new mobility services complement public transport systems.

ENSURE AND STABILISE LONG-TERM FUNDING

The advantages of good public transport networks are not only confined to the passengers. **A study of Barcelona in 2021 showed that for every €1 spent in public transport, the return on investment within the region was €6.5. Urban and local public transport services in Europe contribute between €130-150 billion per year to the economy, this equals 1.0-1.2% of GDP.** Many sectors such as the construction industry, the supply industry, manufacturing, and IT services are recipients of these investments.

Investments in infrastructure and all operational costs should not be entirely paid for from the farebox revenue but include the contribution from competent authorities and indirect beneficiaries (car users, employees and businesses).

Economic tools such as **fuel taxes, congestion charging and parking pricing** may be used to generate revenues for less polluting modes and to raise the price of polluting modes to reflect health and environmental 'externalities' that the market typically does not capture. These tools may be used to support defined policies, such as incentives to phase out older vehicles or reduce congestion in defined areas. They can also provide suitable support in the investments of a good public transport systems that benefits all citizens, while securing long-term funding from diverse sources.

The public transport sector requires stable funding and financing for capital investments and operations in line with the expected quality standards, transport coverage and frequency levels. In order to ensure both the legal framework and capacity to deploy locally earmarked revenue from either existing or new sources, this requires the definition and establishment of diverse mechanisms to cover the costs of operating and maintaining the transport systems. Examples of public and private financing to raise funds for public transport are:

- ❯ Property developers' contributions
- ❯ Levies of parking places
- ❯ Taxes on salaries
- ❯ Taxes on cars spent on improving public transport
- ❯ Tax on fuel which are invested into to local transport

Capturing the value of properties development can be redirected to the public transport sector. Housing and property development, especially when close to transport access usually enhances the value of the land by a premium of 10-13%. It is crucial that some of this is captured to support improvements that make the developments possible. This land value capture (LVC) mechanism can help boost the connectivity of an area which makes higher density feasible, fosters economic life and brings more revenue for the developer. **Some of this revenue can then fund further public transport improvements.**

LIFESTYLE BUSINESS FOR RAILWAY STATIONS IN JAPAN

To diversify its revenues, JR EAST has developed a lifestyle service business growth vision Next10. Its aims at improving businesses located around railway stations and takes on the challenge of "lifestyle creation" (town development). Inside the stations, the operator is maximising the station's space for in-station shopping zones, including restaurants and retail. Office buildings, shopping centres and hotels owned by the operator are being built around the station bringing new services being built around the station bringing new services.

This strategy allows the operator to develop its real estate and housing presence, maximising its revenues. By 2027, JR East is expecting that revenues brought by lifestyle business will be 1.5 times higher than in 2017[23]. The expertise developed with the stations is also supporting their networking in other countries. It also contributes to developing some regional areas in Japan, by giving a space in the station to sell local products and to revitalise facilities surrounding the rail network.

FUNDING PUBLIC TRANSPORT WITH A WORKPLACE PARKING LEVY IN NOTTINGHAM, UK

To finance its public transport and reduce congestion at peak hours, the city of Nottingham implemented a workplace parking levy (WLP). The levy is charged per parking space owned by businesses with 11 or more employees and is paid by the employers. They can decide whether to recoup the charge from their staff.

Since its introduction in 2011, the scheme generated £75 million[24] and contributed to funding the extension of the tram system, redevelopment of the central station and supporting the bus network. Compared to traditional road user charging schemes, WLP ensures a guaranteed revenue stream, such as during the lockdowns due to the COVID-19 pandemic. WLP has also proven not to be a disincentive for companies to base themselves within the city boundaries. On the contrary, the good public transport network has attracted businesses.

/ IN SUMMARY

- Choose investments where it benefits the most citizens.

- Diverse mechanisms are available to support investment in the sector, which is then reinvested back into the economy.

LINKS TO MORE UITP RESOURCES

❯ How to build successful cities: Strengthening the integration between land-use and mobility planning

❯ Promoting safe and sustainable cities with public transport for the SDGs

❯ The value of public transport: How to implement Land Value Capture

❯ Establishing a public transport authority in African cities

❯ Integrating mobility health impacts in decision-making

❯ Key insights into transforming the informal transport sector

❯ Governance and regulation models to manage disruptive mobility services

❯ Governing for quality and performance

❯ Financing and funding public transport land and location value capture - members only via MyLibrary

❯ Financing toolbox – members only via MyLibrary

❯ Organising Authorities Toolbox - members only via MyLibrary

Stay updated with the latest research projects

Helping governments enhance their SUMP process.

Facilitating cooperation and coordination with various stakeholders.

Helping cities achieve climate neutrality before 2050

/ OPTIMISE ROAD AND STREET MANAGEMENT

Street and space management is essential to optimise the use of urban space. **Good management of street and road space means prioritising and reallocating to mass transport modes which provide services to the highest number of people.** This means regulating urban spaces, giving right of way to public transport, building the necessary infrastructure for active mobility, coordinating with delivery services and discouraging private car access and parking in central areas and giving additional public space to citizens for more inclusive, liveable, sustainable and healthy cities.

RETHINK URBAN SPACES

When it comes to mobility, urban space needs to be regulated by prioritising dedicated spaces for public transport and active mobility and the reduction of space for private car use. The following approaches can be taken:
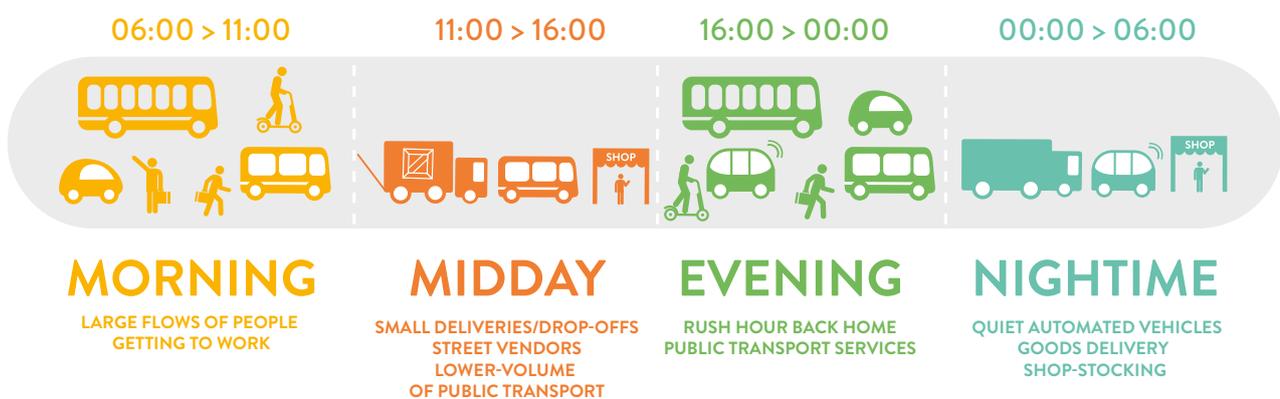
- �) **Assess the purpose of the street**, motorised, mixed-used, touristic area, commercial, residential, and differentiate needs between urban/ peripheral areas.

- ◉ **Coordinate public transport and street management** by integrating walking and cycling and public realm improvements with public transport to improve quality of life, reduce **car-dependency** and improve public transport.

- ◉ **Design new streets and public spaces** as part of developments to support active mobility with infrastructure prioritising safety, comfort, low noise, greenery and social interactions for all ages.

- ◉ **Monitor all mobility interaction**s in the city such as public transport, new mobility services, freight services 24/7 to understand the needs of each mode when parked and in use. Then encourage new services and technologies which help create a safer, quieter and more pleasant environment.

- ◉ **Set up pilots to better understand the use of streets** to investigate possible interaction between passenger flows and freight transport, with a specific focus on fast and instant deliveries.

- ◉ **Use space efficiently**. For example, new services make efficient use of road and kerb space, consider the change in needs over the day especially in congested areas.

- ◉ **Analyse data to understand how space is used and the impact of traffic** (congestion, parking, on-time performance).

- ◉ **Include citizens in the design** of infrastructure, urban spaces and services to understand their needs, their use of the infrastructures and to legitimise the urban planning process.

- ◉ **Establish strong cooperation between the public and private sector**, including the delivery sector.

- ◉ **Define a governance structure, regulations and best practice guidelines** for operators to keep control over the deployment of shared mobility services. Ensure they are in line with the city's mobility strategy and do not cause urban sprawl.

- ◉ **Coordinate deliveries and servicing** to minimise the number of necessary movements using clean and safe vehicles and avoiding peak times.

- ◉ **Abolish car parking requirements** and apply maximum permitted levels in places well connected with mass public transport.

TIME AND ZONE MANAGEMENT

Studies have shown that around 30% of vehicles circulating on streets are looking for parking places. A flexible time and zone management of on-street parking can minimise the impact of congestion, for example by adjusting parking fees throughout the day, reducing parking spaces, fixing time limits, using real-time information and managing access to restricted areas. Time and zone management can be applied to all modes with priorities given according to peak and off-peak hours, such as priorising public transport when demand is high.

Dynamic use of **kerb space** over the day

06:00 > 11:00	11:00 > 16:00	16:00 > 00:00	00:00 > 06:00
MORNING	**MIDDAY**	**EVENING**	**NIGHTIME**
LARGE FLOWS OF PEOPLE GETTING TO WORK	SMALL DELIVERIES/DROP-OFFS STREET VENDORS LOWER-VOLUME OF PUBLIC TRANSPORT	RUSH HOUR BACK HOME PUBLIC TRANSPORT SERVICES	QUIET AUTOMATED VEHICLES GOODS DELIVERY SHOP-STOCKING

HEALTHY STREETS APPROACH IN LONDON, UK

London has pledged to encourage more people to walk, cycle and use public transport with the framework, Healthy Streets for London. The aim is to improve air quality, reduce congestion and create greener, healthier and more attractive places.

A set of priorities were identified, which will be addressed by a variety of coordinated policies for the streets, public transport and urban developments. Numerous bicycle superhighways are being constructed, extra space for walking pavements and bicycle pathways will be granted, public transport stations and surroundings are being improved, a 'Liveable Neighbourhoods' programme will reduce car trips, improve health and air quality. Tools are made available to London's boroughs and stakeholders to support the implementation of this vision.

By 2041, London aims at 80% sustainable mode share, 20 minutes of active travel for all, vision zero for road danger and 3 million fewer private car trips.

INFRASTRUCTURES FOR ACTIVE MOBILITY IN SALVADOR, BRAZIL

In the city of Salvador, urban spaces were redesigned to encourage active mobility and improve modal integration. The construction of 15 elevated bridges, 3 roundabouts, 6 new avenues and 18 footbridges improved congestion and provided safer routes for people. The implementation of a 12km bike and jogging track, as well as a 670,000m² green area with 6,000 new trees created a quality environment for active mobility. Seventeen bike-sharing stations along the metro lines encourage intermodality. Tactile floors, accessible walkways and elevators, fixed stairs with braille signaling and adapted restrooms provide accessibility and autonomy for people with reduced mobility and disabilities. CCR Bahia Metro, the public transport operator of the city supported and encouraged such redevelopments to improve sustainable mobility in the city and region.

❯ *Prioritising development for active mobility improves the mental and physical health of citizens.*

/ IN SUMMARY

❯ Building infrastructures for active mobility and public transport and discouraging private car access and parking in central areas is an efficient tool to build inclusive, liveable, sustainable and healthy cities.

❯ Experimenting with different coordinated measures can help each city find their local solutions.

ADAPT THE PUBLIC REALM FOR ACTIVE MOBILITY

Living in more dense and compact cities means that urban spaces are increasingly important for supporting social and cultural interactions in a safe environment. **Building cities around people's activity and favouring social sustainability improves physical and mental health**, inclusion and contributes to shaping successful and healthy cities. Providing more infrastructure for active mobility, developing street activities and local shopping facilities and creating mixed-used areas reduces the need to travel by car.

A public realm encouraging active mobility is a place with:

- **Parks, plazas, green spaces, open spaces** reserved for social, commercial and leisure activities, where people can play, relax and socialise. These areas should also be well connected by public transport and further walking and cycling areas.

- **Allocated space for public transport and active mobility**, segregating space for public transport so that it can operate efficiently alongside safe walking and cycling infrastructures.

- **Wide pavements** using universal design techniques and continuous pavements with no kerb drops, indicating that streets are for people and not cars.

- **Tree-lined streets** which add separation from the road, provide shade and comfort against the climate.

- **Continuous and safe cycling infrastructures.**

- **Secure bike parking** for both residents and visitors.

- **Restricted access or clear indications on where to park** without creating additional traffic.

- **Traffic calming measures**, speed limits of 30km/h for cars in residential areas and city centres, and shared zones.

- **Good lighting** so that pedestrians feel safe at night.

- **Safe crossing intersections** forcing cars to slow down with improved intersection design and visibility, such as raised "table-top crossings".

- **Public amenities** such as public toilets, seating, bins and wayfinding signage.

When adapting urban spaces, it is essential to **involve the citizens** from the early stages. **Tactical urbanism** is an efficient and low-cost tool to pilot potential new solutions and measure their impact.

REFURBISHMENT OF UNUSED INFRASTRUCTURES FOR A WALKING AND CYCLING PATHS

When transport infrastructures become obsolete, repurposing them for active mobility can revitalise the area of a city. In the US, New York City repurposed an elevated train track in the Manhattan area, called the High Line. Abandoned since 1980, the 2.33km of urban greening contributed to revitalising the Chelsea area, in parallel of real estate development projects and the creation of museums along the line.

In Seoul, South Korea, the city chose to repurpose an elevated highway into a garden and walkway in 2017, called the Seoul Skygarden. Constructed in the 1960's, the elevated highways have been removed gradually from the centre of Seoul due to a changing perspective on urban and transport plan-ning. The Skygarden is located close to the main station of Seoul, with new pathways and park planned as part of the project's future developments.

New York's SkyLine has become a refuge from the busy and polluted streets.

AN EXPRESS BIKE NETWORK IN MONTREAL, CANADA

With more and more people cycling each year, the city of Montreal is building high-capacity, user-friendly and accessible all-year-round cycling infrastructure called the Express Bike Network (EBN). About 184km of bike paths should be created during the project, acting as the backbone of the overall cycling network of the city. The paths are between 2.3-3 meters wide and have a border to physically separate cyclists from cars.

The Corridor one of the network between Berri – Lajeunesse – St Denis was inaugurated in November 2020, which has been a great success amongst cyclists. The 9km development required more than $16m of investments, including the securing of 59 crossroads, adding bike traffic lights and more than 500 bicycle parking spots, and urban greening of the streets.

Thanks to the 17 bike paths which will be deployed with the project, it is expected that, within 10 years, cycling accounts for 15% of trips made in the Montreal region.

WITHIN 10 YEARS CYCLING WILL ACCOUNT FOR 15% OF TRIPS IN THE REGION

/ IN SUMMARY

❯ Providing more infrastructure for active mobility, developing street activities and local shopping facilities and creating mixed-used areas reduces the need to travel by car.

CHARGE PRIVATE CAR USE

The excessive use of cars in towns and cities is encouraged by the free use of roads and free parking. To diminish congestion and improve air quality in cities, private car use can be charged. **Charging congestion is not about increasing taxation on cars but to use carefully selected taxes or tolls.** The money generated by congestion charging can be used by local governments to fund the public transport system and improve the public realm.

Charging for car use in urban areas can be done in various ways:

- **Increasing parking charges to non-residents** and increasing parking controls and recovery of fines.

- **Applying fiscal measures** that discourage the provision of company cars and free private parking at the workplace.

- **Encourage employers to promote the use of public transport** and cycling by offering transport passes and/or bikes.

- **Applying high taxes/increasing taxes** on the purchase of new private vehicles.

- **Applying Urban Vehicle Access Restriction (UVARs) or urban toll** to vehicles crossing a delimited area. There are different types of UVARs that can be applied (cordon based, area licence-based pricing, tolls rings, point-based, distance or time-based) but these should avoid creating congestion in adjacent streets or roads.

- **Introducing urban low emissions zones (LEZs)** that restricts the access to city centres to polluting, typically older vehicles.

TOLLS TO REDUCE CONGESTION, IMPROVE AIR QUALITY AND FINANCE PUBLIC TRANSPORT

Originally introduced in Singapore in 1975, urban tolls aim at reducing traffic congestion in busy urban areas. The scheme evolved over time and became an electronic pricing system in the city. It was then followed by London's congestion charge in 2003, the Stockholm congestion tax in 2007 and Milan's Ecopass in 2008. Most of them include a dynamic pricing depending on the day and time, considering peak travel times. Revenues of the urban tolls are mostly used to finance sustainable transport modes and infrastructures. In London, revenues must be spent on measures to drive the Mayor's Public Transport Strategy. The measure also has a strong environmental impact in areas where it was implemented. Air-borne pollutants were reduced between 10-14% thanks to this scheme in downtown Stockholm[25], while London's air quality improved with a 13% reduction of emissions in nitrogen oxides[26].

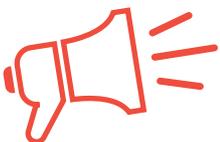## IMPROVING AIR QUALITY IN CITIES WITH THE LOW EMISSIONS ZONES

> *LEZs are areas where the most polluting vehicles are regulated.*

Low Emission Zones (LEZs) are becoming a popular choice, having been implemented in over 13 European countries. The aim is to reduce emissions of air pollutants, by either forbidding the access or charging high fees to polluting vehicles according to Euro standards.

In Berlin, Germany, diesel particles emissions were reduced by 58%, while nitrogen oxides emissions decreased by 20%[27]. In Brussels, Belgium, nitrogen oxides emissions have been reduced by 9% and black carbon emissions by 38% thanks to the decrease of diesel vehicle circulating in the region[28].

LEZ can also be coupled with urban tolls, such as the Area C in Milan's city centre in Italy. To circulate in the area, different tariffs and restrictions apply depending on the vehicle's emissions. Combining both measures reduces car traffic in the city and emissions. In total, Area C has reduced incoming traffic by 30% and contributed to increasing the commercial speed of public transport in the area[29].

/ IN SUMMARY

> Congestion charging is an efficient tool to fund the public transport sector and/or improve public realm and limit through traffic in cities, thus reducing air pollution.
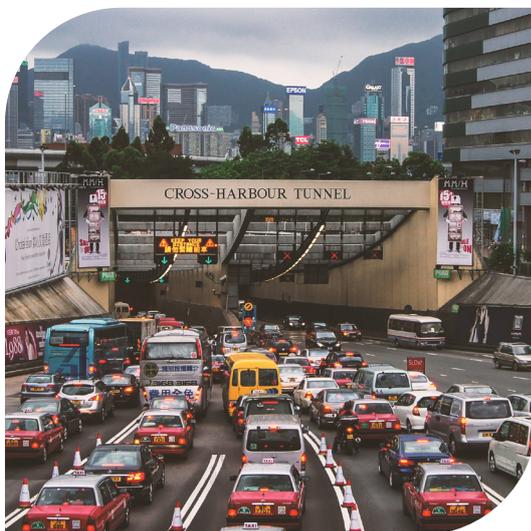
REINFORCE PARKING POLICIES

Cars are parked around 95% of their time and today too many cities still suffer from intrusive and poor parking. Providing a large quantity of on-road parking spaces and off-road car parks in a city encourages car use and congestion and uses precious urban space. **Controlling parking and implementing parking policies in cities is an effective instrument in the management of urban mobility.**

Here are some of the measures that can be taken:

❯ **Integrate all aspects of parking in urban planning and transport planning policies:** Investments, charges, management and surveillance.

❯ **Put in place a parking policy** which sets rules for maximum parking requirements for offices, shops and on-street parking and limit parking capacity in centres and other places well connected by public transport.

❯ **Define parking rules on zoning, pricing and timing**, and eliminate on-road parking for commuters with the use of timing restrictions.

❯ **Enforce and increase surveillance** as fines should discourage parking.

❯ **Remove fiscal advantages for company cars.**

❯ **Reclaim space** to favour efficient public transport systems, walking and cycling and improve public realm.

❯ **Provide visible information on park and rides** for commuters and visitors. Interchanges should be well connected to main road corridors and integrated with public transport and other mobility services such as car-sharing, bike-sharing etc. Parking at interchanges facilitates the transition to public transport.

❯ **Partner with private business developers and agencies** to coordinate parking policies.

Cities which have been successful in deploying public transport have also implemented travel demand management policies, starting with parking. **Often, parking management started in city centre and have extended to include large portions of the cities.**

PARK & RIDE TO REDUCE CONGESTION IN HELSINKI, FINLAND

▶ *Helsinki's journey planner shows real-time information on location of parking and available spaces.*
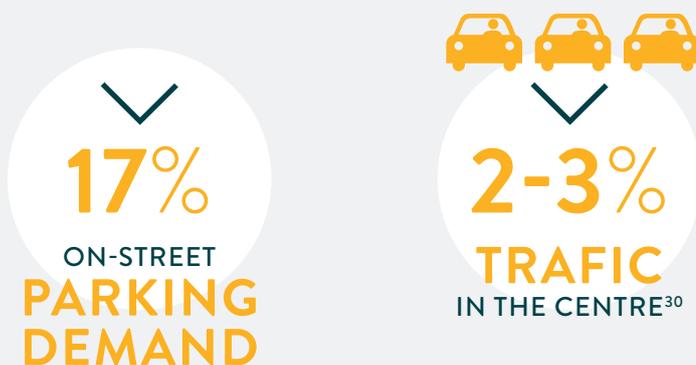
P&R facilities are parking spaces located in the outskirts of a city and near public transport stops aiming to reduce the need to drive in city centres. Widely used since 1994, Helsinki's P&R has been a long-lasting success. The facilities were integrated in the regional parking policy and combined with the region's urban planning since 2008, coordinated with the train and metro system. Most P&Rs are free of charge, but progressive pricing is being implemented for those closer to the city centre. For instance, users need to use a valid public transport ticket or travel card to get access to the parking.

Overall, the facilities had a positive impact on road congestion thanks to their convenient location. A part of the success can also be attributed to the integration of the P&R sites in the route planner and ticketing app.

A STRONG PARKING POLICY IN AMSTERDAM, THE NETHERLANDS

Amsterdam is world famous for its bike culture and aversion to cars. Over the years, the city has been implementing parking policies to reduce traffic in the city centre. The price of hourly on-street parking was recently increased to align with off-street parking. Cars searching for on-street parking space are inevitably generating more traffic.

Additionally, the city is cutting the amount of on-street parking spaces. By the end of 2025, 11,200 parking spaces will be removed in the city centre by not renewing car parking permits. Instead, Amsterdam will focus on other measures such as P&R. Spaces freed from parking are being replaced by trees, bike parking and wider pavements.

17%
ON-STREET
PARKING DEMAND

2-3%
TRAFIC
IN THE CENTRE[30]

/ IN SUMMARY

◗ Controlling parking with policies is an effective instrument in the management of urban mobility.

LINKS TO MORE UITP RESOURCES

- Mobility post-pandemic: A strategy for healthier cities

- New mobility and urban space: How can cities adapt?

- Cities for people: Public transport for better lives

- Park & Ride Factsheets - members only via MyLibrary

Stay updated with the latest research projects

MOMENTUM

Modelling emerging transport solutions for urban mobility.

MORE
Multimodal Optimisation of Roadspace in Europe

Developing and implementing procedures for the design of urban corridors.

PIONEERS
Portable Innovation Open Network for Efficiency and Emissions Reduction Solutions

Reducing GHG emissions in ports while remaining competitive.

/ INNOVATIVE AND EFFICIENT URBAN MOBILITY SYSTEMS

To improve people's mobility in a city and attract citizens to public transport systems, efficient, attractive and innovative mobility systems must be easily accessible to all for it to be a real alternative to private cars. **Public transport is an essential service for the community and plays a vital role in the social and economic wellbeing of a city.** Such urban mobility systems respond to the current needs in terms of digitalisation, emission levels, information and ticketing systems, system integration and cooperation with multiple mobility stakeholders.

ENSURE ACCESSIBILITY AND INCLUSIVENESS OF PUBLIC TRANSPORT SYSTEMS

Accessibility to public transport is a pre-condition for a good social cohesion and economic dynamism of a city. Public transport systems have an important role to play to ensure that all citizens can move smoothly from A to B, and access and participate in economic, social and cultural activities.

Public transport is moving from a traditional service moving masses of people, to a service offering customised solutions. Today, customers expect a safe, inclusive and multimodal experience, offering personalised services.

Accessibility of the transport systems means:

> **Geographical coverage of the transport network** so that all citizens have access to a mobility solution within their immediate neighbourhood.

> Affordable fares for all.

> **Physical accessibility of the network** to people with reduced mobility with ramps, lifts, low floor access vehicles, seats, clear signage that can be understood by people with visibility and illiteracy issues and visitors.

> Ticketing and information provided through digital tools, on-site ticketing machines, signage and information, vocal announcements, visual aids. Many mobility services today are offered to customers through digital channels only, which means they are not accessible to all.

Oslo's approach to inclusivity means more people can choose sustainable mobility.

INCLUSIVE TRANSPORT SYSTEM FOR ALL IN OSLO, NORWAY

Oslo's PTA, Ruter, has set up a long-term ambition to provide "sustainable freedom of movement for all" in the region. In line with the SDGs, Ruter will strive to ensure freedom of choice, equal opportunities, autonomy and respect for all.

Firstly, by identifying the barriers people meet when using public transport and then by changing the mindset of the entire organisation, the goal is to make inclusivity a part of every new venture. In this regard, new Key Performance Indicators (KPIs) have been integrated to measure success.

By this novel approach to inclusivity, and by providing services adapted to a wider range of customers, Ruter expects to increase the modal shift to more sustainable transport modes.

THE FIGHT AGAINST SEXUAL HARASSMENT IN FRANCE'S PARIS REGION

RATP, a transport operator in Paris, has been engaged in fighting against sexual harassment in public transport since March 2020. An ambitious plan was adopted for prevention, management of alerts and participation in the wider collective debate on the topic. Since January 2021, this greater response has meant an adapted support to victim, calling the police station, accompanying the victim by taxi if needed, support in filing the complaints and professional after care.

RATP has also been conducting exploratory walks with female users on public transport to resolve feelings of insecurity in and around the infrastructure. Such initiatives lead to co-created spaces whereby the needs of users are considered, and hopefully makes public transport more inclusive and safe for everyone.

> *By collaborating with female passengers, Paris will become a safer place to travel.*

/ IN SUMMARY

- Mobility is a key factor for economic and social integration.
- Accessible and inclusive transportation is a crucial element in enabling women and girls to access to economic and social opportunities, leading to inclusive societies and equitable growth.

HIGH QUALITY AND ATTRACTIVE PUBLIC TRANSPORT SYSTEMS

For public transport to attract people to stop using cars, high quality public transport based on performance indicators such as punctuality, reliability, information and communication, cleanliness, comfort, safety and security are crucial.

Public transport companies and authorities can respond with the following measures:

- A corporate culture focusing on service excellence should, by default, ensure that the workforce represents the citizens it serves. As a service for all, public transport must strive to recruit people from of all types of. Studies point out that a diverse workforce increases productivity promotes innovation and improves decision making or problem solving[31]. There are several measures that public transport can implement to make its workforce diverse and inclusive, and become competitive in the recruitment market.

- To improve female representation and inclusiveness in the workforce, ensure regulatory compliance, allow for professional development and academic training, address the wage gap, and support women by providing them with the tools to do their job.

- Invest in high quality and efficient operations focusing on availability, frequency, reliability, punctuality, safety and security, comfort, cleanliness. Frequency and passenger information are a top priority. The time spent waiting for the service is a major part of total travel time and travellers want the assurance that the bus will arrive on time and in less than 15 minutes. They want to have accurate information about the service on scheduling, routes, pricing. Public transport companies should provide fluid and integrated mobility customer experience, rely on predictive journey times, real time connectivity, artificial intelligence.

HUMAN FACTOR

IS A **CENTRAL CONCERN**
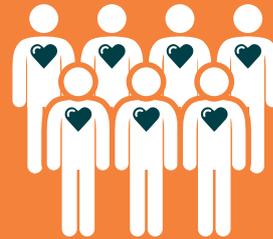IN THE **COMPANY**

ORGANISATION
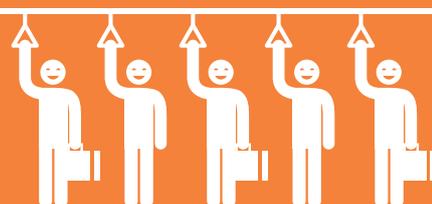
+

COMMUNICATION

+

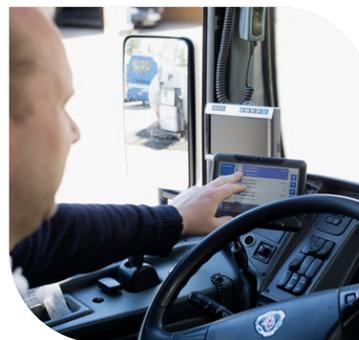MANAGEMENT

ENGAGED STAFF

&

HAPPY CUSTOMERS

❯ High quality and efficient operations also mean high-capacity systems, with comfortable seating and smooth and safe driving, easy and fast boarding, inclusive design. **It means also having vehicles that are not stuck in traffic but have reserved lanes and priority at traffic signals.** This aspect is important to ensure the punctuality and reliability of the system but also to make public transport the preferred mode of transport.

❯ **Making sure ticketing and information systems are integrated to provide seamless travel.** Ticketing systems should allow easy transfer between modes, operators and other mobility services. Automatic fare collection systems and contactless smart cards offer high performance, and advantages in terms of cost, reliability, security and speed of transaction.

❯ **Working on a security strategy and concept** with the use of video surveillance, presence of staff, training and awareness raising for staff and passengers on security issues, measures to avoid crowdedness and crowd management systems to limit the number of passengers on platforms and vehicles (especially in times of pandemics but also for safety issues).

❯ Investing in green vehicles and zero emission technologies.

❯ **Using data to improve planning and operations** and provide accurate information to passengers.

Consider the different aspects for **practical measures** related to performance indicators

	PRACTICAL MEASURES	OPERATIONAL ASPECTS	URBAN ENVIRONMENT	COMMUNITY INVOLVEMENT	POLICY/LEGAL ASPECTS	CAPACITY BUILDING
COMFORT	Improve waiting environment	✓	✓	✓	-	-
	Maintain shelters with AC and ventilation	✓	-	-	-	-
	Clean public toilets	✓	-	-	-	-
EASY-TO-USE	Services between stops	✓	✓	✓	✓	-
	Control camera, panic buttons	✓	-	-	✓	-
	Women-only services	✓	✓	✓	✓	-
	Process for harassment reports	-	✓	✓	✓	✓
SAFTEY & SECURITY	Better lights and pavements	-	✓	✓	-	-
	Trained and professional staff	✓	-	-	-	✓
	Enforce rules and regulations	-	✓	✓	✓	✓

source: UITP Trends Report, 2019

PLACING QUALITY AT THE CENTRE WITH MOSCOW CENTRAL DIAMETERS, RUSSIA

The Moscow Central Diameters (MCD) is network of off-street railway transport lines introduced on an existing railway infrastructure connecting Moscow and its nearby cities. The initiative focuses on the outdated suburban railway transport of the city and aims at integrating it to the Moscow agglomeration's transport scheme thanks to the introduction of uniform standards of payment, service, navigation, infrastructure and rolling stock.

The new service has been strongly solicited by the public with 250 million passengers since launch[32] and soon helped to relieve pressure on the metro network. The MCDs have created a greater accessibility to the public transport system and replaced metro travel, by up to 12%. Near the stations of the MCD, an overall 5-20% reduction of traffic on motorways has been observed.

▶ Moscow Central Diameters improves accessibility and relieves pressure on the networks.

250 MILLION
PASSENGERS

5-20% LESS
MOTORWAY TRAFFIC

AN INNOVATIVE AND FAST-GROWING PUBLIC TRANSPORT SYSTEM IN DUBAI

Since the inauguration of the Dubai metro, the transport authority, RTA, has developed a world class public transport system revolutionising mobility in Dubai.

Dubai is a rapidly growing city. To cater for the increase in mobility needs, Dubai has developed a strategic vision and a sustainable urban mobility system which comprises an array of public transport modes (bus, metro, trams, waterborne…), platforms and technologies including one of the longest driverless metro systems in the world. RTA has also integrated 'soft' mobility, with a wide range first and last mile modes and solutions as well as the physical and digital integration, such as smartcard payment. Finally, RTA launched the S'hail app, which is a one-stop-shop for journey planning encompassing all public and private modes.

The public transport share has increased by three-fold from 6% to 18.1% from 2006 to 2019 (pre COVID-19).

PUBLIC TRANSPORT & TAXIS RIDERSHIP

163
MILLION
RIDERSHIP
- 2006 -

594
MILLION
RIDERSHIP
- 2019 -

/ IN SUMMARY

❯ High quality public transport is based on crucial performance indicators such as punctuality, reliability, information and communication, cleanliness, comfort, safety and security.

GROW STRONG MULTIMODAL ALTERNATIVES TO PRIVATE CARS

By embracing digitalisation, opening to the sharing economy and widely deploying electromobility, **the actors in the transport sector have redefined public transport.**

The deployment of on-demand shared and micro-mobility services complementing conventional systems, such as mass public transport and taxis, offers a unique opportunity to satisfy different mobility needs, serve more people from the first mile to the last and for the entire day. **Cities can move people more efficiently by reducing the reliance on personal motorised vehicles and using a variety of on-demand and shared mobility solutions adapted to the situation and in combination with performing mass public transport.**

Combined mobility offers potential to accelerate the shift towards sustainable mobility while reducing the need for network infrastructure, decreasing operational costs and making a better use of the taxpayer's money. For example, experts say that the biggest enemy of the private car is the shared car. By satisfying a need that can be occasional, for example to shopping centres and trips out of the city, car-sharing systems have shown that they can efficiently reduce car ownership. A study in Bremen, Germany, found that every car-sharing vehicle replaced 16 privately owned vehicles or prevents their purchase, and at the time, car sharing had already contributed to a reduction of more than 2,300 privately owned cars[33].

With the pandemic crisis, multimodality should be consistently considered by authorities and public transport companies when planning their mobility services as a strategic element of resilience. For ex-

ample, since COVID-19, many people have embraced bikes out of concerns for potential infections on transport and in line with their environmental values. E-bikes have become a mobility game changer, by opening cycling to more groups of all ages and abilities and by significantly extending the distance people are willing and able to regularly travel by bicycle. **Sales of bicycles in Europe are forecasted to grow to 30 million a year by 2030, a 47% increase from 2019, with most of this growth coming from e-bikes.** The combination of bikes with public transport will be increasingly important to strengthen their natural win-win for people and society.

Integration of mobility services can strengthen the social benefits of public transport while meeting business ambitions. To achieve an integrated multimodal system, it is crucial that authorities design disincentives to limit single car occupancy and incentives to foster active mobility, while reducing the need to cover long distances and to move altogether through sustainable urban design. In addition, authorities should **design incentives tailored for complementary mobility options**, such as:

> **Infrastructure**: Multimodal redistribution of public space, e.g. mobility hubs in neighbourhoods with space for certified station-based carsharing, parking space for micromobility near public transport hubs, bike lanes and space for walking.

> **Technology**: Trusted data-sharing policies and standards will enable the integration of information, booking, ticketing and payment and make it easier to go multimodal.
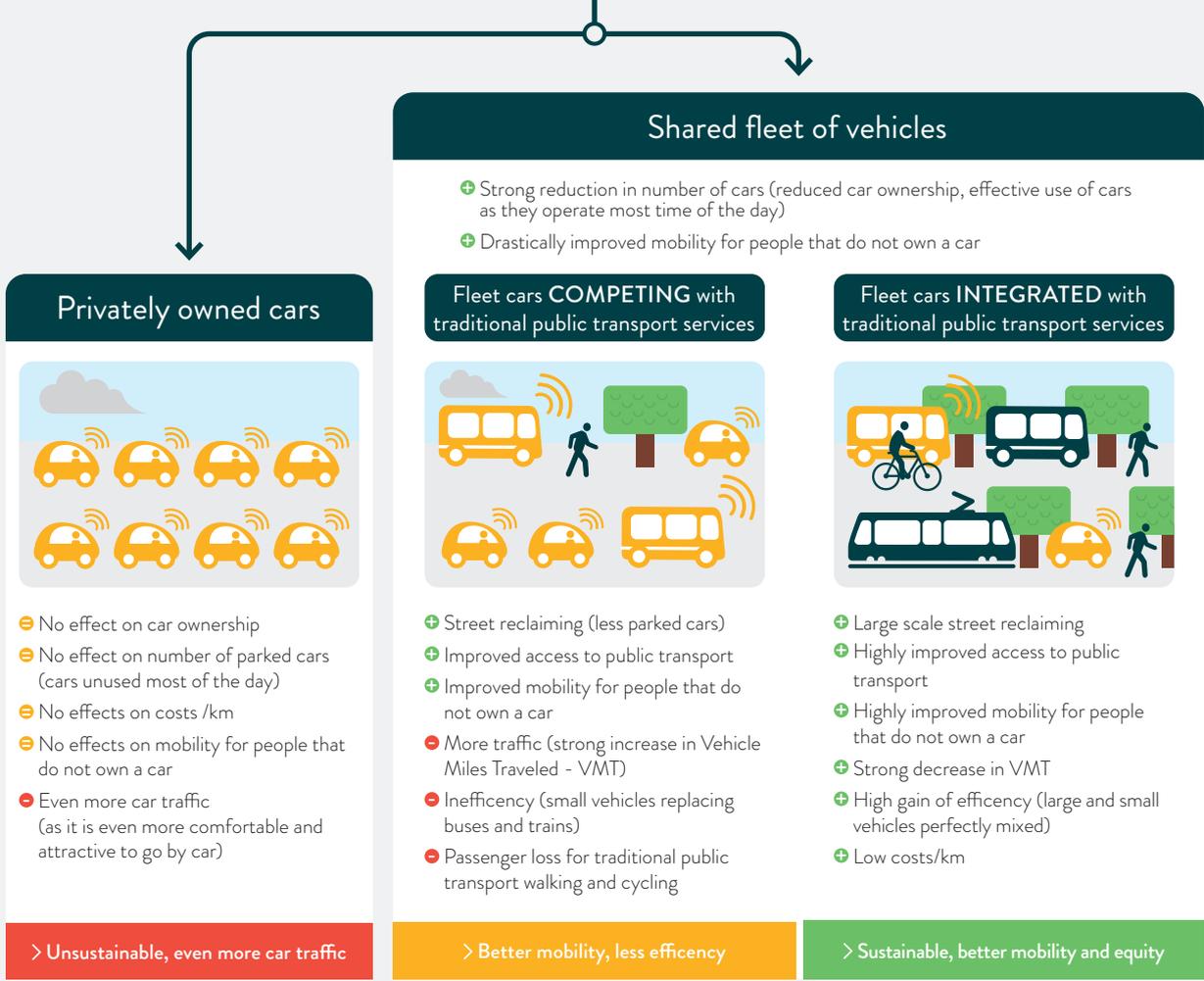
❱ **Policies**: To include and foster the usage of different options, e.g. zero-vision fatalities strategies for safer micromobility, multimodal parking policies, corporate programmes to allow employees to use more multimodal options.

❱ **Funding**: Some services or trips recognised as public utility can receive public money, e.g. public bike-sharing systems, cycling to go to work can be compensated by the employer.

A multi-modal, integrated, and robust public transport system is central to sustainable mobility systems today and even more tomorrow with the introduction of **autonomous vehicles (AVs)**. To avoid a negative scenario with privately-owned AVs or with fleet cars competing with traditional public transport services and worsening congestion problems, AVs are to be introduced in fleets of driverless shared autonomous vehicles of different sizes reinforcing an efficient high-capacity public transport network supporting walking and cycling.

Autonomous vehicles will only help to meet public policy goals if they come as shared fleets integrated with public transport

AUTONOMOUS VEHICLES

Shared fleet of vehicles

- ⊕ Strong reduction in number of cars (reduced car ownership, effective use of cars as they operate most time of the day)
- ⊕ Drastically improved mobility for people that do not own a car

Privately owned cars

- ⊖ No effect on car ownership
- ⊖ No effect on number of parked cars (cars unused most of the day)
- ⊖ No effects on costs /km
- ⊖ No effects on mobility for people that do not own a car
- ⊖ Even more car traffic (as it is even more comfortable and attractive to go by car)

❯ **Unsustainable, even more car traffic**

Fleet cars COMPETING with traditional public transport services

- ⊕ Street reclaiming (less parked cars)
- ⊕ Improved access to public transport
- ⊕ Improved mobility for people that do not own a car
- ⊖ More traffic (strong increase in Vehicle Miles Traveled - VMT)
- ⊖ Inefficiency (small vehicles replacing buses and trains)
- ⊖ Passenger loss for traditional public transport walking and cycling

❯ **Better mobility, less efficency**

Fleet cars INTEGRATED with traditional public transport services

- ⊕ Large scale street reclaiming
- ⊕ Highly improved access to public transport
- ⊕ Highly improved mobility for people that do not own a car
- ⊕ Strong decrease in VMT
- ⊕ High gain of efficency (large and small vehicles perfectly mixed)
- ⊕ Low costs/km

❯ **Sustainable, better mobility and equity**

NEW MOBILITY SERVICES CONTRIBUTING TOWARDS A SUSTAINABLE TRANSPORT SYSTEM IN BUDAPEST

Based on Sustainable Urban Mobility Planning (SUMP) principles, Budapest issued its first transport development plan for the region in 2015. It lays out the strategic goals and directions of development up to 2030, including the foundations of a future integrated network in the region. New mobility services should be made accessible and close to public transport infrastructures to encourage the usage of sustainable transport modes.

Different pilots are ongoing in Budapest to understand how to build the integration of transport modes. In the Mobility Points pilot, a mobility hubs network was deployed and within this scheme, the city bike-sharing system, free-floating bike, e-scooter and moped operators and car sharing services were involved and integrated in the solution. Another pilot is looking at granting parking space to free-floating e-scooters, to avoid poor parking. Called Micromobility Points, signage marks the parking spots and often located close to the bike-sharing stations.

> *Through the pilots, the city government can test how to deploy and manage different micromobility modes.*

ON-DEMAND PUBLIC TRANSPORT SERVICES IN BRAZIL

> *A complimentary service to Brazil's mass public transport.*

On-demand public transport services have gained popularity in Brazil over the last few years. The first was launched in 2019 in the city of Goiânia with the support of Via, under the name CityBus 2.0. Nowadays, 40 vans are on the roads, serving the city centre and surrounding neighbourhoods and complementing traditional public transport. Users can order the service on an app, reach a virtual bus stop to hop in and pay with their public transport pass. As the service is managed by the city's public transport operator, it is fully integrated into the transport system and works hand in hand with the traditional buses. According to surveys, 81% of van users were using their private vehicles for their mobility needs before implementation of the service.

A second service was deployed in the city of Forteleza. TopBus+ operates 18 vans and are serving different neighbourhoods. The strength of the project lies in the fact that the service is operated by the traditional bus operators of the city, ensuring a complete integration with the existing bus network.

/ IN SUMMARY

> New mobility services, if well managed and regulated, contribute to building a sustainable transport ecosystem and diminish car trips.

> Multimodality is a strategic element of resilience.

INTEGRATED AND SEAMLESS MOBILITY SYSTEMS

Mobility as a Service (MaaS) is the integration of, and access to, different transport services in one single digital mobility offer with active mobility and an efficient public transport system as its basis.
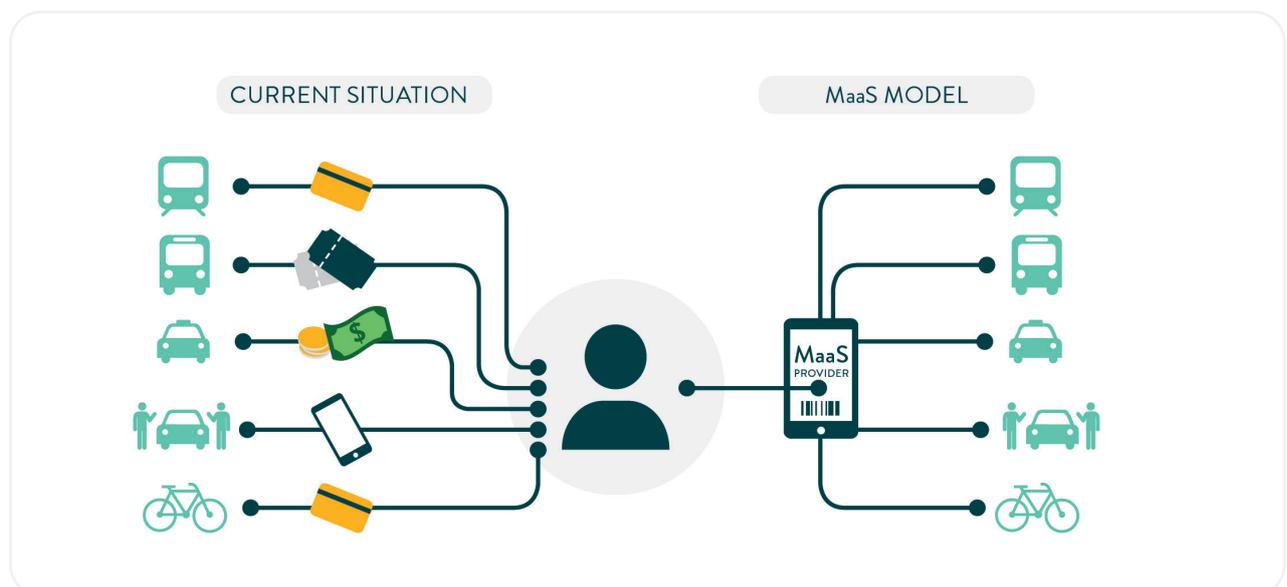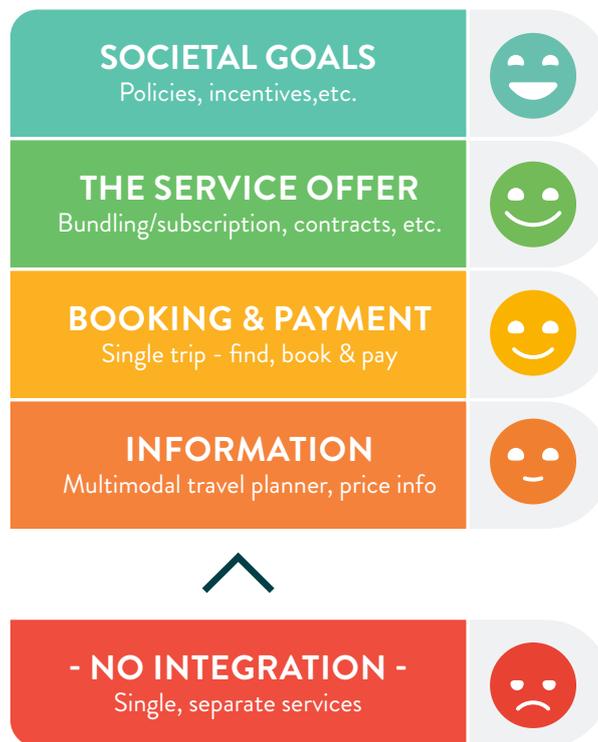
It is crucial for any MaaS to have at least an integration of the service offer through packages and subscriptions, regardless of the provider or mode. The result will be a tailor-made service that suggests the most suitable solutions based on the user's travel needs, on the mobility supply conditions and policy objectives. Thus, MaaS has the potential to create more sustainable travel behaviours while maximising the usage of the mobility services and networks, potentially reducing congestion on networks and allowing the different providers to optimise their service through data.

However, MaaS is still in its infancy with examples from private players, public sector but also non-transport players. One key step for the public transport sector is bringing their information, ticketing and payment systems up to speed to enter the digitalised and MaaS era.

There are different aspects of integration, from the physical integration to the institutional integration, including information, ticketing and payment integra-

tion. The highest integration level is with societal goals, through policies and incentives. This is particularly key to deliver a more sustainable "mix" of mobility that would make it seamless for people. An example of incentives can be customers rewards/bonus points for walking more.

MAAS CAN BE THE INTEGRATION OF...

SOCIETAL GOALS
Policies, incentives,etc.

THE SERVICE OFFER
Bundling/subscription, contracts, etc.

BOOKING & PAYMENT
Single trip - find, book & pay

INFORMATION
Multimodal travel planner, price info

- NO INTEGRATION -
Single, separate services

CURRENT SITUATION

MaaS MODEL

MaaS PROVIDER

> *Dijon proves that seamless mobility is resilient mobility.*

INTEGRATING SUSTAINABLE TRANSPORT MODES IN A MEDIUM-SIZED CITY

Since 2017, DiviaMobilités in Dijon, France, has been managing public transport, parking and bikes in the area. To create a seamless mobility experience, Dijon has integrated the entirety of the mobility offers together to facilitate intermodality. All services have been integrated as well, from branding to passenger information, interoperability of the ticketing system, mobility offers and customer relations. The app gathers all the mobility information in Dijon, including a route planner and online payments. In the future, combined mobility offers will be implemented including public transport, parking and bikes and a real-time passenger information system.

Overall, ridership of public transport has been increasing and even stayed steady after the COVID-19 lockdowns during 2020/21. User satisfaction is high and more than 98% of users would recommend using DiviaMobilités.

A MAAS PLATFORM IN LUXEMBOURG

Initiated by the Ministry of Mobility and Public Works in Luxembourg, an intermodal MaaS platform developed by Hacon provides comprehensive information about all mobility options in Luxembourg.

By integrating P&R areas as well as carpooling providers, the Ministry of Mobility and Public Works encourages commuters to switch to public transport in order to relieve congestion. If taking a private car is unavoidable, the routing function factors in the current traffic situation as well as roadworks and closures in real time, and adjusts the route accordingly. The overall travel time by car as indicated in the app even includes the search for parking, allowing a realistic comparison of all means of transportation. Whether choosing public transport, bike or car, mobiliteit.lu enables door-to-door trip planning. Users are automatically informed about possible disruptions and receive extensive support in the event of a rerouting. Moreover, they benefit from tailor-made suggestions that match their personal mobility behaviour. In addition to seeing their individual bike route's elevation profile, cyclists can define personal preferences, e.g. to suggest easier routes.

❯ *MaaS platforms should place the customer at the centre.*

/ IN SUMMARY

❯ Integration is key to ensure a seamless and attractive experience for the users.

❯ Despite its infancy, Mobility as a Service has the ability to create a real alternative to the private, individual car.

BUILD MOBILITY HUBS

A mobility hub provides a focal point in the transport network that seamlessly integrates different modes of transport, multi-modal supportive infrastructure, and turn spaces into places. **It increases the inherent value of every single transport mode connected to the hub.** As a result, sustainable transport services are viewed as attractive options, as an alternative to private car use.

A mobility hub is much more than providing mobility as it can also provide all sorts of facilities such as local doctors, security lockers etc. This is even more relevant for rural areas where longer travelling times and scattered destinations require private cars to access everything for daily life. In this context, hubs built around communities' needs can become destinations themselves and reduce challenges to transport services, as well as make it easier for those that need to access public transport and other mobility services.

It is not the modalities, but the range and accessibility of facilities that determines the success of a hub. **The more activities in a hub the better because it creates a sense of place.**

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CENTRAL TRAIN STATION

PUBLIC TRANSPORT INTERCHARGE

NEIGHBOURHOOD HUBS

MICROMOBILITY HUBS

LARGE NETWORK **SMALL PROXIMITY**

PARK & RIDE

VILLAGE HUBS

KEY DESTINATION HUBS

SEAMLESS MULTIMODAL MOBILITY ENABLED BY A NETWORK OF MOBILITY HUBS

In Bremen, Germany, mobility hubs managed by the city were created and built around car-sharing stations and public transport stops. The mobil. punkte is also a well-recognised brand of mobility hubs for now 20 years in the city centre and neighbourhoods, easily reachable in most of the city by walking and cycling. Overall, the mobility hubs boosted the usage of car-sharing and the reduction of private car use in the city.

Public transport operators can also benefit from managing mobility hubs. In Vienna, Austria, the WienMobil Station allows the operator, Wiener Linen, to physically gather the different services they operate in a hub, as well as digitally with their multimodal app. With now 20 functioning mobility hubs, the implementation of a new station-based public bike-sharing system and car-sharing will complete the mobility hubs scheme around public transport spots.

Mobility hubs: Places of connectivity where different travel options come together.

CAR-SHARING
BOOST

REDUCTION OF
PRIVATE CAR
USE

LARGE INTERCHANGES CONNECTING MULTIPLE MODES IN DELHI, INDIA

❯ *While the station becomes a hub, the surroundings benefit from a reduction in traffic.*

Interchanges, allowing passengers to shift from one mode to another, are essential in creating a seamless mobility system. In Delhi, an initiative was launched to offer a better multimodal experience to users. Covering 103 stations, mass transport modes are integrated with each other but also the connected with complementary services such as taxis, shared mobility services, walking and cycling paths. Infrastructures have been improved thanks to demarcated pick-up/drop-off areas for taxis, rickshaws, or on-demand transport. User experience for pedestrians was also greatly improved to cross stations, exiting the facilities and finding other modes.

/ IN SUMMARY

❯ Mobility hubs should not be designed only for transport purposes but also as interesting and lively parts of a city where people can interact, entertain and shop.

ENERGY EFFICIENT, CLEAN AND SUSTAINABLE MODES OF TRANSPORT

The Paris Agreement adopted at COP 21 requires the transformation of transport globally to achieve a "net zero-emission economy". **Cities dominate energy demand and as such play a significant role in the reduction of pollution linked to emissions.**

A modal shift to mass public transport is needed as this is the quickest and most cost-efficient way to decarbonise people's daily mobility in cities. Renewable energy solutions in the transport sector need to be embedded in a wider framework of city action on transport. **Emission-free urban transport should not come at the expense of providing accessibility to its citizens, so cities need to employ all three 'avoid-shift-improve'** (ASI) approaches. This approach aims to reduce emissions in the transport sector by:

- **Avoiding** the need to travel
- **Shifting** to more efficient transport modes
- **Improving** fuel and vehicles technologies

Within the short-term, there should be a focus on planning, a modal shift and improved multimodal efficiency. The long-term focus should be on moving to carbon neutral public transport operations.

TECHNOLOGICAL SOLUTIONS ARE AVAILABLE!

While **electrification and hydrogen** are at the forefront for sustainable solutions, electric mobility options in public transport have been around for over a century.

As most public transport vehicles on the roads and rails today can already run on **renewable fuels**, it means that there is an immense potential to achieve cost-effective emission reductions. They offer the greatest impact for the sector in developing regions as they are both available and feasible to implement.

Many other tools and technologies are available and each have an important part to play in the transition to net zero-emission public transport. **Renewable fuels such as biogas and biodiesel, in combination with energy-efficient combustion engines, or used alongside electricity in hybrid engines, can help to reduce the total well-to-wheel carbon emissions of a public transport vehicle by up to 90%, compared with fossil fuels.** As these renewable fuels can be derived from organic material such as agricultural waste, they can also play a wider role in supporting circular economy models of energy sourcing across the entire fuel value chain, from production to the tailpipe. However, it is critical that they are produced in a sustainable manner to **avoid the risk of direct and indirect land-use change.**

❯ Policies that support unleaded fuels, lower-sulphur fuel, alternatives to diesel such as CNG, improved standards or retrofitting of older vehicle engines and better vehicle maintenance and monitoring, can help to lower 25 pollution emissions, particularly from the most polluting vehicles.

❯ Improved safety design of vehicle fronts, especially for cars and buses, can significantly reduce road danger for pedestrians and cyclists.

❯ Policies that encourage the phasing out of older vehicles can help to remove vehicles that are among the most polluting and at greater risk of breakdowns which can in turn be a factor in traffic accidents and injuries.

6 STEPS

SIX STEPS TO DECARBONISE PUBLIC TRANSPORT

The roadmap below sets a broad policy pathway to public transport decarbonisation and is grouped into six components. The components are based on experience from delivering action on the ground and should be seen as an overarching common framework.

01 — ENHANCED FINANCIAL SUPPORT FOR URBAN SUSTAINABLE TRANSPORT

Shift finance towards low carbon and resilient public transport priorities, alongside incentives

02 — LOW CARBON SOLUTIONS ARE PROMOTED & ENCOURAGED

Work with stakeholders to develop/encourage robust implementation strategies and targets

03 — BETTER POLICY DESIGN & LAND USE FRAMEWORKS

Integrate transport/urban planning policies & tools to achieve local, national & international goals

04 — IMPROVED MULTI-MODAL EFFICIENCY

Adapt ASI stratgies to encourage compact, connected, coordinated & resilient cities based on public transport

05 — SCALING UP LOCAL/NATIONAL R&D ALONGSIDE SUPPLY CHAINS

Integrate climate & SDG goals alongside innovation development chains/strategies

06 — SCALING UP CLEAN VEHICLES & OPERATIONS

Advance the update of low/zero traction and non-transport solutions alongside clean energy

SCALING ELECTRIC BUSES IN SANTIAGO, CHILE

The city of Santiago is at the forefront of electromobility in Latin America, with the largest fleet of electric buses on the continent and second largest outside of China[34]. The city was one of the most polluted capital cities in Latin America, which encouraged the Chilean government to monitor air pollution and regulate emissions from the transport sector. Since then, Santiago has launched a successful Bus Rapid Transit (BRT) line, and in 2019 its first fully electric line based on pilots. The new line covers 40 brand new bus stops and benefits 660,000 city dwellers. Since implementation, buses have been cheaper to operate than the traditional electric buses, with about $0.10/km compared to $0.43/km. Cost of operations may even decrease further when implemented on a larger scale.

THANKS TO THE NEW ELECTRIC BUSES

-5%

OF **REDUCTION** OF **CO_2 EMISSIONS** HAVE BEEN NOTICED (compared to 2018 figures)

> *Launched by the Chilean government in line with its urban development policy.*

Hydrogen can be a solution to clean public transport.

FUEL CELL BUSES FOR LONGER ROUTES

Another promising technology to provide clean and efficient public transport can be found in fuel cell hydrogen buses. It offers zero tailpipe emissions as it only emits water and no air pollutants or CO_2 emissions. However, there is only zero CO_2 well-to-wheel when using green H_2. It has been the energy choice for Cologne, Germany, which now operates the largest fleet of fuel cell buses in Europe with about 50 on the road. The region has pledged to replace its entire diesel bus fleet with zero-emission buses.

Fuel cell buses are powered by hydrogen and can provide a greater range as a standard 12-metre bus can run 350km and more without refuelling compared to battery electric buses. This was one of the reasons Cologne chose this technology over traditional electric buses, as buses operate on long lines and cannot rely on the regional electricity grid, perceived as unreliable in comparison to the easy access to hydrogen production sites.

/ IN SUMMARY

❯ A modal shift to mass public transport is the easiest and quickest way to decarbonise the transport sector.

❯ Technological advancements mean that clean and zero-emission energy is available now for most public transport vehicles.

DATA SHARING AND DIGITALISATION

Digitalisation is accelerating the trends towards a sharing economy and on-demand mobility, pushing the development of new solutions. This digital era is increasingly being characterised by an enormous growth in consumer and industry data, generated by advanced technologies such as an increased use of Internet-of-Things (IoT), and artificial intelligence.

Data is one of the **crucial enablers** for the public transport sector to lead on the innovation and digitalisation needed to benefit all citizens and mobility modes. However, the public transport sector is just at the beginning of its data sharing journey and there is a lot of potential for enhancements. The new role that data plays within organisations enhances the necessity for public operators and authorities to **develop a data strategy focusing on sustainability and value creation.** This trend encourages the integration of data into the decision-making process to improve business performance.

Data has value and the public transport sector should foster its process of digital transition with a clear strategy on data, mindful of its costs and benefits. Opening data without proper delimitations can lead to strategic and commercial competitive disadvantage, on the other hand, cooperation and the sharing of data can stimulate innovation[35].

The shift to 'data as an opportunity' mindset will require stakeholders to focus on the end goal of creating value to end users and align their organisation's objectives to reaching this goal. Data sharing may bring many uncertainties but only a **collaboration between the different stakeholders and sectors** will provide strong, consistent and sustainable mobility services to citizens.

Benefits of Data in the public transport sector

REVENUES
NEW MONETISED SERVICES
NEW BUSINESS MODELS

COST
BETTER PRODUCTIVITY
HIGHER COST EFFICIENCY

DATA ENABLES VALUE

CUSTOMER
INCREASED USER BENEFITS
INDIVIDUALISED SERVICES

PRODUCTION
BETTER PLANNING (PTA/PTO)
HIGHER FLEXIBILITY
FASTER RECOVERY TO DISRUPTIONS AND/OR CRISIS MANAGEMENT
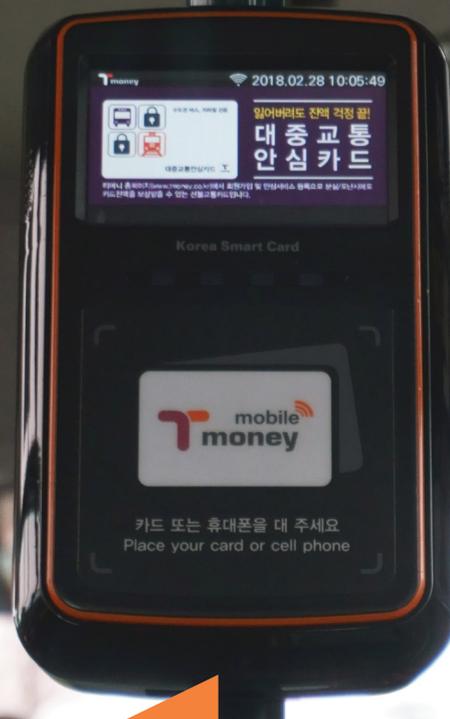
Source: UITP, 2018

THE SECTOR NEEDS TO CONSIDER:

- **Understanding the unique properties** of data as an asset and find the right approach to value data.

- Data sharing as **a factor towards enhancing sustainable urban mobility.**

- **Engaging national and local leaders** in data sharing discussions and proactively joining discussions on the topic.

- Encouraging every organisation to put a **clear and well-defined data sharing strategy** at the centre of the data strategy.

- Building a strong data sharing culture by embracing the potential that data sharing provides, **adopting a 'data as on opportunity' mindset** and develop (or find new partners with) the skills and expertise to exploit this data.

- **Making sure that data sharing is sustainable.** In other words, defining parameters and conditions to ensure that the outcomes have a balanced impact on the five major capitals: social, financial, human, physical and natural.

- Understand that achieving 'sustainability' in data sharing requires a collective effort to **align all stakeholders' objectives.**

- *LTA's DataMall is a platform for transport-related datasets.*

A DATA SHARING STRATEGY IN SINGAPORE

Collecting data is essential for authorities, to enhance economic competitiveness or support the optimisation of transport planning and more mobility options. Singapore has been a pioneer in valuing data since 2011 and has been collecting a variety of datasets on both a government and PTA level with the Land and Transport Authority DataMall. It is mandatory for public transport operators, taxis, private hire companies and new mobility providers to share data with the authority. Data is generated by users and aggregated by LTA. In terms of its data sharing strategy, LTA relies on a hybrid model whereby data is open access but with a limited usage per user. More extensive datasets may be shared for R&D or academic purposes.

TICKETING AND REAL TIME INFORMATION SHARING IN SOUTH KOREA

South Korea has been at the forefront of ticketing integration for years. Tmoney is a smart card service which has been used in public transport since 2004, and in most transport services and major retailers in the country since 2014.
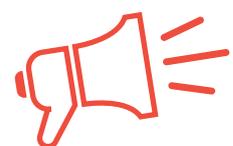
To create a safer transport environment on the road, a Cooperative Intelligent Transport System (C-ITS) pilot is being tested on Seoul's public buses. A support to bus drivers is provided and this system is integrated on a single platform with the other information collected in real time on ticketing or operational data.

In addition, a pilot programme is running to test facial recognition payments in 13 stations of the Seoul Metro's Ui-Sinseol light rail line. Such technology would contribute into making trips more seamless for the users.

❯ *TMoney is nowadays considered a global benchmark due to its huge success.*

/ IN SUMMARY

❯ You cannot have a data strategy without a data sharing strategy.

❯ With the 'data as an opportunity' mindset, stakeholders are required to focus on the goal of creating value to end users.

LINKS TO MORE UITP RESOURCES
(PART 1)

- World metro figures 2018

- World Report on Metro automation

- Fuel Cell Buses: Best practices and commercialisation approaches

- A study on the secondhand city bus market in Europe

- How to place public transport at the centre of the automated vehicle revolution

- A smooth ride to renewable energy: 7 actions for public transport to address emissions and air pollution by advancing renewables

- Going electric: A pathway to zero-emission buses

- Demystifying ticketing and payment in public transport

- Sharing of data in public transport: Value, governance and sustainability

- Digital transformation and social dialogue in urban public transport

- Ready for Maas? Easier mobility for citizens and better data for cities

- How to build a diverse and inclusive sector

- Transforming cities with Bus Rapid Transit systems

LINKS TO MORE UITP RESOURCES
(PART 2)

> Digitalisation in public transport: Implementing predictive asset maintenance

> Women who move nations - Podcast series

> Autonomous vehicles: A potential game changer for urban mobility

> Diversity and Inclusion Toolbox – members only via MyLibrary

Stay updated with the latest research projects

Bringing stakeholders together to support clean bus technologies.

Advancing the commercialisation of fuel cell buses through large-scale deployment.

Supporting deployment of shared, connected and electrified automation in public transport.

Practical steps to address accessibility of passengers with disabilities.

Creating efficient, inclusive and sustainable door-to-door travel experiences.

Conclusion

To move towards sustainable urban mobility systems, cities must work on a combination a solutions; from designing cities around public transport and active mobility, optimising road and street management and deploying innovative and efficient public transport systems. Only a combination of integrated land-use and mobility planning, car restriction policies, improvements of the public realm around clean and efficient public transport and active mobility will help deliver on the objectives set out by the Paris Agreement to build healthy cities with people at the centre.

The COVID-19 pandemic has hit our cities hard but it offers a window of opportunity to accelerate solutions.

The COVID-19 pandemic has hit our cities hard but it offers a window of opportunity to accelerate solutions. Behavioural changes in terms of mobility, digitalisation and e-commerce bring new challenges to cities which might need to reinvent themselves. The increase of car use in many cities is a warning sign that must be taken seriously so as not to recreate the mistakes of the past.

This playbook is a supportive tool to support you in building better urban mobility. UITP will continue to support its members and wider transport community in ensuring public transport remains the backbone of cities.
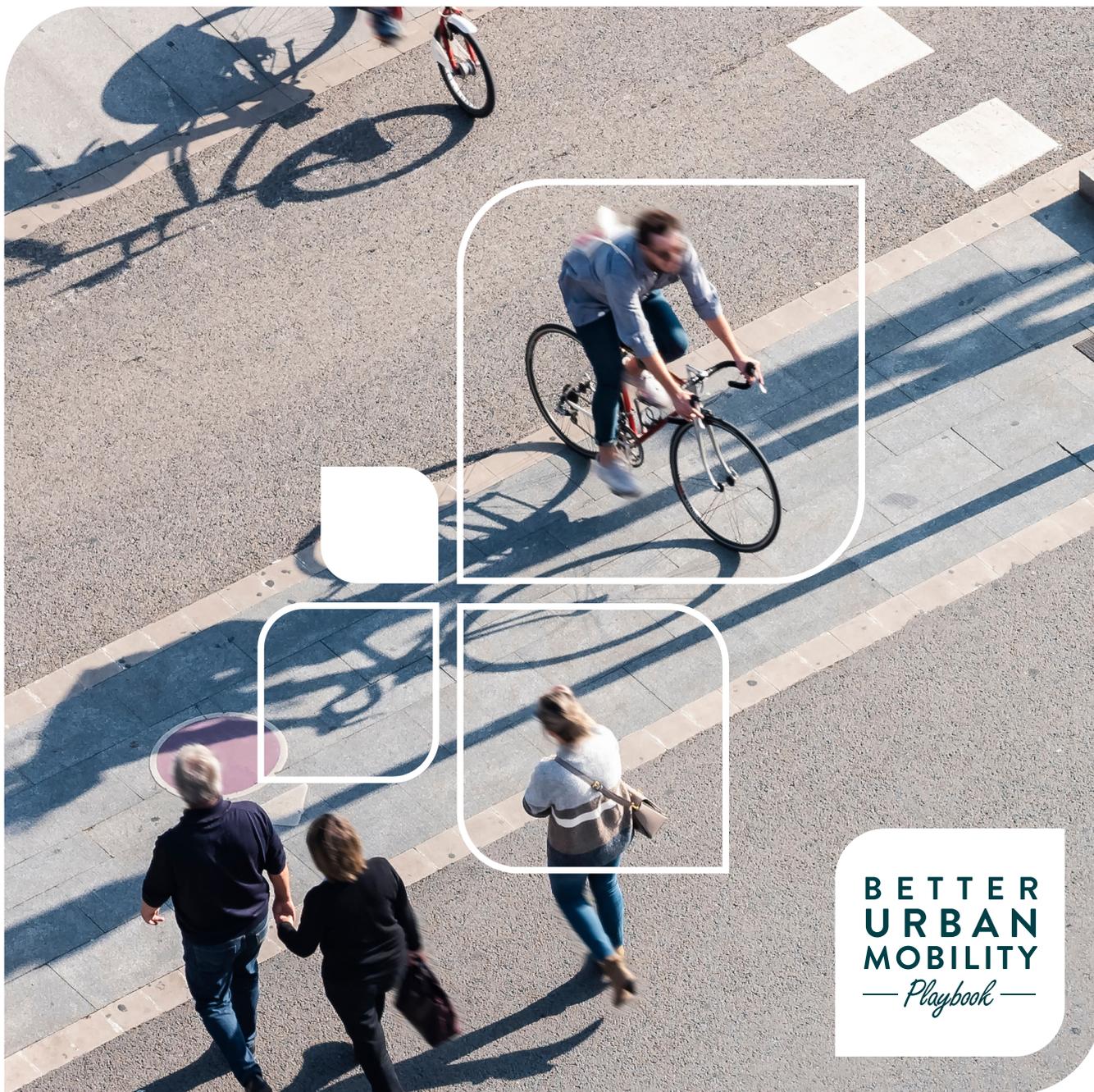
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BETTER URBAN MOBILITY — *Playbook*

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