CEE Smart Cities Mobility Index

Examining urban mobility ecosystems to drive the future of the region

pwc

Contents

pwc

psnm WE DRIVE NEW MOBILITY!

CEE GTI Central & Eastern Europe Green Transport Initiative

AVERE The European Association for Electromobility

eit Urban Mobility

Co-funded by the European Union

1

Introduction

Hazem Galal
Global Cities and Local Government Leader and Global Smart Mobility Co-Leader, PwC Middle East

“The CEE Smart Cities Mobility Index is an important milestone in assessing the progress of smart city thinking and activities across the Central and Eastern European region. The future of smart urban development depends on enablers such as technology, citizen engagement, regulation, financing and effective governance. Moving away from the fossil fuels that currently power our cities is a fundamental challenge, so it is heartening to see the progress that cities are making in transforming their public transport fleets in this report. Ultimately, CEE cities must work together with stakeholders to create smart city ecosystems that are more intelligent, liveable, sustainable and resilient.”

The CEE Smart Cities Mobility Index strives for a better understanding of smart cities and mobility in major cities in Central and Eastern Europe (CEE)[1]. Inspired by a global PwC report, Smart Cities: Mobility ecosystems for a more sustainable future, published in 2022, the CEE edition encompasses 25 cities across the region.

[1]For the purpose of this report, the definition of CEE is those countries covered by PwC Central and Eastern Europe. This is twenty-seven countries spanning the Baltics, Central Europe and the Balkans, the Caucasus and Central Asia, excluding Russia and Belarus. In this case, the scope is limited to 25 major cities within these countries.

The Index is intended to be a starting point for collective regional action—an honest assessment of the state of the smart city thinking and activities of Central and Eastern European urban mobility stakeholders.

The Index reflects the need to assess and acknowledge the challenges that the region faces—but also to identify and showcase best practices that are currently to be found in CEE cities. The Index also strives to provide insights for urban decision-makers throughout our region. In line with our purpose of building trust in society and solving important problems, we aim to help foster cooperation on smart mobility initiatives among local authorities, organisations in the public and private sectors and other stakeholders.

Jens Hörning
PwC Partner, CEE Industrial Manufacturing and Automotive Industry Leader

“Improving the quality of life in cities is what all urban stakeholders should strive for, and becoming better in urban mobility is fundamental for making progress in cities across the CEE region. This report was produced in partnership with AVERE, CEE GTI, EIT Urban Mobility and PSNM. I trust it will help provide a baseline to understand the status quo and give impulses for improving mobility in CEE cities. A key purpose of the PwC CEE Smart Cities Mobility Index is to play a role in encouraging further improvements in smart city thinking and practice across our region and beyond.”

In preparing this Index, PwC CEE has worked with several partner organisations: AVERE, The European Association for Electromobility, CEE GTI (Central and Eastern Europe Green Transport Initiative), EIT Urban Mobility and PSNM (The New Mobility Association). We are grateful for their partnership and contributions, as well as the inputs from several contacts within the cities in scope. We are proud to present our findings.

Heiko Seitz
PwC Partner and Global eMobility Leader

“The CEE Smart Cities Index shows clear progress in the transformation of transport in Central and Eastern European cities. Cities, however, have to work together with local, national and international stakeholders to cut emissions. Electric vehicles are one of the key transformations in the history of the automotive industry, but change can’t happen, however, without scalability and commercial viability, which will be vital in improving the charging infrastructure in CEE cities that this transformation is reliant on.”

2 Mobility challenges and methodology

Maciej Mazur
President at AVERE—The European Association for Electromobility and Managing Director in the PSNM

"We are excited to see the rapid development of sustainable transport solutions across Central and Eastern Europe. The region is embracing smart mobility, electric vehicles and green technologies with a level of innovation and collaboration that is truly inspiring. By bringing together governments, businesses and local communities, significant strides are being made toward reducing emissions, enhancing public transport and creating more liveable cities. However, there are still huge challenges ahead, particularly in scaling infrastructure and ensuring long-term sustainability. Nevertheless, the positive momentum in this part of the world is a key step in advancing the broader vision of a sustainable and connected Europe."

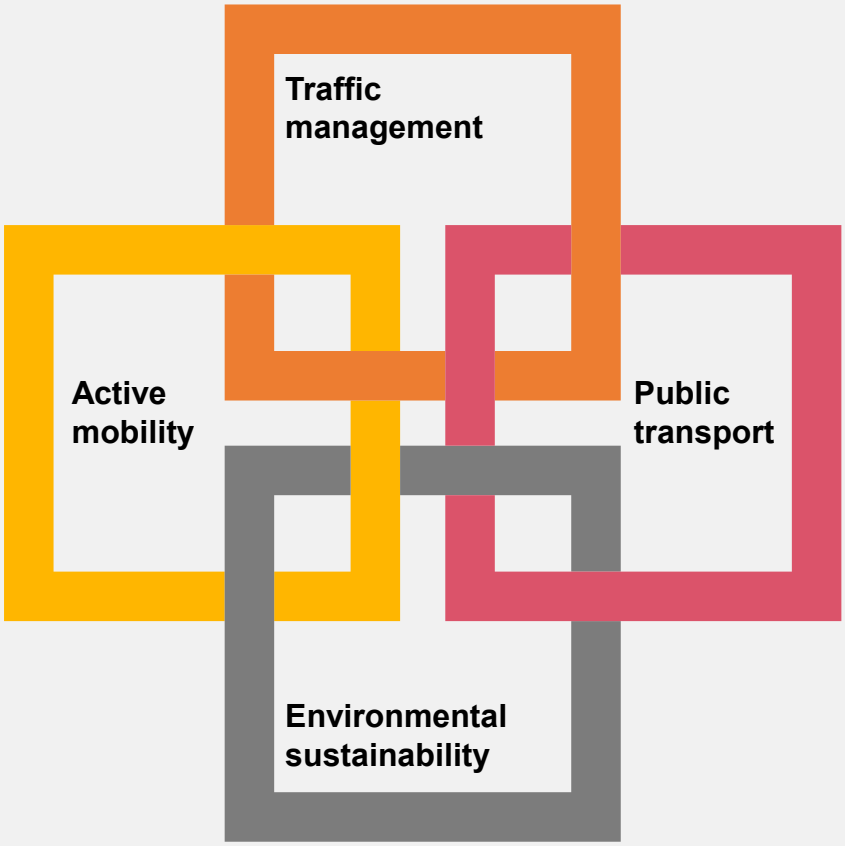
Key findings

- Data on smart mobility isn't readily available in our region—that's why this work in attempting to establish an initial baseline is so important.
- There are real challenges that we face in the region—and one that shows the urgency of finding smarter solutions is that of air quality. Only one city in the Smart City Mobility Index, Tallinn, has a level of air quality that meets the World Health Organisation's safety standards.
- The best-performing cities in terms of smart mobility are located within the EU and particularly in the western part of our region. Factors like geography and history are important in shaping a city's unique context, but policy and practice contexts also appear to be important reasons why EU countries perform better.
- The influence of over a decade of Sustainable Urban Mobility Plans (SUMPs) appears to have focused minds in CEE-EU cities in finding innovative ways to make urban mobility more efficient and sustainable.
- Also, the role of tax deductions, state aid and EU funding, as well as cross-sectoral collaboration for improving mobility outcomes, are top of the mind for local authorities and other stakeholders across the region.
- Battery Electric Vehicle (BEV) infrastructure is slowly improving, but in most cities, this is very much private sector-led. Local authorities across the region might want to consider taking a more active role in improving BEV infrastructure.
- Meeting the ambitious targets of the European Green Deal, which sets the objective of achieving a climate-neutral EU economy by 2050 and calls for a 90% reduction in greenhouse gas emissions from transport, will be very challenging for CEE-EU cities, and for CEE cities more generally. There are some shining examples of good progress—but collectively we need to pick up the pace of transformation.

Methodology and analysis

The Index is based on data collected in four broad categories: traffic management, environmental sustainability, public transport and active mobility.

Data Indicators



- Congestion levels, journey times, inefficiency index/car usage, battery-operated rates and charging infrastructure
- Cost of monthly public transport ticket, cost of a taxi journey, public transport usage and satisfaction
- Air pollution, PM2.5 and PM10 (µg/m3) and CO2 emissions due to traffic
- Segregated cycling infrastructure, share of people walking on a typical day, share of people cycling on a typical day.

There are many publicly available datasets, but it is difficult to find data that is applicable and comparable across different cities, even for cities inside the EU. Having a clearer, common benchmarking methodology for city-level datasets based on the EU's own Urban Mobility Indicators would be very helpful in comparing progress on smart mobility in different cities both in the EU and beyond.

Key themes

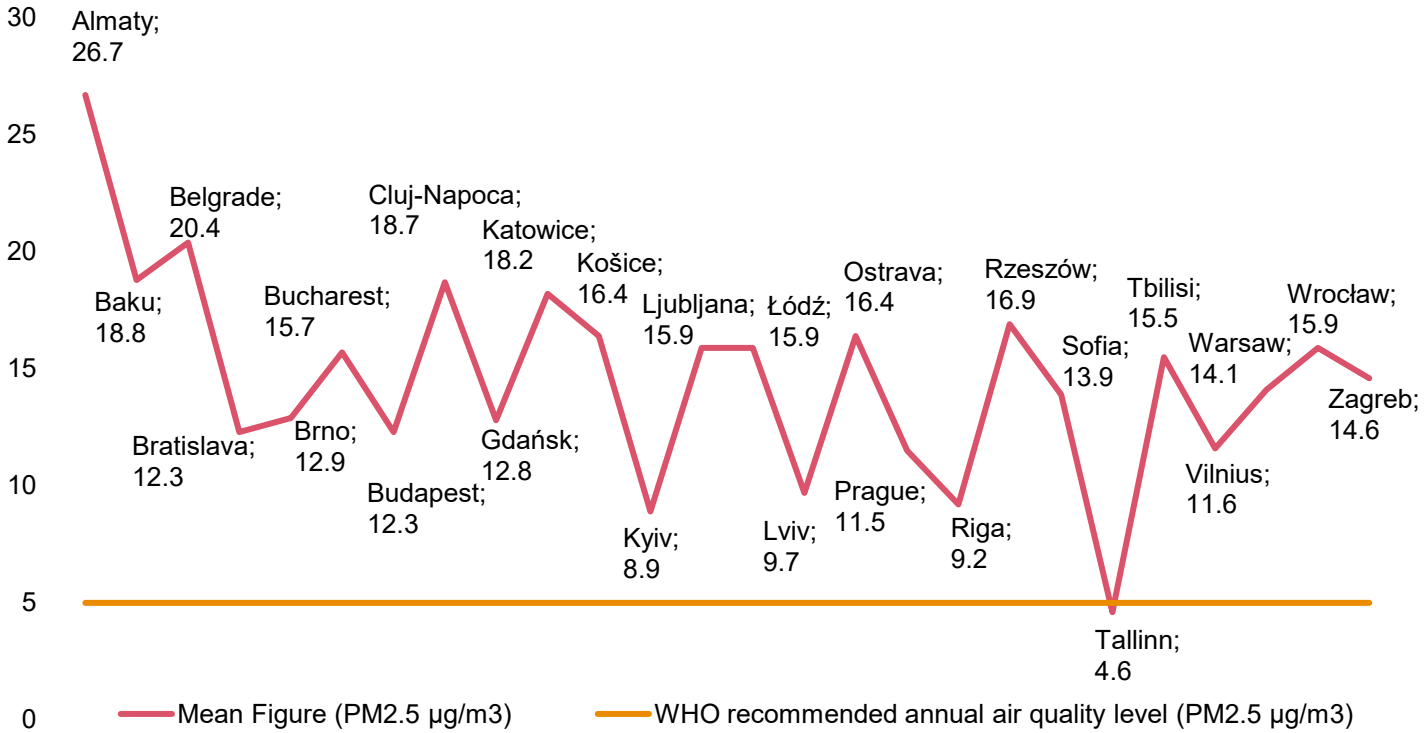
Traffic management

- Traffic congestion is a persistent issue in cities across the CEE region. Budapest, Bucharest, Kyiv, Łódź, Wrocław and Warsaw show particularly high congestion levels of over 40%, based on the average time (in percentage terms) lost to congestion compared to free flow conditions.
- Journey times in these cities also tend to be high, with the exception of Kyiv, and report average journey times of over 20 minutes for a 10km journey, which is also true for Sofia and Zagreb.
- The cities of Almaty and Baku, located in the eastern reaches of the CEE region, show high levels of traffic inefficiency through car usage and significantly higher instances of road fatalities than other CEE cities.
- The results indicate that tackling congestion is key to reducing emissions and increasing quality of life for citizens.

Environmental sustainability

- While the air pollution situation in the CEE region's major cities has generally improved year-on-year, only one of the cities analysed, Tallinn, has air pollution levels that meet World Health Organisation (WHO) guidelines.
- Despite this apparent improvement, over three-quarters of the cities in the Index have air pollution either 2-3 times or 3-5 times higher than WHO recommended levels.
- The diagram below illustrates the urgency of the challenges that CEE cities face in making the air quality safer for residents.

Air pollution levels in cities in the CEE region



Public transport

- The Czech cities of Brno, Ostrava and Prague have the lowest public transport costs in relation to monthly income.
- The Czech cities all report high daily public transport usage, with Ostrava at 69% of journeys, having the highest rate in the region, with Brno and Prague both having rates of 53% vs the regional average of 49% of journeys. This high usage can be at least partly attributed to the affordability of public transport in these cities.
- Affordability can also be partly attributed to subsidy regimes. In the case of Prague, the city covers around 85% of the operating costs through subsidies.
- Tallinn takes the subsidisation of public transport further, offering free public transport to residents since 2013.
- Tallinn, however, is not among the top Index cities for public transport usage or satisfaction, which suggests there are other factors at play in citizens' decisions to use public transport.

Active mobility

- Polish cities typically report high ratios of cycling infrastructure—with Wrocław (63.8%) and Warsaw (49.5%) having high ratios of segregated cycling infrastructure in relation to total road length, such as cycle tracks, cycle and pedestrian tracks and cycle lanes.
- Lviv is the city with the highest ratio of segregated cycling infrastructure, at 70%, which is due to the active development of cycling infrastructure with more than 100 km already built before the start of the full-scale Russian invasion in 2022.
- The CEE Smart Mobility Index cities as a whole have on average marginally higher proportions of people using cycling as a mode of transport on a typical day than EU averages.
- However, this average figure, 11.83%, is substantially lower than average cycling rates in the 'neighbouring' German cities of Berlin, Leipzig, Munich and Rostock, which have a 19.10% average. This suggests that perhaps cultural change may have to take place in CEE cities alongside infrastructural ones to get people out of cars and onto bicycles.
- Kyiv has the highest rate of people who travel on foot from origin to destination on a typical day, at 35%, closely followed by Bucharest, Budapest, Košice and Ljubljana at 29%.

3 Key themes, index analysis and case studies

Traian Urban
Director Innovation Hub East, EIT Urban Mobility

> Cities in the CEE region are making impressive progress in sustainable urban mobility, with advancements in public transport electrification and active mobility networks. The CEE Smart Cities Mobility Index report highlights significant opportunities for further innovation, particularly in expanding charging infrastructure and implementing low-emission zones. By redesigning urban areas to prioritise people, cities can improve air quality and reduce road congestion. This approach will lead to a more sustainable and liveable environment for their residents."

In preparing our Index, we have supplemented our quantitative analysis with qualitative information gathered in interviews with local authorities and other agencies across the region on smart mobility partnerships, green public transport initiatives, carsharing, walking and cycling infrastructure, electric vehicle (EV) charging infrastructure, tech and data-driven mobility solutions and smart mobility finance.

The qualitative element of the research, which consisted primarily of interviews with local authority employees, but also in some cities with elected representatives and employees of local transport companies, revealed some excellent practices and smart city thinking throughout the CEE region. These interviews also acknowledged, however, that in all cities in our Index, there remains a lot of work to be done in order to improve urban mobility and reduce car use and emissions.

Jaromír Beránek
Member of the Prague City Assembly, Chairman of the International Relations and EU Funds Committee

"Prague has one of the most efficient, reliable and affordable public transport systems in the world. Like other growing cities, however, we must explore opportunities brought by new technologies, the 'smartification' of public infrastructure and the emergence of new, innovative means of transportation. Prague is open to technological advancement in smart mobility and actively seeks new solutions through the 'Smart Prague' platform. We are eager to harness new technologies on smart and sustainable urban mobility and are happy to cooperate with tech companies and run pilot projects to prove the viability and economic benefits of new products and services. We are focusing on data collection and analytical work to support informed, evidence-based decision making. We pay particular attention to enhancing our MaaS mobile application and improving information about public transport and active mobility."

In line with the results of the data analysis shown above, qualitative analysis shows that cities tend to be further down the road on their smart city journeys which display commitment to embracing EU and other policy recommendations, facilitate and drive cross-sectoral collaboration and encourage citizen participation. In the table below, we outline five main areas where there is good practice across the region—common themes which emerge in our case studies.

Smart mobility partnerships	**Interviews revealed a keen appetite across the region for cross-sectoral collaboration to deliver better mobility outcomes for citizens.** There is a very diverse range of partnerships in existence, which is shown both in the section below and in numerous case studies.
Green public transport initiatives	**The green transformation of public transport is well underway in CEE.** In almost all cities, significant progress has been made in the electrification of public transport fleets, as well as experimentation with hydrogen buses and other innovations. There remains, however, significant challenges, not least in maintaining services while this transformation takes place.
Walking and cycling infrastructure	**Almost all cities in our Index are investing in infrastructure or at least planning to improve segregated active mobility networks.** A major focus is connectivity, involving bringing together existing cycle paths, cycle lanes and shared pedestrian and cycle spaces both with each other, but also with other modes of transport. One challenge which was a recurring theme in interviews was the difficulties involved in implementing active mobility infrastructure into historic built environments.
Battery Electric Vehicle (BEV) charging infrastructure	**There are signs of progress in developing more comprehensive charging infrastructure,** but this transformation has thus far typically been patchy and very much private sector-led. There are challenges facing cross-sectoral collaboration that will be required to deliver this change, which some cities are meeting head-on through the likes of leading electrification projects, appointing specialist staff and working with national agencies to find charging solutions.
Tech and data-driven mobility solutions	**CEE cities have numerous technological mobility solutions that have been developed and are already in use.** These fall into two connected categories. First, using technology to ease congestion and quicken traffic flow while prioritising public transport, cyclists and pedestrians. Second, they implement data-led, cloud-based intelligent mobility for long and short-term traffic management.
Smart mobility finance	**All interviewed cities reported that they have engaged to some degree with external bodies to find innovative financial instruments.** Overall, different cities reported diverse levels of experience and expertise in ways of financing smart mobility initiatives.

Smart mobility partnerships

Smart mobility partnerships, and finding cross-sectional solutions to improve citizens' lives more generally, are clearly top of mind for local authorities in the CEE region.

Cities across the region have ongoing formal and more loose partnerships with a wide range of other stakeholders including **transport operators at city, regional and national levels, academic institutions, NGOs (particularly those involved in promoting smart and active mobility), micro-mobility providers, consultants, international institutions and their counterparts in other cities internationally**—both as part of information-sharing associations and working on specific projects. These partnerships are most effective when they have defined structures, contractual arrangements, and clearly defined and measurable targets.

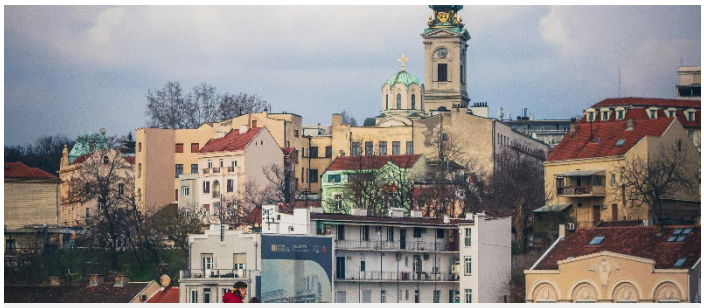
Below are some diverse examples of partnership working from throughout the region:

Almaty

City officials in Almaty are working closely with the 2018-established National Operator of BEV Charging Stations and a wide range of private sector actors to improve charging infrastructure in the city. On the action plan for the development of public transport in the Almaty region, the Akimat (state regional administration) of Almaty works closely with the Akimat of Almaty Region and Kazakhstan Temir Zholy (KTZ—the national railway company). This is aimed at eliminating bottlenecks in transport services and increasing integration, overall efficiency and attractiveness of public transport.

Baku

The Executive Power of Baku works in close cooperation with partners such as the Baku Metro company and Azerbaijani Railways (ADY) as part of the Transportation Coordination Council (TCC). The objective of this Council is to make sure transportation is facilitated and coordinated throughout the country.

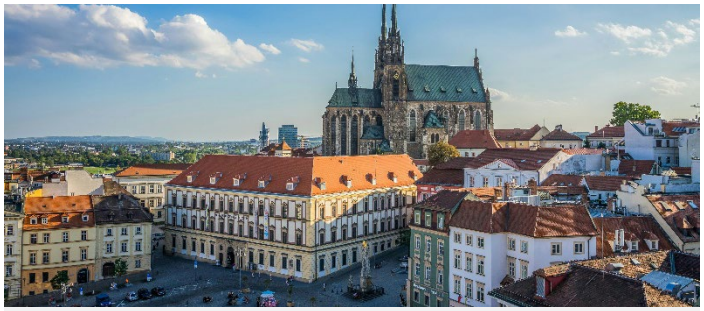


Belgrade

The City of Belgrade is working with the Western Balkans Investment Framework and a range of partners on a project to update the city's transport master plan. This includes a Strategic Environmental Assessment in conformity with EU Directives, preparation for eligible investment projects (including feasibility studies and detailed design of the eligible investment components), and targeted capacity building and implementation support for a new integrated Project Management Unit.

Bucharest

In April 2023, the City of Bucharest announced the establishment of a Mobility and Urban Management Hub. The main goal of the Hub is to create a space that encourages debate, communication and information sharing between the city's local authorities, its residents and stakeholders regarding urban mobility projects of public interest. The Hub is also intended to showcase Bucharest and all its municipalities' mobility plans and development projects, to support the digital connection and collaboration between public institutions and the city's residents.



Brno

The City of Brno develops policy and planning documents in transport and mobility with the extensive involvement of a wide range of stakeholders. Key stakeholders in urban mobility in the city are the Brno Public Transport Company; 'DPMB'—a public transport operator owned by the City of Brno; Brno Communications—a service provider in transport and mobility owned by the city; KORDIS JMK—a regional management company in the South Moravian Region co-owned by the City of Brno and the South Moravian Region; Teplárny Brno (Heating Plants Brno)—an energy supply owned by the City of Brno; and SAKO Brno—a waste management operator owned by the City.

Bratislava

The city of Bratislava maintains various partnerships, mainly with other public institutions and academia. CIVINET is a network of cities in Czechia and Slovakia for sharing knowledge and experiences in the domain of smart mobility. Cooperation between Bratislava and a number of universities is also very strong, including with the Austrian Institute of Technology (AIT) and HafenCity Universitat Hamburg (HCU) as well as local institutions. As mentioned in a case study, many partnerships are driven by the Metropolitan Institute of Bratislava (MIB), whose focus is on urban planning and design.

Budapest

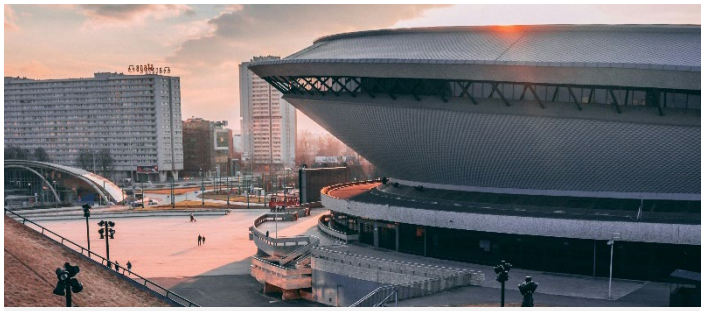
Budapest's transport company, BKK, has participated in 28 EU-funded direct mobility-related RDI projects, receiving more than €3 million in funding. These projects have covered a wide range of topics, including shared mobility, flexible mobility, emission reduction, reallocation of public space and mobility as a service.

Cluj-Napoca

Cluj-Napoca has a very strong academic heritage, and its universities are hugely important to the city. Many formal and informal partnerships exist between the city and academic institutions on mobility and the city can be described as a living lab for experiments, testing and innovation. Cluj-Napoca is also active in EU smart mobility networks. The city was awarded EU Mission—Climate Neutral & Smart Cities status and works with EU partners and other cities to improve the municipality's access to European, national and regional funding, as well as private investment.

Gdańsk

Gdańsk collaborates with several key partners to enhance its smart mobility initiatives. The city is an active member of EIT Urban Mobility and partners with local entities like Gdańsk University of Technology and various international organisations to implement and promote sustainable transport solutions. These collaborations are crucial for integrating advanced technologies and practices into the city's transport systems.



Katowice

Katowice's smart city strategy focuses on the integration of various urban systems to create a cohesive and efficient city. Central to this strategy is the deployment of Intelligent Transportation Systems (ITS) and the establishment of robust infrastructure for electric vehicles and green transport. The city emphasises public consultation and stakeholder engagement to ensure that urban development aligns with the needs and preferences of its residents. By focusing on multi-modal transport and expanding bicycle infrastructure, Katowice aims to promote sustainable mobility and reduce reliance on private cars.

Košice

The City of Košice works in partnership with other public sector and non-profit organisations and, to a lesser extent, the private sector in urban mobility planning. One recent example, highlighted in a case study, is the city's involvement in EIT Urban Mobility's 'RAPTOR' programme to engage start-ups in bringing innovative solutions to mobility challenges.

Kyiv

The City of Kyiv worked in partnership with VISA and Mastercard at the outset of planning and implementing its electronic public transport ticketing system. Other private sector operators, including from the banking sector, were engaged in completing and refining the project.

Ljubljana

The City of Ljubljana works with a range of partners and citizens. One example of this was the redevelopment of Slovenska Cesta, one of the city's main streets. What was once a busy traffic-heavy street has become a shared space after a seven-year-long participatory process that involved experts, stakeholders, interest groups, residents, visitors and the general public. The result is a quality public space that is friendlier to people, especially those with disabilities, pedestrians, cyclists and public transport users.

Łódź

As can be seen in a case study that follows, Łódź is working with a number of partners to deliver the Central Railway Line. The cross-city line is a significant infrastructure project that includes the construction of tunnels connecting major railway stations in the city. This project aims to improve connectivity and reduce travel times. The construction involves a 4 km high-speed rail tunnel, which is expected to facilitate seamless travel across the city and beyond.

Lviv

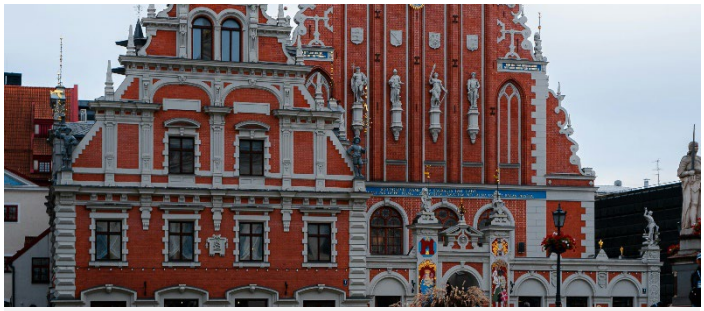
The City of Lviv engaged with international expertise and funding when preparing the city's Sustainable Development Plan. Ultimately, the plan was developed and approved with funding from the German and Swiss governments.

Ostrava

The Ostrava Municipal Office is involved in smart mobility partnerships in bikesharing, carsharing and several energy efficiency projects in transport and mobility. There is a collaborative project with Ostrava University called the 'Walkability Project'. This project involves more than 20 monitoring stations installed to collect relevant walking data, with the goal being the preparation of a Walkability Concept for Ostrava.

Prague

Prague City Hall is the lead partner in the Smart Prague partnership – which brings together specialists from the private, public and academic sectors to participate in selected projects. One of Smart Prague's strategic plans is 'Mobility of the Future,' which features a number of projects including charging infrastructure development, an intermodal route planner, multi-channel public transport check-in and intelligent traffic analysis.



Riga

Riga City Council and its structural entities are engaged in various partnering projects – with local and foreign authorities and agencies, transport companies, automotive and tech businesses, academic institutions and more. One such project is 'Green Dash,' which aims to take a practical approach to last-mile deliveries by testing, improving and demonstrating the benefits of EV cargo scooter deliveries.

Rzeszów

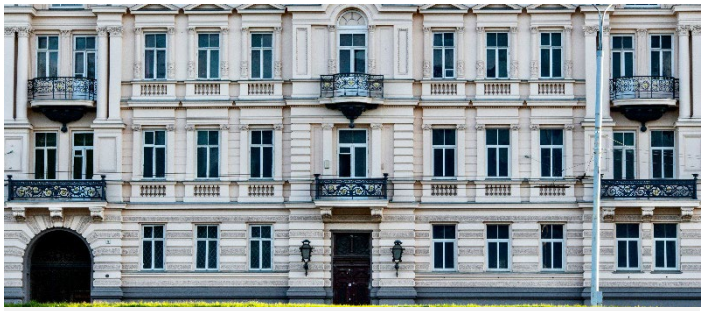
Rzeszów has established strong collaborations with various private and public entities to enhance its urban mobility initiatives. The city partners with local businesses, universities and international organisations to implement smart mobility solutions. Key partnerships include collaborations with technology providers for the development of intelligent transport systems (ITS) and local institutions like the University of Rzeszów, which contribute to research and development in urban mobility.

Sofia

The Sofia Municipality is participating in several smart mobility partnerships. One is a project on European data spaces and Sofia is one of nine participating cities. This project focuses on in-city and intercity data sharing on mobility topics. The goal is to ensure more efficient journey travel planning via the interconnection of public transport, private BEVs, scooters and bikes. Local project partners include Sofia University, the GATE institute, the Centre for Urban Mobility, the Sofia Subway Authority and Bulgarian National Railways. Local carsharing and bikesharing companies also provide data.

Tallinn

Tallinn City Hall actively collaborates with Tallinn Technical University—TalTech. As explained in a case study which follows, the city has also set up the ‘Test in Tallinn’ programme for different start-ups and businesses to get connected to the right contacts in the city. Also, there is also a collaboration with micro-mobility providers, for example Tuul and Bolt. Tallinn is also active in the EIT Urban Mobility Community.



Vilnius

Vilnius City Municipality is involved in several key partnerships, such as working with Lithuanian Railways to integrate railway services into the city’s mobility strategy. The goal is to offer door-to-door services, integrate ticketing systems and to adjust timetables to ensure that railways do not compete with buses.

Warsaw

Warsaw collaborates extensively with various stakeholders to enhance its urban mobility. The city partners with local governments, private companies and international organisations to develop integrated mobility solutions. Notable partnerships include collaborations with tech companies for the development of intelligent transport systems (ITS) and with European entities for funding and expertise. These partnerships aim to improve transport efficiency, reduce emissions and provide seamless mobility options for residents and visitors.

Wrocław

Wrocław has established significant smart mobility partnerships, notably with Nokia, to drive its smart city initiatives. The collaboration involves using Nokia's 'City as a Platform' approach, which integrates digital services across various sectors, including healthcare, transport and education. This partnership aims to enhance the quality of life for residents by implementing IoT-based solutions for remote monitoring and improving the city's transport ecosystem.

Zagreb

The City of Zagreb is involved in various partnerships with the aim of developing smart mobility. The city cooperates with Ericsson on the project to develop a system for monitoring and analysing traffic data in real time. Additionally, Zagreb is actively collaborating with Croatian Railways to facilitate travel and improve connectivity with surrounding cities and municipalities. The city cooperates with foreign partners on infrastructure for active mobility and is currently in the phase of consulting foreign partners and specialists/consultants regarding public city bicycle projects—Vienna (Austria) and SUMP (Slovenia).

City	Case studies
Košice	The RAPTOR programme
Rzeszów	Collaborating with business to build a smart city
Sofia	deployEMDS – European Mobility Data Spaces
Warsaw	The Green and Safe Warsaw Initiative

Green public transport initiatives

Oto Nováček
Architect and Urbanist, the Metropolitan Institute of Bratislava

"The Metropolitan Institute of Bratislava (MIB) is transforming the city's public spaces with a strong focus on accessibility, safety and community engagement. Through design guides and standardised urban design principles, MIB is scaling up improvements to walking and cycling infrastructure across the city, making public spaces more welcoming and climate resilient. Besides repaving and planting, we utilise tactical urbanism and temporary interventions to expand pedestrian areas and calm traffic. Our programme City for Kids (Mesto pre deti) is engaging the youngest residents into rethinking areas around schools to prioritise children's safety and pedestrian comfort. These transformations of streetscape around schools which once posed traffic hazards now offer more greenery, places to sit or play, cycle stands and safe raised pedestrian crossings. The programme exemplifies how Bratislava's smart mobility efforts are not only reshaping the physical infrastructure but also changing mobility patterns through participation, play streets, education and action with and for the community on the ground."

All cities in the CEE Index are engaged in activities aimed at making public transport a more sustainable and attractive travel option. Almost every Index city has developed or is in the process of developing digital apps that make using public transport more convenient. These apps typically offer contactless ticketing and live timetable and other information. Other ongoing activities concern the development or improvement of public transport-only traffic lanes, urban planning that aims to prioritise public transport and barrier-free routes for people who need support to access the public transport networks.

All cities have either implemented, run pilot programmes or are planning the transformation of their public transport fleets to lower emission power trains. Several cities are looking at hydrogen buses, battery-powered buses and trolleybuses and bio-gas-powered buses. Several cities have major projects either completed, underway or planned to significantly upgrade public transport. These include several new tram and trolleybus lines and in one case, in Prague, a new metro line.

One key challenge in this transformation is maintaining a service while planning and executing the transformation to electric or other low-emission fuel sources. There has been some initial experimentation with Artificial Intelligence (AI), such as using driverless vehicles and AI for smart traffic management, but these are largely at the planning or exploratory stages.

City	Case studies
Baku	Baku electric buses upgrade—production and maintenance
Belgrade	The electrification of Belgrade's public bus fleet
Bratislava	Improving the transport system while greening the fleet
Budapest	Extension of the Budapest trolleybus network
Košice	Transformation of Košice's public transport fleet
Lviv	Accessibility in public transportation
Lviv	Reconstruction of Shevchenka Street
Prague	Metro Line D1 Phase I
Riga	The emission-free transport line and the electrification of the bus fleet
Tallinn	Public transport transformation in Tallinn

Carsharing

Carsharing is not keenly prioritised in the vast majority of cities, certainly not in terms of local authorities running carsharing initiatives themselves, with only a handful of very localised publicly-run schemes. Carsharing schemes are typically led by the private sector in the CEE Index cities, with local authorities having a limited role.

Some cities, however, encourage and incentivise carsharing through providing free or discounted parking for carsharing services. On the whole, however, cities are much more focused on promoting active mobility and public transport usage than on carsharing.

Walking and cycling infrastructure

There is significant and growing cycling infrastructure across the region, with over 4,000 km of cycle tracks alone in the 25 cities in the CEE Smart Cities Mobility Index. Most cities are investing in infrastructure or at least planning to increase the distance of their segregated active mobility networks.

A major focus of the Sustainable Urban Mobility Plans of the majority of cities—which generally have an active mobility strategy as a key component—is connectivity. This connectivity involves bringing together existing cycle paths, cycle lanes and shared pedestrian and cycle spaces both with each other, but also with other modes of transport. Some local authorities cited the importance of last-mile mobility (transportation from public or private transit to the destination) as a key element of their thinking on connecting journeys.

There are a number of challenges—many of which are related to urban planning. These include: how to deal with an overabundance of cars, unplanned and illegal parking interfering with pavements and cycling lanes, and gathering data to properly understand how people travel in and around cities. Also, there are challenges related to historic city centres. Specifically, these concern the difficulties of implementing changes in the streetscape while preserving historic built environments—and procuring the skills and experience to carry out this specialist work.

Several cities have looked to take on these challenges by working, for example, to increase pedestrian zones and restrict cars entering city centres. Cities also looked to engage and enter into partnerships with non-profit cycling and citizen organisations to encourage more people-centred urban planning.

Piotr Borawski
Deputy Mayor of the City of Gdańsk

"The Mevo Metropolitan Bike Sharing System is not just a means of transportation, but an important element of modern and intelligent mobility. Thanks to modern technologies and solutions, we combine ecology with innovation. In the context of smart cities, this is becoming a symbol of sustainable development and effective management of urban space. Thanks to the use of digital technologies, we can offer the residents of Gdańsk solutions that are convenient, ecological and future-proof. Smart mobility is the future, and the metropolitan bicycle is one of its foundations."

City	Case studies
Belgrade	Micro-mobility in Belgrade
Budapest	The MOL Bubi bike-sharing system
Bratislava	Integrating active mobility into urban planning and design: The Metropolitan Institute of Bratislava (MIB) and the City for Children
Gdańsk	Introduction of the MEVO bike-sharing system
Katowice	MetroRower metropolitan bicycle system
Łódź	A pedestrian-friendly city
Ostrava	Creating a walkability methodology as a tool to support sustainable mobility
Wrocław	Bicycle data in Wrocław—collecting real-time cycling information
Zagreb	Construction of the Zagreb-East bicycle highway
Zagreb	State bicycle route No.2 Greenway

Battery Electric Vehicle (BEV) charging infrastructure

To date, the installation of BEV charging infrastructure in the CEE cities covered by our Smart Cities Mobility Index has been somewhat patchy and very much private sector-led. There is, however, growing evidence of local authorities working in partnership with energy providers and other stakeholders as they take on a much more active role in BEV infrastructure planning and activation in their cities.

While these activities are typically at an early stage, BEV activities and projects include:

- Several local authorities are either actively engaging in or planning to engage energy providers and other stakeholders (such as supermarkets and malls, car park companies and apartment building owners and managers) in public-private partnerships to extend BEV charging coverage.
- Some cities have been working with local energy companies to install charging infrastructure, with at least one local authority engaged in a pilot project that looks to provide free-of-charge electricity. Another project uses adapted, modernised street lighting poles as charging stations.
- There are some projects that look to improve information about BEV charging infrastructure in their cities—including apps that help BEV vehicle drivers locate where they can charge.
- One local authority, in the city of Tallinn, has created a role which has the sole focus of improving partnerships and BEV infrastructure in the city.

City	Case studies
Baku	Government-led expansion of electric vehicles in Baku
Prague	Systemic Electric Vehicle (EV) charging infrastructure development financed with EU funding

Tech and data-driven mobility solutions

Marcin Krupa
Mayor of the City of Katowice

> The primary goal of implementing the Intelligent Transportation System (ITS) in Katowice was to make public transport more attractive and improve traffic flow within the city. The system provides drivers with real-time information about alternative routes—for example, in case of a tunnel closure, via variable message boards. It also prioritises buses and trams to streamline their movement. Additionally, digital boards inform citizens about the availability of parking spaces in the downtown area. Overall, these measures aim to ease congestion on the city's main roads, reducing both exhaust emissions and noise pollution. The ITS also includes a trip planning platform where residents can access information on traffic conditions, roadworks and parking availability.

Numerous technological mobility solutions have been developed and are already in use in CEE cities. These fall into two connected categories. First, using technology to ease congestion and quicken traffic flow, prioritise public transport, cyclists and pedestrians. Second, implementing cloud-based intelligent mobility—both to improve the immediate mobility experience of citizens in real-time, and to provide data and information to improve mobility planning in the longer term.

Some examples of tech-based solutions currently employed or in development in CEE cities are:

- Autonomous traffic management systems such as red and green light cameras, which adapt to increase traffic flow at peak hours.
- Traffic cameras and drones collate data, which is then analysed, increasingly with the use of AI to inform mobility strategy and urban planning. Also, onboard cameras in public transport are being used to track the number of passengers, as well as cameras tracking footfall on pedestrian crossings.
- Tracking public transport vehicles via Global Positioning System (GPS) data and informing travellers on journey information in real-time through apps, which also enable contactless payment of fares.
- The implementation of road sensors which can then relay information via large digital screens with information such as on icy conditions, accidents or other traffic information.
- Sensors are also being used to weigh vehicles, specifically to ensure freight trucks are not breaking rules by entering areas where they are not permitted. Working with micro-mobility operators to provide live information on the location of e-bikes, e-scooters, e-mopeds (and in one case even kayaks!), and on charging infrastructure for micro-mobility.
- Clearly, local authorities and other stakeholders in the CEE region are actively seeking ways to improve urban mobility through harnessing data. Resources, capacity and skills were, however, consistently cited as challenges to leveraging tech and data-driven solutions. As one local authority official put it: “We have more data than resources to process it.”

City	Case studies
Brno	C-Roads Project for Intelligent Transport Systems (C-ITS)
Katowice	Intelligent Transport System
Kyiv	Barrier-free transport map
Kyiv	The "Kyiv digital" app
Łódź	Tunnel construction under the historic centre of Łódź
Ostrava	ČistáOVA mobile/web app for reporting issues in the urban environment
Sofia	Installation of cameras on buses and garbage trucks for traffic management
Tallinn	Test in Tallinn
Wrocław	Mikrohub Wrocław and last-mile cargobikes

Dionizy Smoleń
Partner and Public Sector Leader, PwC Poland

> It is hugely encouraging to see that cities across the CEE region are making significant progress in making mobility smarter. In the many excellent case studies in this report, I believe one of the keys to success in urban transformation is having a keen citizen-centric focus. Improving the quality of life for people living in cities should be the focal point of urban mobility ecosystem growth. It is our shared fundamental responsibility to place citizens' needs at the heart of urban development."

Smart mobility finance

In speaking with local city authorities in preparing our Index, we learned that there are a variety of ways in which they have sought to finance smart mobility initiatives.

- The most commonly cited institutions and mechanisms reported by cities are funding from national governments, the European Bank for Reconstruction and Development (EBRD), the European Union—specifically the European Investment Bank (EIB)—in particular Framework loans for the public sector and green loans, European Regional Development Fund (ERDF) and the Cohesion Fund (CF).
- Some local authorities also reported working with EU-funded organisations such as EIT Urban Mobility and EIT Climate-KIC and being part of the EU Missions Cities project to help them better understand the funding options for smart mobility projects.
- Some cities have successfully established or are looking into the creation of specific innovation funds to source and manage the funding of smart mobility projects.
- The Ukrainian cities are, of course, in a different situation due to war being waged on their country. In general, they have had to reinvest money earmarked for smart mobility into safety, typically alarm notifications, radiation index, air quality index and social services.
- A challenge that local authorities face is the capacity to carry out all the projects. Even in cases when project managers are hired from external organisations, they still utilise the time of the local authority employees.

City	Case studies
Brno	The Brno Mobility Fund for financing sustainable mobility
Riga	The Riga Municipality Innovation Fund

4 CEE Smart mobility progress analysis

Piotr Michalczyk
PwC Partner, CEE Entrepreneurial and Private Business Leader and Automotive Leader in Poland

Urban mobility is undergoing a significant transformation, as highlighted by the findings of the CEE Smart Cities Mobility Index. Progress is evident in the development of mobility ecosystems that are less polluting and more efficient in moving people around our region's cities. Despite these advancements, it is clear that stakeholders still have a long journey ahead to achieve a sustainable future. As this transition accelerates, it's crucial to remember that overcoming mobility challenges requires collaboration among citizens, local and national government representatives, business leaders in the automotive and energy sectors and the broader private sector."

What is clear from data analysis, qualitative interviews with local authorities and the numerous case studies in this report, is that progress is being made in cities across Central and Eastern Europe in making mobility smarter, more efficient and greener. It is also apparent that while transformations are well underway, all cities face challenges in quickly upgrading their mobility ecosystems to have a real impact on reducing air pollution and quality of life for citizens.

Importantly, the below categorisation of cities we offer in our CEE Smart Cities Mobility Index is not a league table or way to grade cities from 1 to 25. Rather, it is intended to provide a snapshot of the degree to which various aspects of smart city thinking and practice are realised in the region—an honest assessment of progress made to date, to provide a baseline for further discussion and action.

Smart Mobility progress

At an early stage	Some progress made	Notable progress made	Extensive progress made	Excellent practice

City	City size	1. Traffic management	2. Environmental sustainability	3. Public transport	4. Active mobility	5. Smart mobility initiatives
Category 1 cities: CEE leaders in smart mobility						
Bratislava	Medium					
Brno	Small					
Gdańsk	Medium					
Košice	Small					
Ostrava	Small					
Prague	Large					
Tallinn	Medium					
Warsaw	Large					
Category 2 cities: CEE cities making positive progress in their smart mobility journey						
Budapest	Large					
Katowice	Small					
Ljubljana	Small					
Łódź	Medium					
Lviv	Medium					
Riga	Medium					
Rzeszów	Small					
Vilnius	Medium					
Wrocław	Medium					
Zagreb	Medium					
Category 3 cities: CEE cities at an early stage in their smart mobility journey						
Almaty	Large					
Baku	Large					
Belgrade	Large					
Bucharest	Large					
Cluj-Napoca	Medium					
Kyiv	Large					
Sofia	Large					

Taking action:

5 Key considerations for CEE mobility ecosystem stakeholders

Harald Wimmer
PwC Partner and Global Automotive Leader

> Mobility is a basic need—but contributes to almost a quarter of global CO2 emissions. We are committed to helping society shape clear visions for a more sustainable and seamless future of mobility. The insights in the CEE Smart Cities Mobility Index should motivate and enable all actors in smart mobility to further drive innovation in the region and beyond—to make a lasting impact. My key takeaway is that there are lots of challenges but even more opportunities ahead. My experience tells me that we will ultimately be much better off when strong players work together. This report is an important step in this direction for the CEE region."

Every city exists in its own unique geographical, social, historical and economic context. What is common in making cities smarter and in delivering connected, efficient and sustainable mobility ecosystems is cross-sectoral collaboration.

This CEE Smart Cities Mobility Index shows that local government and other mobility stakeholders are already engaged in partnerships to harness a digitally-enabled ecosystem for smarter mobility outcomes in cities across the region. The key question is: How can the various sets of key stakeholders work together more effectively?

City mayors, policymakers and transport authorities

- To meet ambitious climate targets, local governments in the first instance must consider their role in mobility transformation. The Danish capital of Copenhagen, for instance, is consistently rated as one of the world's most liveable cities, with an international reputation for efficient public transport and cycle-friendliness. The local authority explicitly states that it is a transformation "facilitator" as well as an agency of delivery.
- Local government leaders in CEE cities might take inspiration from leading cities like Copenhagen in considering their role in how each city can better harness the power of their mobility ecosystem. While there is clear evidence of innovative practice in harnessing partnerships in the CEE region to deliver for citizens, this is in several cases not strategic.
- Local authorities also must be aware that market forces alone are unlikely to facilitate mass adoption of more sustainable and user-friendly mobility. For instance, there has been gradual but inconsistent improvement in the electric vehicle (EV) charging infrastructure in the CEE region. The CEE Smart Cities Mobility Index shows the development of charging infrastructure in CEE cities has been typically private sector-led and is not sufficient to meet growing demand.
- With EU electric vehicle sales having grown three times faster than charging point installation between 2017 and 2023, there is an opportunity for local governments to play a much more active role in improving charging infrastructure.
- Local governments might actively engage with tech and energy companies to help encourage increased adoption of EVs and hybrids and lower emissions. Other CEE cities might look to the example of Prague, which has developed a master plan for charging infrastructure development, aiming to establish 4,500 public charging stations catering for 200,000 electric cars by 2030.
- There are a variety of sources of financing available to local authorities, but varying levels of consistency in how well local authorities are taking advantage of the opportunities for funding. Local authorities should, therefore, consider how they can gain the knowledge and skills that allow them to leverage the full potential of sources of funding available to them.
- City planners can also look beyond traditional street designs to develop more liveable, walkable and cyclable areas. Often, this requires factoring in the externalised costs of privately owned vehicles in cities—such as time spent sitting in traffic, CO_2 emissions and parking. The City of Bratislava has been very proactive in this regard, working with the Metropolitan Institute of Bratislava to come up with standardised urban design principles and standards for both cycling and walking infrastructure.

Transit operators and infrastructure providers

- Interviews with representatives of local governments and other local organisations revealed that mobility companies, explicitly Bolt and Uber, are viewed as an established and integral part of transportation ecosystems in CEE cities.
- In several CEE cities, there are private and public companies very active in delivering and managing infrastructure.
- The key question for transit operators and infrastructure providers in the mobility sphere is: Could our organisation communicate and collaborate more effectively with local authorities and other stakeholders?
- Private sector operators have a key role to play in improving urban mobility, but are they doing all they can to ensure that they are an effective part of ecosystems to solve urban mobility and wider societal problems?
  Can the environmental, social and governance (ESG) approach of these companies be adapted to make a positive difference to citizens in the cities where their businesses are active?
- Some CEE cities, such as Tallinn through their 'Test in Tallinn' programme, actively engage international green technology providers and start-ups to provide an environment to test their solutions—but can private sector operators do more to engage with local authorities and other stakeholders in a collaborative spirit?

Organisations whose direct operations are mobility-reliant

- Organisations such as schools and other educational institutions, employers, logistics companies and the emergency services are heavily reliant on mobility infrastructure.
- Interviews with local authorities showed numerous examples of local authorities working with these types of organisations who have direct daily operations intertwined with the mobility network. They have expertise and in some cases data that can be potentially tapped into to make mobility smarter.
- In Bratislava, for instance, the 'Mesto pre deti' ('City for children') project engaged schools to inform the physical transformation of public spaces around the schools and improve the safety and comfort of pedestrians.
- Similarly, Bucharest, Lviv and Sofia, among other CEE cities, worked with emergency services to ensure that traffic management system improvements prioritise emergency service vehicles.
- Key questions are: Does urban planning sufficiently engage with mobility-reliant organisations and bring their experience and expertise to the table? Could studies and analysis involve these players—and potentially partner to drive innovation?

Financial organisations and investors

- Riga and Brno have been proactive in setting up city-specific funds that are dedicated to finding innovative solutions to urban issues and that can finance smart mobility initiatives.
- Several CEE cities, however, reported that while they have awareness and experience in financing smart mobility projects, they lack the resources and, in some cases, the expertise to explore and deploy funding mechanisms to their full potential.
- Is there a space, therefore, where investors can engage early with players in the city's ecosystem and entities? All cities in the CEE Smart Cities Mobility Index are in the process of the transformation of their fleets, for instance, but could financial institutions and investors who have a stake in improving mobility in CEE cities expedite this transformation?
- Financial institutions and investors might ask themselves: In which ways can financing smart mobility projects contribute to their own ESG commitments and goals?

Research and academic institutions

- Several interviews with cities directly cited partnerships with local and international universities. Cluj-Napoca, Łódź, Rzeszów and Wrocław, in particular, highlighted the importance of their local universities as both partners in urban ecosystem improvements and for their wider city economies.
- Also, an interesting case study in Zagreb shows a major cycling infrastructure project was born out of the ideas of local architecture students.
- Other interviews reveal, however, that partnerships and collaboration between local authorities and universities and other academic and research institutions aren't always strategic, and often are managed on a case-by-case basis.
- This leaves some questions for academia: Can CEE educational institutions engage more with stakeholders in their cities to help provide the basis for experimentation and to deliver practical urban mobility solutions? Are they ensuring their programmes are equipping students with the skills and knowledge needed to find innovative smart solutions to urban mobility challenges?

6 Looking to the future of mobility in CEE cities

Albena Markova
PwC Partner and CEE Sustainability Leader

> Developing and accelerating the growth of zero-emission transport networks is one of the most critical issues that we face. I believe this joint research project can make a contribution to promoting multidisciplinary work that can make a cleaner future possible. I look forward to working closely with a range of city stakeholders to see how we can build upon the excellent practice in urban mobility innovation that this report showcases."

There is overwhelming evidence that urban-dwellers globally are increasingly eager to see transformation in their cities' transportation systems. PwC's 2024 Voice of the Consumer Survey shows that people who live in cities are keen to see innovative changes in mobility. Nearly three-quarters of consumers indicate willingness to use an improved public transport network—and six out of ten support car-free city centres.

Cities across the world must take heed of these changing expectations, and CEE cities are no exception. In essence, in making cities smarter we should never lose sight of improving citizens' quality of life. Improving urban mobility delivers obvious benefits such as joining up journeys and easing congestion—but perhaps importantly, it makes cities more sustainable and healthier for their residents by improving air quality across the region.

The main message from the CEE Smart Cities Mobility Index, however, is one of positivity. In particular, the case studies in this report are testament to the work of local authorities and other stakeholders in improving urban mobility across the region. The challenge for cities is to build upon their progress and achieve the momentum required to transform mobility more completely.

Jason Wardell
PwC Partner and CEE Energy, Utility and Resources Leader

"As population centres, cities are crucially important to the green energy transition. As major consumers of energy and producers of emissions, all stakeholders in urban planning have huge roles to play in tackling climate change and reducing reliance on fossil fuels. While it is heartening to see the progress in the CEE Smart Cities Mobility Index, it also illustrates sharp issues with emissions and air quality in our region that we must tackle collectively and collaboratively."

7 About the Index

The CEE Smart Cities Mobility Index recognises the critical importance of cities and smart mobility in delivering green policies essential for a sustainable future. The Index intends to provide a comprehensive view of the current state of urban ecosystems in the CEE region. The research also focuses on identifying best practices in data and tech-driven mobility in major Central and Eastern European cities.

As well as being data driven, the process of compiling the Index sought to gain expert input from stakeholders in urban mobility. Over 20 interviews took place involving senior officials in local authorities, government ministries and transport companies. These interviews took place between November 2023 and August 2024.

Editors & Acknowledgements

Editorial contribution to the CEE Smart Cities Mobility Index was led by: Jens Hörning, PwC Partner, CEE Industrial Manufacturing and Automotive Industry Leader; Piotr Michalczyk, PwC Partner, CEE Entrepreneurial and Private Business Leader and Automotive Leader in Poland; Albena Markova, PwC Partner and CEE Sustainability Leader; Maciej Mazur, President at AVERE - The European Association for Electromobility and Managing Director at PSNM; and Traian Urban, Director Innovation Hub East at EIT Urban Mobility.

Tony McLaughlin, Senior Content Consultant at PwC CEE is the chief author of the report and Jeffery McMillan, PwC CEE Director of Brand, Marketing & Communications is the chief editor.

We would like to acknowledge the contributions of all who helped compile this report. Thanks to Aleksander Rajch at PSNM and Marian Nic at EIT Urban Mobility, Professor Miroslav Svítek at the Faculty of Transportation Sciences of the Czech Technical University in Prague and Holger Haubold and Goran Lepen from the European Cycling Federation for their insights and assistance.

We also thank the representatives of local authorities, government ministries and transport organisations for their willingness to share their insights and experiences in interviews and in subsequently sharing information:

Ms. Nargiz Gulmaliyeva from the Ministry of Digital Development and Transport of the Republic of Azerbaijan, Mr. Ivan Goychev, Deputy Mayor in charge of Digitalisation, Innovations and Economic Development at Sofia City Council, Mr. Hrvoje Kalčiček, Assistant Head for the EU Digitalisation Projects and Process Development and Improvement, Zagreb City Council, Ms. Iva Rorečková, Head of Transport Development and Strategy Office, Brno City Council, Mr. Jaromir Beránek, Member of the Prague City Assembly, Chairman of the Committee for Foreign Relations and EU Funds, Prague City Council, Mr. Ondřej Dostál, Head of Strategic Planning Unit, Ostrava City Council, Mr. Liivar Luts, Chief Specialist of Development Projects and Mr. Indrek Gailan, Head of Department at Tallinn Transport Department and Mr. Raido Roop, City Strategy Director at Tallinn Strategic Management Office, Mr. Péter Bársony, Director of Strategic Data Management and Knowledge Centre, Budapest Transport Company (BKK), Ms. Diāna Korbe, Head of Board of Geomatics at Riga City Development Department and Mr. Jānis Prūsis, Head of Administration, Investment and Tourism agency of Riga, Mr. Anton Nikitin, Chief Sustainability Officer at Vilnius City Council, Mr. Łukasz Kłos, Director of the Municipal Transport Authority in Gdańsk, Mr. Tomasz Bużałek at Łódź City Council, Mr. Paweł Sucheta, Director at Katowice City Council, Mr. Paweł Potyrański, Deputy Director at Rzeszów City Council, Mr. Krzysztof Gubińskim, Manager, Warsaw City Council, Mr. Robert Bednarski, SmartCity Director at Wrocław City Council, Ms. Diana Mardarovici, Bucharest City Councillor, Ms. Oana Buzutu, Innovation Strategy Officer, Cluj-Napoca City Council, Mr. Michal Dekánek, Director of the Public Transport Section, Mr. Oto Nováček, Metropolitan Institute of Bratislava Mr. Martin Mudrák, Plenipotentiary of the City of Košice for Innovation & Economic Development, Mr. Roman Derkach, Deputy Head of the Department of Project Management and Head of the Innovative Services Division, Kyiv City State Administration, Mr. Pavlo Syrvatka, Deputy Head of the Safety and Street Infrastructure Office, Lviv City Council

Finally, we would like to acknowledge the contributions of the following PwC colleagues for their contributions to this report: Mikhail Chubarov (PwC Azerbaijan), Nikolay Mihaylov (PwC Bulgaria), Borna Culjak and Isabela Miskulin (PwC Croatia), Petr Dovolil (PwC Czechia) Raiko Puustusmaa (PwC Estonia), Borbála Palotai (PwC Hungary) Silga Gintere and Sindija Kirsteine (PwC Latvia), Greta Grigaleviciute (PwC Lithuania), Aleksandra Furmanek-Gaska, Marta Gocłowska and Zuzanna Bartczak (PwC Poland), Radu Andrei (PwC Romania), Adam Knaze and Ivan Hlavenka (PwC Slovakia) and Kostiantyn Sinelnychenko (PwC Ukraine), Iveta Maliskova and Maciej Szczepanski of the CEE MCBD Team, Ivo Cupak, Industrial Manufacturing and Automotive Director at PwC CEE, Faisal Khan, Manager with PwC India on the Automotive Team, and Anouk Henkelmann, Business Development Manager, Global Automotive and Smart Mobility.

Data used to examine the state of smart city thinking and activities in major cities across the region were drawn from:

Traffic management

- **Tom Tom traffic index:** https://www.tomtom.com/traffic-index/ranking
- **Numbeo Europe:** Traffic Index: https://www.numbeo.com/traffic/region_rankings
- **Road Fatalities:** EU ACEA statistics: https://www.acea.auto/figure/road-fatality-statistics-european-union/
- **Additional Data:** Baku: https://www.dyp.gov.az/index.php?/en/news/view/840/#:~:text=As%20a%20result%20of%201587,460%20traffic%20accidents%20in%20Baku
- Zagreb: https://autonet.bug.hr/promet/u-hrvatskoj-i-eu-usporen-pad-broja-smrtnih-slucajeva-u-prometu-39363
- Tallinn: https://statistika.tallinn.ee/
- Almaty: https://www.csdd.lv/celu-satiksmes-negadijumi/celu-satiksmes-negadijumu-sadalijums-pa-pagastiem
- Belgrade: https://cejgsd.org/CEJGSD_2022-04/02/article/05/78-93_full.pdf
- Kyiv: https://patrolpolice.gov.ua/statystyka/
- Lviv: https://dashboard.city-adm.lviv.ua/concepcia/dtp
- **EU Quality of Life Report:** https://ec.europa.eu/regional_policy/information-sources/maps/quality-of-life_en
- **BEV charging infrastructure data from PSNM**

Environmental sustainability

- **Air quality:** European Environmental Agency Data: https://www.eea.europa.eu/data-and-maps/dashboards/air-quality-statistics and IQ air quality https://www.iqair.com
- **CO2 emissions:** Tom Tom: https://www.tomtom.com/traffic-index/

Active mobility

- **Cycling Infrastructure:** European Cyclists' Federation: https://european-cyclists-federation.github.io/
- **Cycling and walking rates:** EU Quality of Life Report: https://ec.europa.eu/regional_policy/information-sources/maps/quality-of-life_en, Katowice: https://polskialarmsmogowy.pl/2020/05/polacy-chca-lepszego-transportu-zbiorowego-i-mniej-aut-w-miastach-badanie/
- Kyiv and Lviv City Councils

Photo credits

Additional images not directly added by PwC were provided by Bratislava City Council/Metropolitan Institute of Bratislava, Brno City Council, Košice City Council, Kyiv City Council, Lviv City Council, Ministry of Digital Development and Transport of the Republic of Azerbaijan, Ostrava City Council, Prague City Council/Prague Public Transit Company, Riga City Council, Tallinn City Council, Wrocław City Council and Zagreb City Council.

Public transport

- **Fares:**
  Baku: https://bakikart.az/ticket-and-tariffs
- Sofia: https://www.metrosofia.com/en/tickets
- Zagreb: https://www.zet.hr/tickets-and-fares/fares/605
- Brno: https://www.dpmb.cz/sites/default/files/inline-files/cenik-2023_2.pdf
- Prague: https://www.dpp.cz/en/fares/fare-pricelist
- Ostrava: https://www.dpo.cz/jizdne/
- Tallinn: https://www.tallinn.ee/en/pilet/ticket-prices
- Budapest: https://bkk.hu/en/tickets-and-passes/prices/monthly-passes/
- Almaty: https://alatransit.kz/en/content/tickets
- Riga: https://www.rigassatiksme.lv/en/tickets-and-e-ticket/types-and-prices-of-tickets/one-month-ticket/
- Vilnius: https://judu.lt/en/for-public-transport-passengers/ticket-types-and-prices/
- Gdańsk: https://ztm.gda.pl/bilety/bilety-okresowe,a,3020
- Katowice: https://www.metropoliaztm.pl/en/s/cennik-od-010324-r
- Łódź: https://mpk.lodz.pl/showarticleslist.action?category=1077&Tickets+and+fares,
- Rzeszów: https://ztm.rzeszow.pl/menu/epodrozny/bilety/
- Warsaw: https://www.wtp.waw.pl/en/ticket-tariff/long-term-tickets/
- Wrocław: https://www.wroclaw.pl/en/tickets
- Bucharest: https://stbsa.ro/eng/abonamente_eng
- Cluj-Napoca: https://ctpcj.ro/index.php/en/fares/urban-transportation/full-price-electronic-tickets/1060
- Belgrade: https://www.bigcenters.rs/en/blog/public-transport-belgrade-bus-tram-trolley-and-tickets/
- Bratislava: https://imhd.sk/ba/doc/en/20709/20709#long
- Košice: https://www.dpmk.sk/prepravne-podmienky/tarifa-tarifi
- Ljubljana: https://www.jhl.si/en/single-city-card-urbana/prices
- Kyiv: https://kyivcity.gov.ua/npa/pro_vstanovlennya_tarifiv_na_poslugi_z_perevezennya_pasazhiriv_i_vartosti_proznikh_kvitkiv_u_miskomu_pasazhirskomu_transporti_yakiy_pratsyuye_u_zvichaynomu_rezhimi_rukhu/hv2vmhzzfw_kmda__399/
- Lviv: https://lviv.travel/en/news/gaid-lvivskim-gromadskim-transportom
- **Taxi tariffs:** https://www.numbeo.com/cost-of-living
- **Public transport usage and satisfaction:**
  EU Quality of Life Report: https://ec.europa.eu/regional_policy/information-sources/maps/quality-of-life_en and Ukraine: https://iri.org.ua/survey/munitsypalne-opytuvannya-iri-bilshist-naselennya-viryt-u-krashche-maybutnye-skhvalyuye
  https://transformative-mobility.org/lviv-mobility-research-2021-cold-season/

Additional information sources

https://www.polisnetwork.eu/news/member-in-the-spotlight-ljubljana/
https://eurocities.eu/stories/the-new-life-of-ljubljanas-main-street/
https://www.wbif.eu/project/PRJ-SRB-TRA-008
https://urban-mobility-observatory.transport.ec.europa.eu/news-events/news/bucharest-implement-hub-share-data-and-information-2023-04-24_en?prefLang=nl

8

Annexes—Case studies

Baku electric buses upgrade – production and maintenance

Baku

Urban Mobility Challenge

Reducing CO2 emissions through creating a more passenger-friendly secure and environmentally friendly transport system.

Solution

The Ministry of Economy and the Ministry of Digital Development and Transport in Azerbaijan are collaborating to upgrade the country's bus fleet. An agreement, signed by representatives from both ministries and Chinese manufacturer BYD, focuses on the local production and maintenance of electric buses. This involves the establishment of production facilities within Azerbaijan to enhance electric public transport infrastructure, improve passenger comfort and reduce environmental impact.

The agreement is particularly significant as it precedes Baku's hosting of the United Nations Framework Convention on Climate Change (COP29), which highlights the country's commitment to global climate change efforts. BYD plans to invest in new production areas to enhance the value chain within Azerbaijan. Starting from 2026, the collaboration will include the manufacturing of low-tonnage electric trucks, utility vehicles and electric passenger cars. By 2028, the focus will shift to assembling batteries for electricity storage, with an additional investment of approximately $60 million expected through a joint venture.

In alignment with a state order, electric buses will be acquired from BYD, which will also establish a manufacturing facility in Azerbaijan. Until the local manufacturing enterprise becomes operational, "BakuBus" LLC will purchase 160 electric buses and 100 chargers from BYD, aiming to deploy these buses in Baku by October 2024. The collaboration also includes the localisation of spare parts starting in 2025, support mechanisms, joint venture financing and intellectual property rights, with a goal to localise 40% of the buses' total costs by 2030.

The "Azerbaijan Investment Company" OJSC will join the electric bus production project as a shareholder, with BYD partnering with "Electrify Azerbaijan" LLC, a part of the "SARDA Group." The new joint venture will invest around $34 million to build an electric bus manufacturing plant in the Sumgait Chemical Industrial Park near Baku, which will have an annual production capacity of 500 buses to meet both domestic and export demands.

Weblink

City Contact

Azerbaijani Ministry of Digital Development and Transport: office@mincom.gov.az, Azerbaijani Ministry of Economy: office@economy.gov.az

Government-led expansion of electric vehicles in Baku

Baku

Urban Mobility Challenge

Reducing CO2 emissions through increasing the use of battery electric vehicles (BEVs).

Solution

The Azerbaijani government, led by Prime Minister Ali Asadov, has introduced measures to promote the use of BEVs by adjusting import customs duties and developing necessary infrastructure.

Changes aim to encourage the adoption of electric vehicles over traditional combustion engines. To support this shift, the government plans to expand the network of EV charging stations. Currently, there are about 4,000 electric vehicles and 87 charging stations in Azerbaijan, mainly in Baku. To meet the growing demand, the country needs over 400 charging stations now and up to 800 by the end of 2024 if the EV fleet doubles to 8,000 units. This infrastructure development is crucial for encouraging EV purchases, as accessible charging points are a significant motivating factor for consumers.

The economic and environmental benefits of EVs are substantial. Charging an EV is significantly cheaper than fuelling a gasoline vehicle, and electric cars produce no direct emissions, which helps reduce greenhouse gases and improve air quality. Additionally, the initiative is expected to create new jobs and promote the use of Azerbaijan's abundant solar and wind resources for generating the necessary electricity.

The Azerbaijani government is also investing in renewable energy infrastructure and may provide future subsidies or tax incentives to make EVs more affordable. Last year, the country imported around 14,100 hybrid cars and 3,100 electric vehicles, a significant increase compared to previous years. These measures are part of a broader strategy to create a sustainable economy less dependent on fossil fuels.

Weblink

City Contact

Azerbaijani Ministry of Digital Development and Transport: office@mincom.gov.az, Azerbaijani Ministry of Economy: office@economy.gov.az

The electrification of Belgrade's public bus fleet

Belgrade

Urban Mobility Challenge

To reduce CO2 emissions by creating a more passenger-friendly, secure and environmentally friendly transport system.

Solution

The Belgrade municipality invested in e-mobility for its public transport network by purchasing 10 new electric buses in January 2022. The new buses were deployed on a new route, designed with an appropriate range for this type of vehicle—around 80 minutes of driving.

The charge time for the new vehicles is just seven minutes, which makes them easy to use in public transport. These additions to the fleet help Belgrade get closer to the goal of being a less polluted and more liveable city. This was part of the City of Belgrade's goal that 40% of buses should run on electricity by 2030, which the city committed to by joining the Covenant of Mayors for Climate and Energy in 2018.

Also, according to the Green City Action Plan (GCAP), the City of Belgrade plans to invest a total of €1.2 billion in transportation by 2030, together with private stakeholders. The aim is to reduce greenhouse gas (GHG) emissions and improve air quality. This investment includes the purchase of electric buses and development of infrastructure to meet their energy demand through renewable sources.

The City of Belgrade also implemented two other projects related to electric buses with the Faculty of Mechanical Engineering. The project titled "Research on the effect of driving style on the energy efficiency of electric buses" has been completed, while the project "Implementation of driver assistance system for better energy efficiency of electric buses" is currently underway.

The aim of these projects is to create a system that helps the driver in real-time to realise the "recommended driving style," determining the necessary intensity of acceleration and deceleration to increase the energy efficiency of electric buses. Through a visual display and/or an audible signal, the system would inform the driver about the "best driving style."

Weblink

City Contact

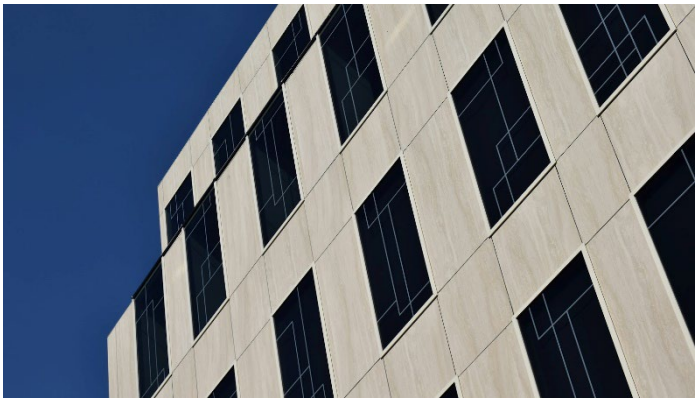
Marko Stojcic, City Architect of the City of Belgrade, marko.stojcic@beograd.gov.rs
Darko Sutanovac, Office of the Chief Urban Planner of the City of Belgrade, darko.sutanovac@beograd.gov.rs
Ognjen Todorovic, Head of Department of Urban Mobility at City of Belgrade, ognjen.todorovic@beograd.gov.rs

Micro-mobility in Belgrade

Belgrade

Urban Mobility Challenge

To promote sustainable urban mobility, reduce traffic congestion and improve air quality by providing eco-friendly alternatives to car travel.



Solution

The Republic of Serbia's Sustainable and Integrated Urban Development Strategy, which runs until 2030, encompasses a set of measures for strengthening transport accessibility and urban mobility.

Concurrently, the City of Belgrade's Smart Urban Development Plan is also under development. Furthermore, the newly enacted Law on Road Traffic Safety now recognises micro-mobility vehicles.

Helbiz, a global leader in micro-mobility, has been designated as the exclusive provider of public e-bike services in Belgrade. The company has formalised a 15-year agreement with city authorities to exclusively offer e-bike services, with plans to deploy a minimum of 1,000 e-bikes and 150 parking terminals across the city. The e-bike fleet will feature built-in IoT devices, GPS and advanced security measures, including AI-driven helmet verification technology developed by Helbiz's internal tech team.

In addition, E Prime, a Serbian electric bike manufacturer based in Belgrade, offers a range of seven electric bicycle models along with an e-tricycle.

The start-up ePark 011 is also innovating with green parking spaces and recharging stations throughout Belgrade. Launched during the COVID-19 pandemic in response to a growing preference for alternative transportation, their system operates through a user-friendly mobile application.

Additionally, CarGo, a mobility start-up providing passenger transport services via an app in Belgrade, plans to develop its own recharging network for its vehicles. Investments, however, in this initiative have not yet commenced.

Weblink

City Contact

Marko Stojcic, City Architect of the City of Belgrade, marko.stojcic@beograd.gov.rs
Darko Sutanovac, Office of the Chief Urban Planner of the City of Belgrade, darko.sutanovac@beograd.gov.rs
Ognjen Todorovic, Head of department of urban mobility at City of Belgrade, ognjen.todorovic@beograd.gov.rs

Improving the transport system while greening the fleet

Bratislava

Urban Mobility Challenge

Meeting ambitious green transportation goals and regulations and improving the quality of life of citizens through enhanced connectivity.

Solution

The City of Bratislava is undertaking several large-scale public transport projects aimed at the green transformation of the city's transport fleet while simultaneously making services more efficient. Bratislava's transport strategy is based on the city's commitment to gathering best practice from other cities around the world in relation to green public transportation.

There are multiple major ongoing projects that will extend both tram, bus and trolleybus networks in Bratislava. The most significant of them is a tram connection between the city's (and Slovakia's) largest housing estate, Petržalka, and the rest of the city. The prolongation of the current tram line will introduce 3.9 km of new tram lines, increasing the capacity of public transportation across Petržalka, which the city authorities foresee as having long-term social and economic benefits.

In terms of vehicles, Bratislava's public transportation company is currently reducing its dependency on combustion engine-powered vehicles.
These are being gradually replaced by the introduction of electric buses (currently 18 vehicles), IMC trolleybuses (50 vehicles) and trams.

Bratislava introduced four hydrogen-powered buses, the first city to do so in Slovakia. Another national first is the deployment of 24-metre-long double articulated trolleybuses. The purpose of these lengthy vehicles aims to increase passenger capacity with the same number of drivers.

Bratislava has also undertaken successful digitalisation efforts in recent years, resulting in expanded ways to purchase tickets and find connections and more accessible information about real-time traffic through digital timetables at bus stops. The city has also implemented multiple service optimisations aimed at providing a better service to passengers, such as switching trams to more frequent services on a reduced number of lines (metro-style network).

Weblink

City Contact

Michal Dekánek, Director of the Public Transport Section, dekanek.michal@dpb.sk

Integrating active mobility into urban planning and design: The Metropolitan Institute of Bratislava (MIB) and the City for Children

Bratislava

Urban Mobility Challenge

Create an urban environment that encourages citizens to walk and cycle.

Solution

The Metropolitan Institute of Bratislava (MIB) is a conceptual institute in the field of architecture, urban planning, participation and strategic planning. MIB was founded by the City of Bratislava but is a separate legal entity with its own leadership.

MIB has a role in the context of smart mobility that translates into the design of infrastructure and public amenities, thereby improving the everyday lives of Bratislava citizens and for visitors to the city.

The Institute has developed standardised urban design principles and standards for both cycling and walking infrastructure. These are essentially a set of guidelines for public spaces, dealing with topics such as vegetation, public amenities and accessibility.

The principles and standards were also translated into practice in a number of 'quick win' projects, such as adding trees in temporary 'pots' to expand pedestrian spaces, improve thermal comfort of pedestrians and to calm the road traffic. MIB has produced principles and standards for numerous aspects of urban design, such as pavement surfaces, pedestrian spaces, public transport stops and platforms, bicycle stands and cycle paths.

Another successful smart mobility project in Bratislava is Mesto pre deti (City for children). It involves the physical transformation of public spaces around the schools, improving safety and comfort of pedestrians and educating citizens on how to use them. This direct engagement of the public and focus on the behavioural aspect of the issue is often overlooked in projects like this.

Weblink

City Contact

Oto Nováček, Metropolitan Institute of Bratislava, oto.novacek@mib.sk

C-Roads Project for Intelligent Transport Systems (C-ITS)

Brno

Urban Mobility Challenge

Increase road safety, protect health and people, reduce accidents and increase traffic flow via intelligent transport systems.

Solution

The Statutory City of Brno joined the C-ROADS project in 2015 via its arm's-length company Brněnské komunikace a.s. C-Roads is a pan-European pilot project, whose Czech part C-ROADS CZ has the task of deploying the new C-ITS technology in real traffic on defined sections of the road network of the Czech Republic. C-ITS technology refers to cooperative intelligent transport systems in which data exchange between car-car and car-infrastructure takes place.

C-ITS cooperative systems will provide drivers with information about the current road traffic situation and will contribute significantly to drivers' traffic anticipation, traffic flow and to the reduction of accidents, especially serious accidents. The timely receipt of accurate information is essential to enable drivers to readily understand the road traffic situation and focus on potential problems. The special feature of the Czech part of the project is a joint testing of C-ITS in railway operations and public transport.

The C-ROADS project aims to harmonise and cooperate in the deployment of C-ITS systems in European Member States. The project is co-financed by CEF Transport.

Weblink

City Contact

Ing. Roman Nekula, MBA, Administrative Director, Brněnské komunikace a.s. (Brno Communications),
nekula@bkom.cz
+420 736 757 573

The Brno Mobility Fund for financing sustainable mobility

Brno

Urban Mobility Challenge

Increase road safety, promote health and personal safety, reduce accidents and increase traffic flow via intelligent transport systems.

Solution

In 2019, the Statutory City of Brno established a special-purpose municipal budgetary fund that would use funds collected on its territory in connection with parking regulations or other traffic measures to support sustainable mobility in Brno.

The fund is managed by the Transport Department of the Municipality of Brno. Together with Brno City Council, a committee decides on how the fund should be allocated.

Specific key revenue sources of the fund are:

- Charges for use of local roads are in accordance with regulations approved by the Brno City Council, including parking fees based on resident, subscription and visitor status, and
- Penalties for violations of urban transport rules.

The finance generated through the fund is typically used to upgrade and or introduce measures/facilities such as:

- Parking facilities
- Safe pedestrian crossings
- Cycling measures and infrastructure
- Safer school journey to school
- K+R stops at school buildings
- Barrier-free solutions
- Campaigns for increasing the safety of road users
- Improving the accessibility of public transport stops
- Electromobility.

Weblink

City Contact

Iva Rorečková,
roreckova.iva@brno.cz
+420 770 147 956

Extension of the Budapest trolleybus network

Budapest

Urban Mobility Challenge

To continually upgrade the public transport network while lowering emissions.

Solution

The Budapest public transport company, Budapesti Közlekedési Központ (BKK), is in the process of significantly renewing and expanding its trolleybus network to enhance green transportation within the city.

The current network, which has grown from 138 km in 2019 to 155 km in 2024, is planned to reach 190 kilometres by 2026 and up to 325 kilometres by 2030. New connections will include extensions of existing lines and the introduction of new overhead lines to serve outlying areas.

The vehicle fleet will be bolstered by the addition of 160 new trolleybuses, following the recent acquisition of 48 modern vehicles. These new trolleybuses feature low floors, air conditioning and the ability to travel at least 15 kilometres without overhead wires, thanks to built-in batteries.

The environmental benefits of these developments are significant, aiming to reduce carbon emissions by 7,000 tonnes annually. With two-thirds of trips in Budapest already made using electrically powered transport like trams and the metro, the expansion of the trolleybus network will further support the city's sustainability goals.

To ensure community involvement and transparent planning, BKK is conducting public consultation on the proposed developments. The projects are expected to be funded by the European Union, reflecting the strategic importance of these upgrades for both the city and the wider EU. These advancements will make public transport in Budapest greener, comfortable and accessible, ultimately contributing to a more sustainable urban environment.

Weblink

City Contact

Ádám Bodor, Director, Mobility Development, BKK, adam.bodor@bkk.hu, 00 36 70 640 9452

Gergely Kofrán, Mobility strategy and shared mobility, gergely.kofran@bkk.hu, 00 36 70 443 3689

László Horváth, Director, Development, BKK, laszlo.horvath5@bkk.hu, 00 36 70 338 9416

The MOL Bubi bikesharing system

Budapest

Urban Mobility Challenge

To provide and continually improve a safe, user-friendly bikesharing system to encourage cycling.

Solution

The MOL Bubi bikesharing system has been operating in Budapest since 2014, providing users with an environmentally friendly, active mode of transport available 24 hours a day. In 2021, the system was renewed based on user feedback and has since become even easier to use. The renewal can be dubbed a success, the usage rate of bikes, and the number of users have increased 5-10 fold, compared to the first iteration.

There are 211 stations at citywide locations and 2,460 bikes awaiting users, who can access the public bikesharing service with a mobile app. MOL Bubi has become an integrated part of urban transport, with stations displayed in the BudapestGO app and trip planning.

The MOL Bubi service has been growing in popularity. In 2023, an average of more than 9,000 trips were made on the bikes each day, and on the busiest day of last year, 13 September, BKK recorded more than 18,000 trips. A new monthly record was achieved in May 2024, where more than 457,000 trips took place in a month. BKK's BudapestGO app, also makes it easy to plan cycling trips, either by private bike or a MOL Bubi. The route proposed by BudapestGO includes the Bubi stations, shows what traffic to expect, car-free bike lanes and can also be set to be cycling-friendly and avoid hills.

BKK Centre for Budapest Transport continuously adds new stations to the system; it is expected to reach 220 stations by the end of 2024.

BKK is gearing up to launch a public procurement for the third iteration of its Bubi system, expected to launch in January 2026. This new system will not only have more mechanical bikes, but will focus on including e-bikes in the fleet as well.

Furthermore, BKK is relying heavily on data science initiatives and opportunities, the main driver of what is to come and the design of the new operating model of Bubi 3.0 is analysed by BKK’s data scientists.

Weblink

City Contact

Bence Nagy, Head of Digital Channels Business Development, BKK, +36 70 526 7281, bencecsaba.nagy@bkk.hu
Anna Rónai, Senior product manager, BKK, anna.ronay@bkk.hu, +36 70 390 3553

Introduction of the MEVO bikesharing system

Gdańsk

Urban Mobility Challenge

To promote sustainable urban mobility, reduce traffic congestion and improve air quality through providing an eco-friendly alternative to car travel—and demonstrate the city's commitment to sustainable transport solutions.

Solution

The MEVO bikesharing system in the Gdańsk-Gdynia-Sopot metropolitan area was initially launched in 2019. Initially deploying over 1,200 electric bikes with plans to expand to more, MEVO aimed to become one of the largest electric bikesharing systems in Europe.

MEVO's implementation, however, faced some challenges. Users encountered issues with bike availability due to logistical challenges in distributing bikes evenly. Another problem was that the former contractor did not deliver enough bicycles on time. This led to financial penalties and difficulties operating the system on the part of the former operator. These persistent issues eventually resulted in a temporary system shutdown.

To address these challenges, strategic improvements and upgrades were implemented, and the MEVO system was re-launched in November 2023. Technical support was enhanced to keep bikes in optimal condition. A more sustainable financial model assumes that funds from users go to the metropolitan area rather than to the operator. Each day, the operator is required to meet contractually regulated key performance indicators, which are reviewed daily. In the event that the operator does not fully meet all of the key performance indicators, the agreement provides for penalties. The user experience was also prioritised, making the system more intuitive and user-friendly. The system consists of both 3,099 electric-assisted bicycles and 1,000 traditional bicycles.

MEVO aims to set a new standard for bikesharing systems throughout Poland and Europe. By resolving technical, financial and operational issues, the system seeks to provide an efficient and user-friendly transport solution throughout the year. From March to November, there is a whole fleet of bicycles on the streets of the metropolis. During the other months, residents have 50% of all bicycles at their disposal. This initiative is part of Gdańsk's broader commitment to sustainable urban mobility and smart city development, enhancing the quality of life for residents and making the city more attractive to visitors.

Weblink

City Contact

Łukasz Kłos, Deputy Director of Municipal Services Department, lukasz.klos@gdansk.gda.pl

MetroRower metropolitan bicycle system

Katowice

Urban Mobility Challenge

Katowice, as a rapidly growing city, faces challenges in ensuring smooth and sustainable urban mobility. With population growth and economic development, the demand for efficient public transportation and mobility solutions has increased. The city aims to enhance its transport infrastructure, reduce traffic congestion and offer environmentally friendly mobility alternatives.

Solution

One of Katowice's key initiatives is the introduction of an integrated Intelligent Transport System (ITS), a smart city solution designed to improve the efficiency and sustainability of urban mobility. A flagship project within the Katowice metropolitan area is MetroRower, the largest bicycle rental system in Poland. MetroRower is part of a broader strategy to promote green mobility and encourage residents to use alternative modes of transportation to reduce carbon emissions and ease traffic.

The system, which operates across 31 municipalities in the GZM metropolitan area, offers 7,000 bicycles, including electric ones. Passengers holding long-term public transport tickets can use the bikes for free for up to 60 minutes, further incentivising the use of multimodal transport. This effort to connect public transport with bike rentals has successfully integrated Katowice into a larger, more sustainable mobility network.

In addition to the ITS, the city has developed traffic management tools, including monitoring systems that help optimise traffic flow, reduce congestion and improve safety. These systems also provide real-time data, allowing for better decision-making by both transport operators and city authorities.

Weblink

City Contact

Adriana Kaminska-Flak, Head of Transport Systems and Sustainable Mobility Unit, City of Katowice,
Adriana.Kaminska-Flak@katowice.eu
Paweł Sucheta, Deputy Head of the Transport, City of Katowice,
Pawel.Sucheta@katowice.eu

Intelligent Transport System

Katowice

Urban Mobility Challenge

How to make public transport more attractive and improve traffic flow within the city

Solution

The project, developed and implemented between 2017 and 2023 at a cost of over PLN 86,000,000 (€20,157,000), has significantly improved the travel experience for Katowice residents, reducing travel times across the city by 15%. According to city and independent analyses, the introduction of the ITS system has also led to reductions in both noise and emissions. The publicly accessible ITS system provides information on the following elements:

Traffic Intensity
The traffic intensity feature allows users to check the current achievable speeds on major city roads. Through a network of 112 ITS-managed intersections, real-time road conditions can be monitored and managed to improve traffic flow. Additionally, by connecting to the local public transport database, the system optimises travel times for public transportation.

Parking
By monitoring more than 1,700 parking spaces, the system helps residents efficiently locate available spots. The website and app allow users to check the current occupancy in specific areas and city zones, significantly simplifying their search. Parking availability is also displayed on 12 digital boards throughout the city.

Cameras
The website provides real-time access to footage from over 100 city cameras.

Variable Message Signs (VMS)
Fourteen variable message signs provide information about current or unexpected road events, further enhancing traffic management.

Route Planning
Users can check the current travel time between selected points within the city.

In addition to these features, the Katowice ITS serves as a comprehensive database of useful information for residents, including real-time weather updates and the locations of nearby hospitals, police stations and fire departments. Finally, system users can provide feedback on its performance, which helps to ensure its continuous improvement.

Weblink

City Contact

Adriana Kaminska-Flak, Head of Transport Systems and Sustainable Mobility Unit, City of Katowice,
Adriana.Kaminska-Flak@katowice.eu
Paweł Sucheta, Deputy Head of the Transport, City of Katowice,
Pawel.Sucheta@katowice.eu

Košice's partnership in EIT Urban Mobility's Rapid Applications for Transport (RAPTOR) programme to enhance traffic management optimisation

Košice

Urban Mobility Challenge

Košice's traffic management system relies heavily on outdated traffic signals, with many dating back to the 1990s. Recent projects modernised tram infrastructure, but other road users haven't benefited from prioritisation features. This, coupled with inefficient traffic flow, leads to congestion and potentially hinders emergency responses.

Solution

The city seeks to implement an intelligent, cost-effective traffic signal prioritisation system for public transport and emergency vehicles ensuring minimal infrastructural impact and technological compatibility. This solution should result in smoother and optimised travel, especially for public transport and emergency vehicles.

To find such a solution, Košice is a partner in the Rapid Applications for Transport (RAPTOR) programme. The programme is run by EIT Urban Mobility, an initiative of the European Union's European Institute of Innovation and Technology (EIT), aimed at facing sustainable urban mobility challenges across Europe.

RAPTOR is a challenge-oriented platform designed to connect cities, start-ups and SMEs to tackle niche urban mobility issues. Start-ups are invited to propose innovative solutions to these challenges, with winners receiving €40,000 in funding along with tailored mentoring support to pilot their solutions over a five-month period within the city.

Outcomes Košice hopes to achieve through the partnership include:

- Reduced congestion and travel times for all users.
- Ensured faster response times for ambulances, fire trucks and police cars.
- Seamless integration with various vehicle types and brands.
- Optimisation to minimise congestion and maximise traffic efficiency.

The winning entry is due to undertake the project in autumn 2024. This is the latest in several partnerships aimed at stimulating innovation in mobility, such as the Challenger Urban Creative, which brought international start-ups to Košice, some of them focused on urban mobility. Also, the "Košice 2.0" project, co-organised with non-profit Creative Industry Košice and funded from the EU Urban Innovative Actions programme, is a successful example of systematic approach to urban improvements.

Weblink

City Contact

Martin Mudrák, Plenipotentiary of the City of Košice for Innovation & Economic Development, martin.mudrak@kosice.sk

Transformation of Košice's public transport fleet through EU funding and a new electric car plant

Košice

Urban Mobility Challenge

The transformation of the city's public transport fleet so that it runs on low or zero emission power trains.

Solution

The city of Košice follows its long-term plan to electrify its public transportation system, on track to lower the ratio of gas-powered vehicles from 85% to 50%. Its green fleet currently consists of 100 trams and 23 battery-electric buses.

Just recently, the city announced an acquisition of 11 new electric buses along with the charging infrastructure, supported by the European Union's Just Transition fund.

Slovakia's central government provided a grant of €267 million to support Volvo Cars in the establishment of a new electric passenger vehicles production plant. As part of this project, the factory, which is located on the outskirts of the city, will be connected to the city centre by four new all-electric public transportation lines. They will be served by new fleet of 15 battery electric buses.

As well as the new transport lines, the project will create at least 3,300 direct jobs and as further indirect jobs. The project is also expected to bring sustainability benefits by aiming to be climate neutral from the start of production and by offering only electric vehicles.

City Contact	Martin Mudrák, Plenipotentiary of the City of Košice for Innovation & Economic Development, martin.mudrak@kosice.sk

Barrier-free transport map

Kyiv

Urban Mobility Challenge

To create conditions in public transport and in the urban built environment to assist people with mobility issues to get around the city.

Solution

With war and ongoing Russian aggression now unfortunately part of everyday life in Kyiv and wider Ukraine, perhaps public opinion doesn't see accessibility and mobility as top priorities. In reality, however, the war has meant that there are current and future needs for more accessibility around the city.

To date, the number of people in Kyiv who need special conditions for mobility due to the loss of limbs has reached more than 100,000. The authorities, therefore, must provide these people with comfortable conditions for moving around the city, as well as conditions for adaptation to civilian life.

Kyiv's 'Barrier-free map' is a system to assist people with limited mobility, so that persons using wheelchairs and other aids can plan a convenient, independent route, which may include ramps in public transport. The first iteration of the map is due to be launched in November 2024.

First, a barrier-free map will be implemented, then a transport map will be superimposed on it, which will indicate the accessibility of transport vehicles and stops. It will also be possible to subscribe to favourite routes, learn about traffic status and provide information about technical or road works on the routes. In addition to the city council, a private business is involved in the project, which is obliged to provide ramps and a certain height of kerbs.

City Contact	Roman Derkach, Deputy Head of the Department of Project Management—Head of the Innovative Services Division of the municipal enterprise "Main Information and Computing Centre" of the Kyiv City State Administration, roman.derkach@kmda.gov.ua

The 'Kyiv Digital' app

Kyiv

Urban Mobility Challenge

To harness technology to make public transport easier for users and provide transport and other important information for Kyiv residents and visitors.

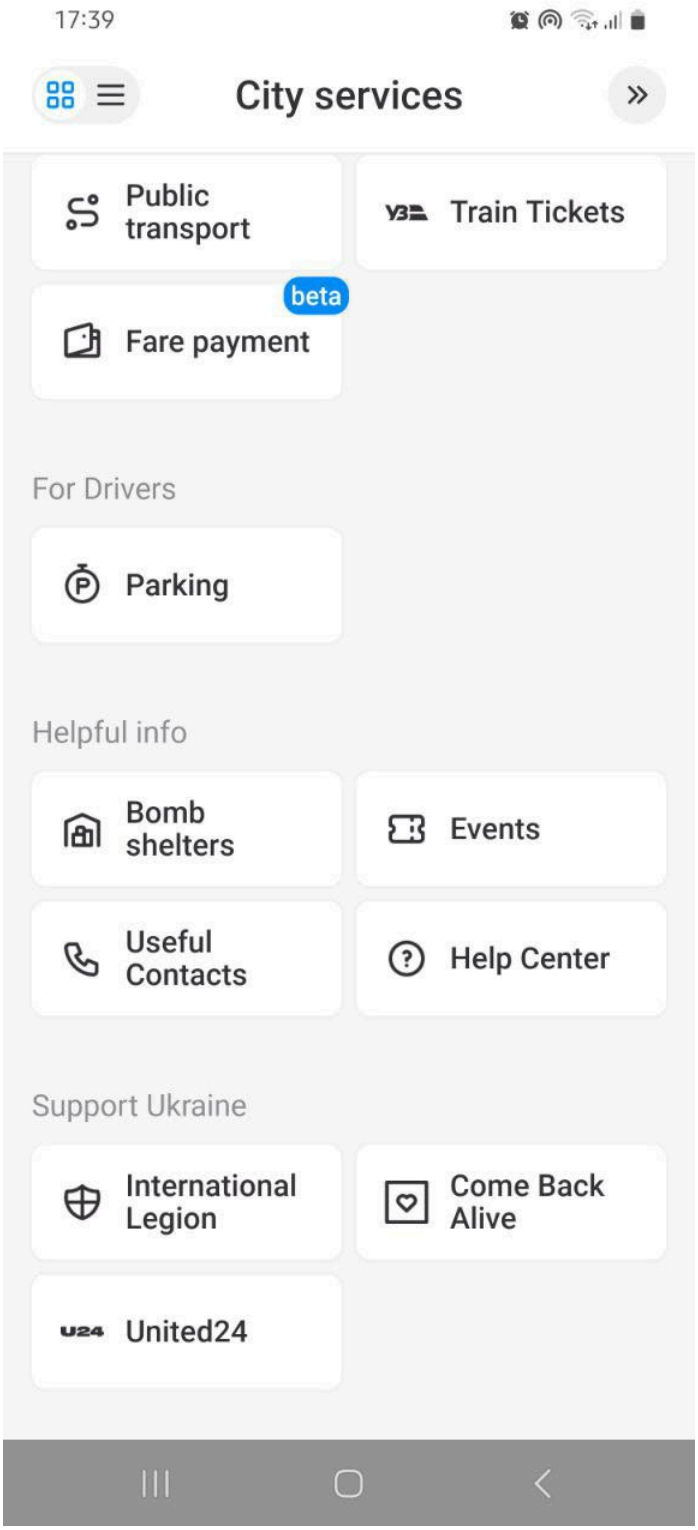
Solution

The ‘Kyiv Digital’ application is essentially a "city in the pocket" for Kyiv residents and is being developed by the city independently or in some aspects with the involvement of various specialist companies.

Kyiv Digital is a multifunctional application for residents and visitors of the capital that provides information primarily about public transport. Since the full-scale Russian invasion, however, the app has been used to relay information about air alerts, road closures and accidents and to provide updates on the city’s amenities and infrastructure. Users can buy QR public transport tickets, top-up travel cards, and even interact with the city authorities through petitions and voting.

The 'Kyiv Digital' application includes many functions which are based on transport, but provides a lot of other options, including:

- Interactive maps of public transport routes with a map of stops.
- Hourly parking—a service that helps users find a place and pay for parking.
- Messages regarding payment of fines for traffic violations or parking offences.



(continued) ▼

The 'Kyiv Digital' app (continued)

Kyiv

Solution

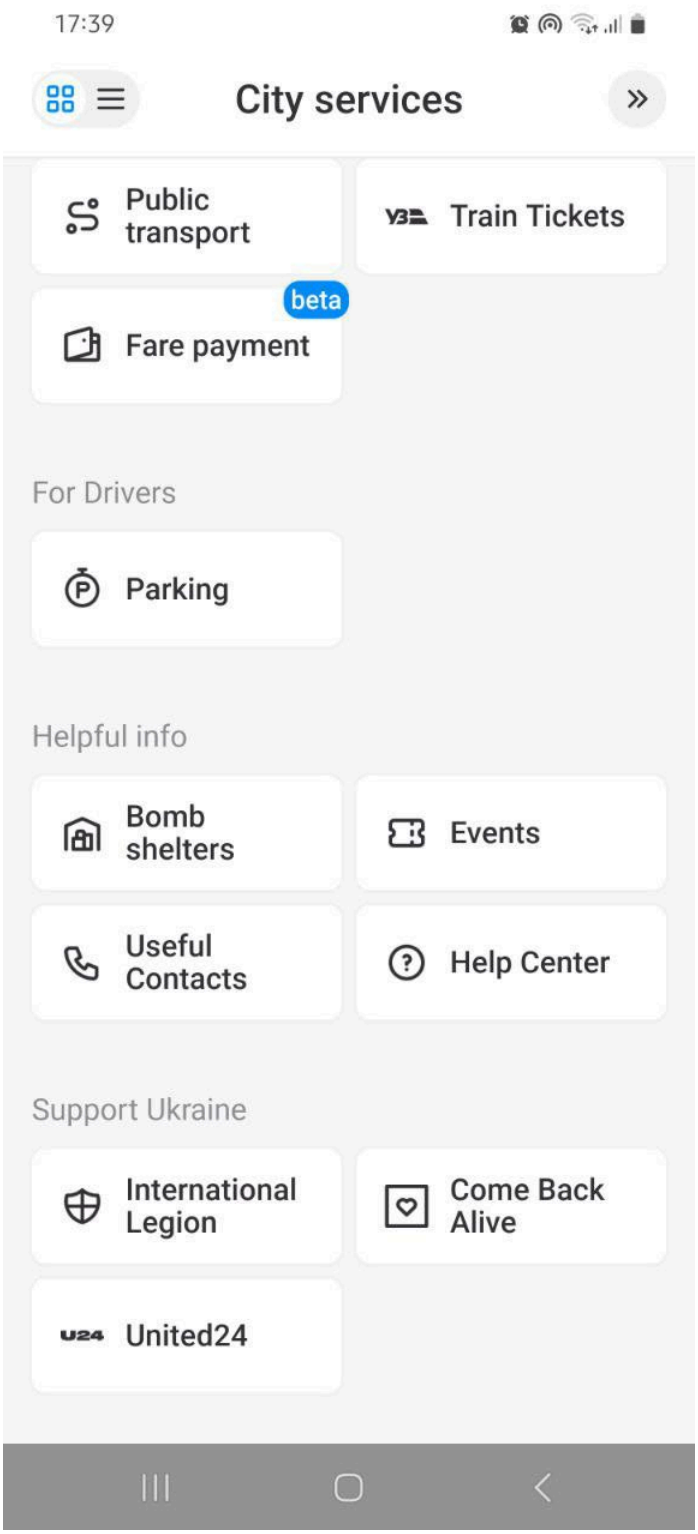
- Due to the full-scale war, the app was upgraded to provide up-to-date data on safe places, as well as heating/lighting points in case of a long-term absence of power.
- The app allows users to take part in local democracy through petitions and polls.
- Utilities bills can also be paid through the app. Users can specify their address and receive electronic receipts for electricity, gas, water, heating and maintenance of apartment buildings.

In the app, it is also possible to determine if a person qualifies for benefits (older people, schoolchildren, students and others) when using public transport. The app now extends this to veterans and internally displaced persons. A person who has benefits for transportation will be able to undergo verification for the availability of benefits.

The app also provides a group of services to support Ukraine. The largest volunteer NGOs who support Ukrainian forces raise funds to buy military equipment and to contribute to UNITED24—the fund created by the Ukrainian President to raise funds for the restoration of the country.

Weblink

City Contact	Roman Derkach, Deputy Head of the Department of Project Management—Head of the Innovative Services Division of the municipal enterprise "Main Information and Computing Centre" of the Kyiv City State Administration, roman.derkach@kmda.gov.ua



A pedestrian-friendly city

Łódź

Urban Mobility Challenge

To reduce the number of cars in the city centre, to lower emissions and stimulate local commerce.

Solution

Łódź is one of many cities that have made an effort toward reclaiming streets for pedestrians, particularly in the city centre, in order to encourage as many residents as possible to give up their cars as their regular method of transportation.

The first of these efforts was the renovation of streets and squares located all over the city. As part of this process, new greenery, such as large trees, shrubs and flowers, bloomed throughout Łódź, accompanied by new benches, pavements and bus stops. Furthermore, some car parks were transformed into green spaces and playgrounds, streets were narrowed, and special pedestrian crossings were built—all in order to calm vehicular traffic and further improve the comfort of pedestrians travelling through the city.

As for the city centre, Łódź is proud of its achievements, which were a direct result of the transformation of 20 streets in the centre of Łódź into so-called “woonerfs” or “living streets”.

These areas include abundant greenery, common spaces and calm vehicular traffic. These renovations have revitalised deserted streets and spurred the growth of local businesses with the opening of new shops and cafes.

However, street redesign is not the only effort Łódź is making to improve infrastructure for pedestrians in the city centre. Another pioneering initiative is the mutual recognition of train and public transport tickets.

To encourage residents to leave their cars at home, travellers with a city ticket can use train services within the city territory. Although this solution is common in Western Europe, Łódź has been the only city in Poland to offer it to its residents for the past seven years.

Weblink

City Contact

Tomasz Bużałek, Chief Specialist, Strategy Office, Łódź City Council, t.buzalek@uml.lodz.pl and Agnieszka Sińska, Deputy Director of Strategy, Łódź City Council, agnieszka.sinska@uml.lodz.pl

Tunnel Construction under the historic centre of Łódź

Łódź

Urban Mobility Challenge

To enhance urban mobility, reduce congestion and encourage low-emission transport in Łódź while simultaneously preserving the cultural and historical fabric of the city.

Solution

Łódź has begun an ambitious project to construct cross-city railway tunnels beneath its historic city centre. This initiative, the first of its type in Poland, is part of a strategy to transform Łódź, integrating advanced smart technologies to improve the quality of life of residents.

The tunnels are designed to allow the railway to closely cooperate with other sustainable transport options like buses, trams and bicycles. The local tunnel contains underground stations to serve tramway and bus stops, residential areas and pedestrian zones, contributing to a greener urban environment. It will revolutionise mobility patterns as the railway will become the fastest mode of transport due to the separated tracks and high accessibility. The metamorphosis includes also the Intelligent Transport Systems (ITS) to manage traffic flow, prioritise public transport efficiently and reduce surface-level congestion and pollution. The ITS is used to manage traffic with AI-driven traffic lights, real-time monitoring and advanced public transportation scheduling. The project is financed through various EU initiatives, national programs and public-private partnerships.

Several challenges come with this project, including balancing historical preservation with modern infrastructure needs. Innovative engineering solutions are employed to minimise disruption to historical sites. The narrow streets and dense urban fabric of the city centre limit expansion scope, which is addressed by constructing underground tunnels. Extensive public consultation ensures that residents' needs and concerns are addressed, fostering public support and tailored solutions.

The impact of this project will be significant, promising enhanced urban mobility by reducing traffic, improving travel times, boosting multimodality and fighting congestion. Environmental benefits include promoting electric public transport and reducing surface-level traffic, leading to lower emissions and better air quality.

Weblink

City Contact

Tomasz Bużałek, Chief Specialist, Strategy Office, Łódź City Council, t.buzalek@uml.lodz.pl and Agnieszka Sińska, Deputy Director of Strategy, Łódź City Council, agnieszka.sinska@uml.lodz.pl

Accessibility in public transportation

Lviv

Urban Mobility Challenge

To make public transport more accessible and inclusive due to an increasing number of the population with disabilities due to the ongoing full-scale war in Ukraine.

Solution

The project involves the arrangement of barrier-free and accessible public transport stops in Lviv and the possibility to access these stops from homes or points of interest. Particular adaptations are through installing barrier-free walking infrastructure, raised boarding platforms, the installation of Kassel kerbs which allow public transport to approach the stop platform as close as possible, ensuring comfortable boarding and disembarking of passengers.

The current plan for 2024 is to improve accessibility of at least 25 stops within the city, among which are some of the busiest ones. Work is already underway to improve accessibility.

Boarding platforms are raised to provide smooth boarding to low-floor public transport vehicles and decreasing number of stops to climb for older high-floor ones. Also, tactile tiles will be placed that guide and warn, so that the approaches to the stop are safer for those with visual impairments.

A special feature of the work is at one of the city's largest bus stops, where 20 bus routes and 1 trolleybus route stop. Kassel kerbs, which are 20 cm high and spherical in shape, will be installed here. These kerbs enable public transport to approach the stop platform as closely as possible.

In general, as of August 2024, almost 75% of stops in Lviv are accessible or partially accessible to groups of the population with reduced mobility. In addition, during 2023 1,237 pedestrian crossings were lowered in the city to make them accessible and inclusive. An accessibility map for Lviv tram and trolleybus stops has also been developed.

Weblink

City Contact

Pavlo Syrvatka, Deputy Head of the Safety and Street Infrastructure Office, Lviv City Council, syrvatka.pavlo@lvivcity.gov.ua

Reconstruction of Shevchenka Street

Lviv

Urban Mobility Challenge

To reduce the impact of congestion on public transport and prioritise public transport.

Solution

Shevchenka Street is a major road adjacent to central Lviv and connects many streets, several of which lead to large office buildings in which many people are employed. Shevchenka Street also leads to Lviv's main railway station. These factors give the thoroughfare a vitally strategic position.

The City of Lviv undertook a major reconstruction project to provide better quality of life for residents and commuters as well as decrease congestion in the area. The project also focused on bringing the street up to the standards of current regulations on urban design on: surfaces, pedestrian, bicycle, automobile infrastructure and the prioritisation of public transport. Key challenges of the project included:

- Public transport was often caught on traffic in the direction of the city centre and changing this was difficult as it is impossible to have all traffic going smoothly in both directions due to the geometrical restrictions of the built environment.
- The need to make a solution fit with the city centre, where historically formed street corridors are too narrow for vehicles, making it impossible to ensure comfortable movement by all types of transport.

Key to the reconstruction, completed in 2023, was:

- Encouraging public transport and limiting the entry of cars into the centre with a priority green light for public transport.
- The number of vehicles that can be guaranteed to travel further is allowed on the site.
- During rush hour, when there are more traffic participants, private cars do not interfere with the movement of buses, trams, cyclists or pedestrians. Also, the street was opened immediately with new traffic lights and infrastructure.

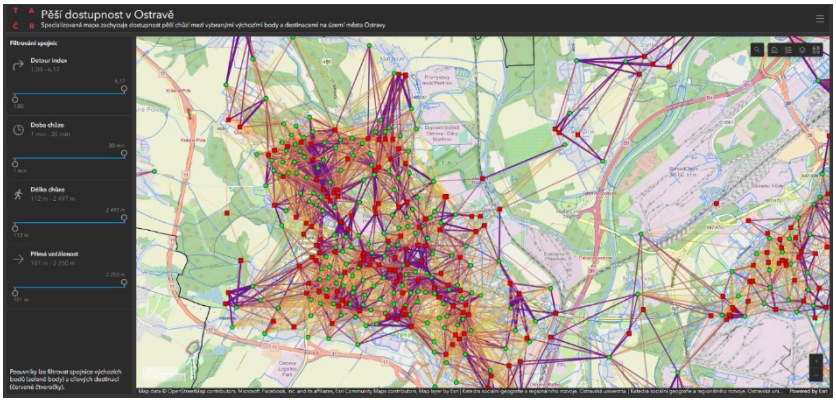
City Contact	Pavlo Syrvatka, Deputy Head of the Safety and Street Infrastructure Office, Lviv City Council, syrvatka.pavlo@lvivcity.gov.ua

Creating a walkability methodology as a tool to support sustainable mobility

Ostrava

Urban Mobility Challenge

Improving conditions for pedestrians in Czech cities by implementing the walkability concept, which is one of the ways to increase the sustainability of traffic in urban space.



Solution

The project was implemented by the University of Ostrava under a grant from the Technology Agency of the Czech Republic in the period 2023 and 2024. The main output is walkability methodology as a tool for supporting sustainable mobility in Czech cities and two specific walkability concepts for the cities of Ostrava and Most. These cities are the application guarantors of the project. The methodology will be a guide for improving the conditions of pedestrian traffic in other Czech cities.

As part of the project, a tool for mapping and evaluating conditions for pedestrians (UWET – urban walkability evidence tool) has been developed.

The project includes specialised maps, which bring analytical data for the creation of walkability concepts for the cities of Ostrava and Most.

The experience and knowledge gained during the development of these concepts were used in the walkability methodology for other Czech cities.

Weblink

City Contact

Jan Horák,
jan.horak@ostrava.cz
+420 602 676 932

ČistáOVA mobile/web app for reporting issues in the urban environment

Ostrava

Urban Mobility Challenge

A digital tool for the facilitation of communication between the city and the citizens. It allows residents to draw attention to defects and deficiencies in public space.

Solution

ČistáOVA is a web application for reporting defects and deficiencies in the urban environment in Ostrava. These include non-urgent events, which can be solved by the city authorities, such as:

- illegal dumping sites
- damaged children's playgrounds
- unmaintained public greenery
- overflowing garbage bins
- broken benches
- holes in the sidewalk
- dog waste on streets.

The web application čistáOVA was launched in 2018 as a tool for empowering communication between the city and its residents and visitors. It is not necessary to download the application, the users report problems directly via the website by filling in the description field, choosing a category of incident, locating the incident in a map as accurately as possible and by attaching a photo. Instead of placing the incident on a map manually, the user can allow their mobile phone to transcribe their GPS coordinates.

Since its launch in 2018, citizens reported over 16,000 incidents via čistáOVA, the overwhelming majority of which has been successfully solved.

Weblink

City Contact

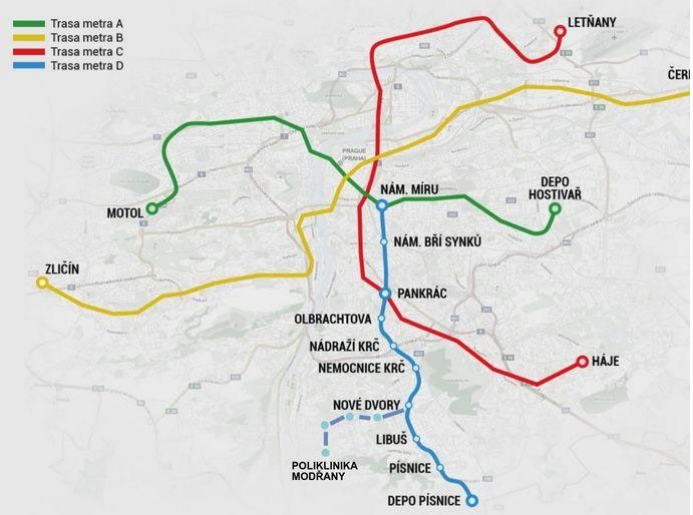
Dušan Pöllich,
dusan.pollich@ostrava.cz
+420 599 442 052

Metro Line D1 Phase I

Prague

Urban Mobility Challenge

To continually improve urban public transport infrastructure (metro network) via green financing.



Solution

The new line of the Prague Metro, the D Line (blue line), will cover 10 stations, diversify public transport options and improve quality of travel in the south of the city of Prague not currently served by an underground line—and in the wider metropolitan area.

Metro D will be Prague's fourth metro line, and when fully completed, will extend from Náměstí Míru near the city centre to Depo Písnice in the south of the city with new driverless trains. It will intersect with the existing Metro A and Metro C lines, as well as with commuter trains at Nádraží Krč. The first stage is underway, which is the construction (I.D1) of the Prague Metro Line from Pankrác to Nové Dvory.

The new line should significantly reduce road congestion and associated externalities such as local pollution, contribute towards reduction of greenhouse gas (GHG) emissions from transport as well as improve road safety.

Although other public transport services in the area of the proposed metro already exist, it is expected that this project will lead to a modal shift to public transport as metro systems are better placed than buses to compete with private vehicles.

Weblink

City Contact

Jaromír Beránek, Member of the Prague Assembly and Chair of the International Relations and EU Funds Committee
Email: jaromir.beranek@praha.eu
Tel: +420 720 761 616

Systemic Electric Vehicle (EV) charging infrastructure development

Prague

Urban Mobility Challenge

To develop public EV charging infrastructure systematically across the city in order to encourage electric car use and lower emissions.

Solution

In 2019, the Council of the Capital City of Prague prepared a “Master plan for charging infrastructure development in the Capital City of Prague for 2030”. This aims to establish 4,500 public charging stations in Prague which will cater for 200,000 electric cars by 2030.

In the last three years, the city has invested approximately CZK 220 million (€8,706,000) in preparing a network of charging stations on street lighting poles.

Prague aims to further support the development of electromobility through two major projects and plans to utilise European subsidies, if approved, to finance up to 80% of eligible costs. The projects are scheduled for delivery in 2025–2027:

- Construction of up to 1,500 slow charging stations in Prague for electric vehicles. The goal is to provide a sufficient number of publicly accessible stations as an alternative to home charging for residents who do not have the possibility to charge electric vehicles at home.
- Building 30 charging stations within car parks and garages managed by Prague’s Technical Administration of Communications (TSK).

These projects are part of the broader plan for the development of charging infrastructure in Prague by 2030, which has the following goals and expectations:

- Improving environmental quality through reducing emissions and noise from road traffic.
- Supporting publicly accessible, non-residential charging stations.
- Planned reform of paid parking zones where electric vehicles have reduced fees and designated spots at charging stations.
- Strengthening Infrastructure such as charging infrastructure in public car parks and park-and-ride (P+R) zones.

If successful in obtaining European subsidies, the city of Prague plans to co-finance the project municipal budgets to cover 20% of the costs of developing charging infrastructure.

Weblink

City Contact

Jaromír Beránek, Member of the Prague Assembly and Chair of the International Relations and EU Funds Committee
Email: jaromir.beranek@praha.eu
Tel: +420 720 761 616

The emission-free transport line and the electrification of the bus fleet

Riga

Urban Mobility Challenge

In line with the European Green Deal, the Latvian Transport Development Guidelines for 2021-2027 aim to speed up the transition to sustainable and smart mobility building.

Solution

More than one-third of CO2 emissions in Latvia are caused by the transport sector, with cars as the biggest source of pollution. As Latvia's capital and most populous city, Riga is home to one-third of the country's population. This means the city faces various mobility and sustainability challenges in providing an efficient transport system.

The City of Riga actively promotes the improvement of mobility and sustainability in the transport system, through expanding the public transport network and increasing its accessibility and efficiency. The city also is developing green transport alternatives such as improving bicycle infrastructure and electrifying public transport vehicles.

In December 2023, 35 electric buses were introduced to the streets of Riga by Rīgas Satiksme, the public transportation and infrastructure company serving the city. There are also plans to purchase 17 more. Also, the passenger-carrying railway company in Latvia, Vivi, ordered 32 electric trains, some of which are already in use.

Micro-mobility is also encouraged by the widespread availability of scooters and carsharing.

Improvements in the applications of public transport providers Rīgas Satiksme and Vivi have made it possible to buy a code ticket that allows you to pay for public transport trips with your smartphone online, which is not only convenient for the transport user, but also friendly to nature.

Weblink | Weblink | Weblink | Weblink

City Contact

"Rīgas Satiksme" (responsible for trams, buses and trolleybuses), + 371 20361862, info@rigassatiksme.lv // Baiba Bartaševiča-Feldmane, Head of the Public Relations Department, baiba.bartasevica@rigassatiksme.lv

The Riga Municipality Innovation Fund

Riga

Urban Mobility Challenge

The City of Riga wants to develop and promote projects that improve quality of life, mobility and efficiency in the city, using modern technologies and sustainable solutions.

Solution

The purpose of the Riga Municipality Innovation Fund is to promote the development of Riga as a smart city and the implementation of innovative projects in Riga.

The Fund exists to promote the development, modernisation, and digitisation of the smart city of Riga, to provide support to municipal institutions in implementing innovative projects and improving the services for citizens. The Fund simultaneously promotes the development of pilot/testing areas for smart city technologies in Riga, deals with project testing at the prototype level, supports innovative procurement such as the purchase of external technologies for testing purposes and provides support for research in cooperation with research institutions and academia.

In addition, one of the goals of the Fund is to promote an internal innovation culture in the municipality by supporting innovative ideas and encouraging creative approaches and thinking.

Priorities are set annually, taking into account the respective needs of the municipality in the relevant time period.

In 2023, priority has been given to projects that reduce noise and pollution, innovative digitisation solutions for pilot projects in the field of climate neutrality and urban environment, data collection solutions for pilot projects and feasibility studies.

Pilot projects related to the mobility and supported by the Fund by over €45 640,26):

1. A solution for monitoring and improving public transport lanes and “green waves” based on GPS data.
2. A solution for ensuring the priority of public transport at regulated intersections with the recognition of state registration number plates and vehicle type classification.
3. Truck tyre overload and overheating detection using video analytics.
4. A pilot project of vehicle noise monitoring systems using CCTV cameras.

The fund promotes cooperation between the municipality, entrepreneurs and residents, stimulates the local economy and attracts talent and investments to Riga.

Weblink	Weblink	**City Contact**	Riga City Council Department of City Development (administers the fund), +371 67 105 800, pad@riga.lv

Collaborating with business to build a smart city

Rzeszów

Urban Mobility Challenge

To engage the private sector and other stakeholders in developing smart mobility solutions.

Solution

The City of Rzeszów is notable for its strong collaboration with the private sector in developing smart city solutions, particularly in the realm of smart mobility. The city's approach emphasises entrepreneurial freedom, and collaboration typically takes the following forms.

Business partnerships

Rzeszów collaborates with technology firms to implement advanced transport solutions, deploying intelligent transport systems (ITS) and real-time traffic management technologies to enhance the city's transport efficiency. The project was implemented using a 'design and build' formula—a system integrating public transport in the city of Rzeszów and the surrounding area. This included the design, delivery, assembly and launch of an integrated traffic and public transport management system, together with a dedicated ICT platform.

Another example of such collaboration is the partnership with companies in implementing the ITS system in Rzeszów. The city also supports local start-ups and SMEs through incubators and accelerator programmes such as the INUP 'Startup Coalition,' 'Platformy Startowe' (Launch Platforms) initiative and Samsung Inkubator, which provide funding, mentoring and resources.

Autonomous business operations

The city offers a regulatory environment that encourages innovation, attracting leading companies and fostering a competitive market for smart mobility solutions. Rzeszów, with its development potential, has created the conditions for public-private partnerships (PPPs), such as the partnership with a local company over the management of one of the most prestigious trade and exhibition centres around Rzeszów, the G2A Arena. This demonstrates the city's ability to leverage private expertise while serving public interests.

(continued) ▼

Collaborating with business to build a smart city (continued)

Solution

Innovative Solutions and Impact

Rzeszów has created the conditions for implementing carsharing programmes and expanding the network of electric vehicle charging stations to further reduce traffic congestion and pollution. This provides a favourable environment for activities by companies like Traficar, the leading carsharing enterprise in Poland, which entered Rzeszów's market last year and plays a key role in this process. Furthermore, businesses contribute to the city's data-driven approach by providing technologies that collect and analyse transport data, enhancing decision-making and optimising transport systems.

Challenges and Future Directions

Key challenges include enabling scalability and integration of smart mobility solutions with existing infrastructure and securing sustainable funding. Rzeszów is exploring innovative financing models, including more public-private partnerships and EU grants, to support ongoing and future projects.

Through these initiatives, Rzeszów showcases effective private-sector collaboration to drive smart city development, enhancing urban mobility and improving residents' quality of life.

Weblink

City Contact

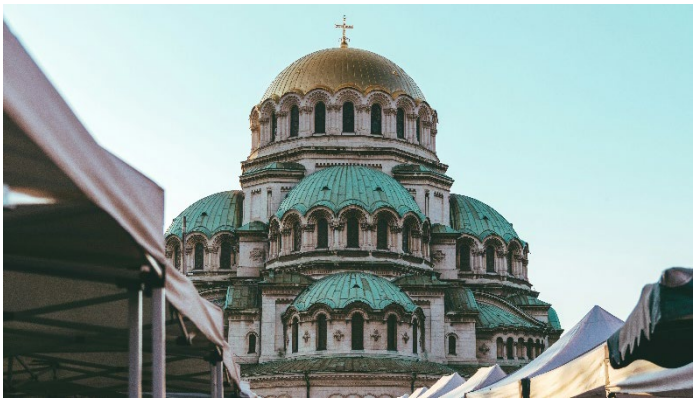
Paweł Potyrański, Director of Fund Acquisition Department, Rzeszów City Council, pawel.potyranski@erzeszow.pl

deployEMDS – European Mobility Data Space

Sofia

Urban Mobility Challenge

How can European cities, institutions and different stakeholders work together to share mobility data and ensure more efficient journey planning via the interconnection of all modes of transport?



Solution

Sofia is one of nine participating cities in the deployEMDS project, an ambitious initiative aimed at creating a European Mobility Data Space (EMDS) to support digital and green transformation in Europe's mobility and transport sector. The project aligns with key European Union strategies, aiming to develop a technical infrastructure that enables data access and that fosters an ecosystem of services and applications with machine-readable data.

The project uses frameworks from the Open Data Product Specification (ODPS) and the Data Space Business Alliance (DSBA) Technical Convergence document. Its methodology addresses the diverse needs of nine implementation sites across Europe, ensuring the development of a scalable, secure and flexible data space.

The Sofia use case is notable for integrating mobility and environmental data, involving local authorities, public transport operators and environmental agencies. It aims to enhance public transport efficiency, improve air quality monitoring and promote sustainable mobility like public transport, cycling and walking.

Key findings from the project include the consolidation of over 100 data sources and the operationalisation of local data spaces alongside the deployEMDS data space. The project recommends refining governance and business models, enhancing collaboration among implementation sites and focusing on scalability in future phases.

The deployEMDS project marks a significant step towards establishing a unified European Mobility Data Space, contributing to the EU's digital and green transformation goals.

Weblink

City Contact

Sofia Yovcheva, Junior specialist in charge of Digitalisation, Innovations and Economic Development Department, Sofia Municipality, sofiya.yovcheva@sofia.bg

Installation of cameras on buses and garbage trucks for traffic management

Sofia

Urban Mobility Challenge

How best to use data and innovative ways of collecting data to find mobility solutions that enhance urban management.

Solution

This initiative is designed to improve waste management systems and infrastructure monitoring by leveraging advanced camera technology and data analytics. The primary method of data collection is through placing monitoring cameras on public buses and garbage trucks.

The City of Sofia is planning to install high-resolution cameras on garbage trucks to monitor waste collection activities. These cameras provide real-time data on the trucks' locations, the types of waste they collect, and the exact source of the waste. This ensures waste collection is conducted according to regulations, reducing instances of improper disposal.

By analysing the data gathered, the system will also enable more efficient planning and forecasting of waste collection routes and schedules. This predictive capability will allow the city to optimise resource allocation, improving overall efficiency.

The project also involves installing cameras on public buses to monitor road signage and path markings. By continuously capturing images of road infrastructure, this system will help detect missing signs and assess the condition of road markings.

This proactive approach will ensure that road safety is maintained and that signage and markings are kept in optimal condition. The data collected can also be used to develop preventative measures, reducing the frequency of maintenance interventions and improving the overall safety of the transportation network.

City Contact	Sofia Yovcheva, Junior specialist in charge of Digitalisation, Innovations and Economic Development Department, Sofia Municipality, sofiya.yovcheva@sofia.bg

Public transport transformation in Tallinn

Tallinn

Urban Mobility Challenge

To meet the target set out in Tallinn's Mobility Plan—that the city's public transport be emission-free by 2035.

Solution

Tallinn aims for an emission-free public transport system by 2035. Tallinn's Mobility Plan has a number of development areas, but key to this is making public transport vehicles attractive and meeting ambitious emission targets.

There are currently four trolleybus lines operating in Tallinn, but in many locations, their infrastructure is decades old and requires replacement. Tallinn is currently substituting its trolleybus network with 40 new battery-powered buses, putting ageing trolleybuses out of use. Over half of these (22) are articulated buses with a length of 18 metres, with the remainder being 12 metres in length.

The local authority has instructed public transport company, Tallinna Linnatransport, to start preparations for the necessary procurement. The total cost of the investment, the purchase of the battery-powered buses and the reconstruction of the contact network, is estimated to be €40-50 million over the next five to six years.

The city is also reshaping the public transport network and considering adding new routes. Also, despite the removal of overhead lines in the city centre from previous public transport, the battery-powered trolleybuses will utilise overhead lines outside of the city centre. Modern trams are expected to debut this year, battery-powered trolleybuses in 2026, furthering Tallinn's commitment to sustainable public transportation.

Weblink

City Contact

Liis Spiegelberg, Head of Public Transport Division, liis.spiegelberg@tallinnlv.ee

Test in Tallinn

Tallinn

Urban Mobility Challenge

To find solutions to global environmental and urban mobility challenges and identify ways to stimulate innovation

Solution

Test in Tallinn is an initiative in which the City of Tallinn seeks to use its favourable test environment for green innovation and status as a competence centre at the European level to find innovative solutions for urban challenges.

The project aims to use the attractive environment for international green technology providers and start-ups to test their solutions in three key areas of focus: mobility, energy efficiency and renewable energy. The Test in Tallinn project's core is to use the city environment to allow companies working with the city and local academic and research and other organisations to gain experience and to use Tallinn as a testbed for trying out solutions that may then be applied in other cities across the world.

In line with the Tallinn 2035 Development Strategy, the city aims to be internationally renowned as a city of science, innovation and experimentation. The city seeks to have local and international companies introduce tech solutions, new products and services on a testing level using Tallinn as a living laboratory.

The city allows tests on a case-by-case basis. City officials and experts analyse and validate proposals based on a project evaluation model. This includes ensuring that successful projects have the most appropriate urban testing environments through, for example, assigning the location or service unit for the tests and involving city professionals, staff and/or customer groups, if required, in the test.

Testing projects include:

- Testing noise sensors using devices, already extensively tested in Barcelona, through using Tallinn's unique geographic location to evaluate them in a northern climate. This focuses on gathering comprehensive real-time data on noise in order to create a smart noise management plan, implement noise reduction activities and assess their effectiveness.
- AI-based mobility solutions that can detect misuse of bus lanes, among other applications.
- The testing of two new types of cameras, Vector P2P and MiniRack, in Tallinn. These cameras will be used for the first time in an urban area in Estonia to monitor average speed sections and bus lane misuse.
- Electric car charger testing to verify and develop current functionality. In addition, there is a desire to test the Dynamic 1 (Dynamic Load Management) solution, which avoids overloading the object's electrical infrastructure.

Weblink

City Contact

Mark-Emil Talivere, Innovation Expert,
mark-emil.talivere@tallinnlv.ee

The Green and Safe Warsaw Initiative

Warsaw

Urban Mobility Challenge

How to plan a strategic approach to improving urban planning with a focus on mobility which also brings social and economic benefits to the city?

Solution

The ‘Green and Safe Warsaw’ initiative is a multifaceted programme aimed at addressing the city's mobility challenges through innovative solutions. The initiative seeks to create a more sustainable and efficient urban environment by expanding green public transport, improving cycling and pedestrian infrastructure and utilising advanced technologies for traffic management through strong public-private partnerships.

Areas of focus include:

- Significant investments in electric buses and trams, with around 160 electric buses already on Warsaw’s streets and more contracts signed, all putting the Polish capital on track to reach over 200 vehicles by next year.
- Further expansion of its electric vehicle infrastructure, despite already being Poland’s leader in this area, with 171 charging stations and 330 charging points scattered around Warsaw.
- The expansion of the bikesharing programme Veturilo and the development of new bike lanes and pedestrian zones.
- The implementation of Intelligent Transport Systems (ITS) through a broad catalogue of solutions, ranging anywhere from new Park&Ride spots or smart parking solutions to interactive screens located at tram stops and informing passengers about accurate arrival times.

The environmental benefits of the initiative are substantial, with a focus on reducing greenhouse gas emissions and improving air quality. Social and economic benefits include an enhanced quality of life for residents through improved public transport and safer cycling and pedestrian infrastructure, as well as economic growth driven by new business opportunities and jobs in the technology and transport sectors. The initiative positions Warsaw as an innovation hub in Europe by embracing smart mobility solutions and integrating advanced technologies into its transport infrastructure.

Despite the promising outlook, the initiative faces challenges such as the complex integration of new technologies with existing infrastructure and ensuring financial sustainability. Continuous funding through public-private partnerships is essential. Future directions include the continuous improvement of smart mobility solutions, scaling successful pilot projects and expanding these solutions across the metropolitan area.

Weblink

City Contact

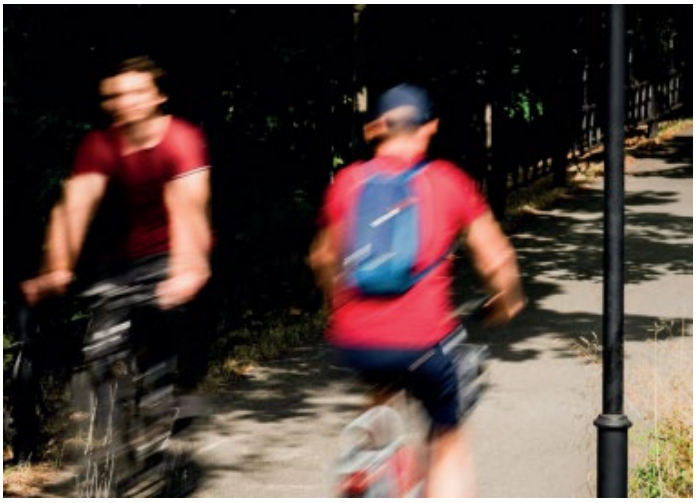
Krzysztof Gubański, Researcher and Analyst of Urban Issues, Warsaw City Council, kgubanski@um.warszawa.pl

Bicycle data in Wrocław—collecting real-time cycling information

Wrocław

Urban Mobility Challenge

How to use technology and data to continually improve cycling infrastructure in the city?



Solution

Data on bicycle traffic intensity in the city are key to assessing the implementation of the Wrocław Mobility Policy and the Wrocław Bicycle Policy, as they allow the city authorities to evaluate the impact of bicycle traffic development in Wrocław. Since 2006, bicycle traffic intensity measurements have been conducted at several selected intersections in Wrocław.

At the beginning of 2024, the City of Wrocław launched an automatic cyclist counting service. This initiative results from pilot projects carried out within the 'CityLab Wrocław' programme for the needs of the Office of Sustainable Mobility, involving companies that provide such solutions.

The cyclist counting system in Wrocław, Scanoo CAM, uses special cameras recording various events at intersections and measuring how many cyclists use 11 bike routes in the city. It not only measures the number of people moving but can also distinguish between registered users based on their mode of transport, such as those on scooters, bicycles or working for delivery services.

Thanks to automatic measurements, this data gathering is almost instantaneous. This allows us to see how bike traffic evolves daily, what initiatives contribute to this and how these changes occur. This information is crucial for planning and implementing bicycle infrastructure investments, as well as for organising actions promoting cycling.

Weblink

City Contact

Robert Bendnarski, Deputy Director, Department of Promotion and Tourism, Wrocław City Council,
robert.bednarski@um.wroc.pl

Mikrohub Wrocław and last mile cargobikes

Wrocław

Urban Mobility Challenge

Increasing the availability of parking spaces

Solution

The city of Wrocław has recently introduced an innovative solution aimed at streamlining the last-mile delivery process. A **Mikrohub** is an underground reload space for delivery companies, located in the heart of Wrocław.

Until now, courier companies in Wrocław have operated on a model that involves picking up packages from a warehouse or sorting centre located on the outskirts of a city and then delivering them by vans to customers' doors. Although this solution is widely used, it has brought, and continues to bring, many inconveniences both for residents and the courier companies.

Firstly, large delivery vans generate more pollution, negatively impacting the well-being of residents. Moreover, their abundance in the densely populated city centre has caused issues with finding parking spaces, resulting in the frequent sight of "abandoned" delivery vans, thereby hindering movement for other drivers and pedestrians. Lastly, the difficulties in navigating this mode of transportation through Wrocław's city centre have made the late delivery of packages a common occurrence.

The **Mikrohub** is an initiative designed to address this problem. It proposes a change in the logistics model for delivering packages to customers in Wrocław. By delivery vans, packages will be transported exclusively to the reloading **Mikrohub** (located in the National Forum of Music's parking garage), from where couriers will deliver them to consumers' doors using low-emission vehicles or cargo bikes.

This initiative has garnered interest not only from city authorities but also from representatives of the largest courier companies in Wrocław. As a result, in July of this year, the "Partnership for the Quality of Goods Service in the Historical Centre of Wrocław" was signed. It includes companies such **as InPost, Allegro, DPD Polska, MAKRO Cash and Carry Polska** and many others. It is expected that the first couriers using the underground **Mikrohub** will hit the streets of Wrocław as early as September of this year.

Weblink

City Contact

Robert Bendnarski, Deputy Director, Department of Promotion and Tourism, Wrocław City Council,
robert.bednarski@um.wroc.pl

Construction of the Zagreb-East bicycle highway

Zagreb

Urban Mobility Challenge

To provide cycling infrastructure to encourage active mobility, promote sustainable traffic management, increase traffic safety and ensure better connectivity for cyclists.

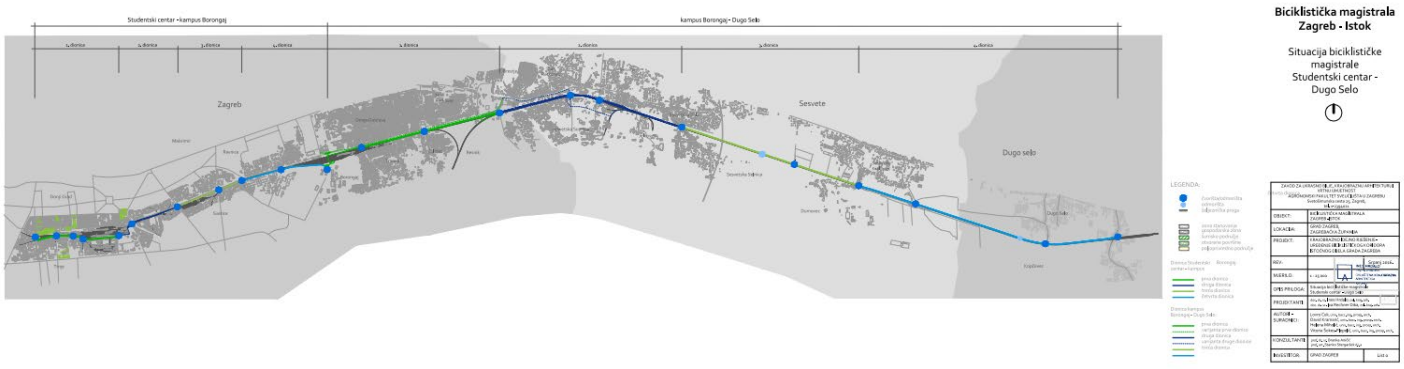
Solution

The concept of the Zagreb-East Cycling Highway was originally the idea of a group of landscape architecture students from the Faculty of Agriculture at Zagreb University. The students came up with the idea to connect their Borongaj Campus in the east of the city, the city centre and Dugo Selo, a route alongside the railway spanning 22.3 km.

These ideas evolved into cooperation between the faculty and the City of Zagreb and as a master plan for the Cycling Highway, a major project to connect new and existing cycling infrastructure, creating a continuous network.

The Highway seeks to enhance overall cycling traffic in Zagreb and surrounding areas, offering a quality alternative to other modes of transport.

The pilot session is already underway, and the project is scheduled to be completed by 2027. The budget for the project is expected to be €3,790,563 which is funded by the City of Zagreb budget with support from EU funds.



Weblink

City Contact

Darinka Jug, darinka.jug@zagreb.hr
Kristijan Vasilj, kristijan.vasilj@zagreb.hr

State bicycle route No.2 Greenway

Zagreb

Urban Mobility Challenge

To provide cycling infrastructure to encourage active mobility, promote sustainable traffic management, increase traffic safety and ensure better connectivity for cyclists.

Solution

The state bicycle route No.2 Greenway is a major cycling infrastructure project, the central section of which runs through the City of Zagreb. The route has a total length of 132 km and follows the Sava River from the Slovenian border through the city to Lijevi Dubrovčak.

The City of Zagreb is the project leader and works with Zagreb County, which surrounds but does not include the city. The local authorities provide significant funding, an amount of €2,412,068.23 (or 15% of the total, with the remaining 85% of €13,668,386.63 planned to be secured through grants from the European Structural and Investment Funds (ESI)

The Greenway has a number of innovative features including lighting, e-bike chargers, rest areas, parking and information signs. The route will have paths on both sides of the Sava River in the City of Zagreb and includes access improvements to bridges and connections to existing cycling and road infrastructure.

Construction of state bicycle route No. 2 Greenway is underway. Phase V was completed in 2023. Phase VI will begin by the end of summer 2024.

Weblink	Weblink	**City Contact**	Darinka Jug, darinka.jug@zagreb.hr Domagoj Đurkinjak, domagoj.durkinjak@zagreb.hr