SMART PRAGUE INDEX

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The Smart Prague Index was developed in cooperation with the consulting company Ernst & Young s. r. o. in 2017.

Published by:
Operátor ICT, a. s.
Dělnická 213/12, Prague 7, 170 00
1st edition, Prague, 2024

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INTRODUCTORY WORD BY A REPRESENTATIVE OF THE CITY OF PRAGUE

Dear readers,

It is a great honour to present to you the seventh edition of the Smart Prague Index, in which we map the progress made by the Czech metropolis in the fields of innovation, digitalisation and modern technologies. This document is prepared every year thanks to cooperation between experts from Prague City Hall, city companies, academia and the private sector. The goal is not only to evaluate the achieved results, but also to set the direction and priorities for the further development of Prague.

We continued making progress in the Smart Prague 2030 Concept in 2023, and we have provided more details for the six monitored areas in the individual chapters. As a small taster, I would like to highlight a few examples from 2023 that have made me proud. The number of registered electric cars in Prague increased by almost 50% year on year and, compared to 2022, we have 60% more charging points for electric cars. In Mobility of the Future, we launched a new-generation route finder for public transport through the PID Lítačka mobile application, which can combine different types of public, private and shared means of transport.

We also noted a significant shift in the Waste-free City key area. In Prague, we already have eight re-use points, there were 20 collection yards in the Czech capital in 2023, and the pilot project for the collection of kitchen scraps will return in November 2023 - containers for gastro waste are being placed in publicly accessible sorted-waste locations in eight parts of the city.

Tourism in Prague is slowly returning to its pre-pandemic levels, something well demonstrated by the more than 25,000 Prague Visitor Pass tourist cards sold in 2023.

All these and many other projects and activities are described in detail in this yearbook, which is not only a look in the rear view mirror but also a view into the future. I believe that together we can maintain the dynamics and enthusiasm for the development of Smart Prague and contribute to making the Czech metropolis an even better place in which to live, work and play.

I wish you pleasant and interesting reading.

Daniel Mazur
Prague city councillor responsible for Smart City, ICT, science, research and innovation

INTRODUCTORY WORD OF THE VICE-CHAIRMAN OF THE OICT BOARD OF DIRECTORS

Dear readers,

You have just opened the latest edition of the Smart Prague Index, this time for 2023. This is a yearbook that tracks trends and summarises the capital city's achievements in the field of innovation. The year 2023 was a period of significant progress for our company in smart technologies, sustainable development and international cooperation. We continued to expand our portfolio of projects that contribute to making Prague not only a modern metropolis but also a city in which people work and live well.

One of the main topics this year was mobility of the future and sustainable travel, and this was not limited to the Czech capital. The number of vehicles with "EL" registration plates increased from 9,496 to 14,119, while the number of electric-car charging points also increased: there are already 1,230 on the streets of Prague.

The past year was also marked by intensive development of the PID Lítačka mobile application that offers a complete service for passengers in Prague and the Central Bohemian Region. The application already has over 1.5 million active users, while the number of searches for connections increased by 35% from 53 million to 72 million.

We also continued to develop the smart buildings and energy key area in Prague. For example, the number of "smart lamps" in Prague increased by more than 60% to over 11,000. Their contribution lies primarily in improving street safety and more efficient energy use.

Tourism, which last year finally reached levels seen before the pandemic, has also provided some interesting numbers. Nearly 7.5 million people visited Prague in 2023.

Prague has been very active in digitalisation. Prague Citizen Portal (Portál Pražana), an online authority for Prague residents, developed throughout the year and saw a sixfold increase in visits in 2023. Almost 180,000 users took advantage of the online registration option launched at the end of 2022.

The involvement of Prague residents in the development of the city was also of fundamental importance thanks to the Prague Innovation Marathon. We thus know the other winners of the fourth annual innovation marathon of the Nakopni Prahu competition: the projects *Waste Digital*, *Na tácu* and *Muuv*, which contribute to improving the quality of life in the Czech capital.

Now I would like to wish you pleasant reading and thank you for the time and support you give to our projects.

Petr Suška, MSc
Vice-chairman of the OICT Board of Directors, in charge of managing the Smart City and Innovation Unit

SMART CITY CONCEPT

The term „Smart City“ has been around since the second half of the 1990s and there are many ways of defining it. In addition to „smart city“, it also takes the form of „city of innovation“, „intelligent city“, „city of knowledge“, „digital city“ or „sustainable city“. Most of these terms describe what various theories say a „Smart City“ should look like and what it should be characterised by.

In simple terms, it could be said that such a city should follow a sustainable development path to improve the quality of life of its residents. And as more and more people move to cities as urbanisation continues (more than half of the world's population now lives in urban areas), there is a growing need to assess what future cities should look like and what services they should provide to their residents.

However, all the possible terms that appear in the context of modern cities should to some extent be more indicative of how „smart cities“ should work. An intelligent city should be able to build on its knowledge, it should abound in the ability to choose the best possible social system settings and the ability to evaluate all available options. Related to this is the ability to learn, which gives the city and its residents the basis for increasing their „smartness“. Knowledge and its use then serve the city to choose well the path that will lead to its successful development. This is made possible through the use of new innovative approaches to problem solving that use information and communication technologies as well as digitalisation for development in the socio-economic sphere. Similarly, there is an emphasis on agility in decision-making, which gives modern „smart cities“ the ability to respond quickly and effectively to constantly changing conditions and environments. This requires cooperation at city as well as regional level to achieve continuous sustainable development.

DIMENSIONS OF A SMART CITY

A Smart City should address the challenges it faces by making intelligent decisions based on its best knowledge of the current situation. It then uses the resources of modern information technology to implement these solutions in practice.

A city cannot be described as smart if its actions are not based on smart practices, i.e. constantly examining and evaluating its environment and looking for signals and indications of change that the city can use to its advantage and further development.

According to many theories, the main dimensions that a smart city focuses on in its operations are economy, people, governance, mobility, environment and living. „Smart economy“ benefits from innovation, which enables it to change and adapt to global markets. „Smart people“ refers to a city‘s population that is skilled, creative, open-minded, and committed to public participation and continuous development. „Smart governance“ leads to greater transparency and participation of residents in public decisions. „Smart mobility“ goes hand in hand with the use of new technologies forming an ICT infrastructure that ensures accessible, sustainable, innovative and safe transport systems in a given city. „Smart environment“ addresses the issue of local natural conditions and seeks to take steps to reduce pollution and protect nature and its wealth. Last but not least, ‚smart living‘ encompasses the characteristics that a smart city society should exhibit, be it its health, safety, housing, educational institutions, tourism activities or social cohesion.

Simply put, three factors are important for smart cities: technology, people and institutions. Cities referred to as Smart Cities then strive to continuously improve and advance their level of „smartness“ in order to set their institutional foundation to enable the use of modern approaches, innovations and new technologies for their goal of raising the level and improving the quality of life of their population.

The modern city of the 21st century is therefore inherently smart, sustainable and resilient. The most competitive cities are those that have the highest possible quality of life for their residents. Dozens of cities around the world are making good use of modern technology to better connect all their parts. To do this, they are using data, information and knowledge to put into practice innovations and solutions for the most resilient and sustainable future. In this future, we should see cities that are able to cope with external pressures, be they environmental, economic or social, but at the same time develop and prosper in a stable way.

Cities in the 21st century face many pressures to which they must respond. The digital revolution is not only affecting society, but also its socio-economic processes. Modern smart cities continuously offer their citizens new opportunities for development and growth, but at the same time they are exposed to global threats. Society faces economic fluctuations, energy crises caused by political influences, changes in the demographic composition of the population caused by migration, and many unanswered questions about the future of our environment.

Cities in 2023 face high levels of political instability caused by both the ongoing war in Ukraine and the reignited conflict in the Middle East. The ongoing conflicts have placed a high socio-economic burden on many countries due to humanitarian or military aid efforts and the hosting of refugees from the most affected areas. In many regions, economic pressures have deepened and the need to ensure their own sustainable security has resonated more than ever. And this is where the unquestionable role of modern technologies comes into play, providing a greater range of quality prediction and prevention options, but also a pathway for better optimising interventions and dealing with the crises and emergencies that modern smart cities increasingly face.

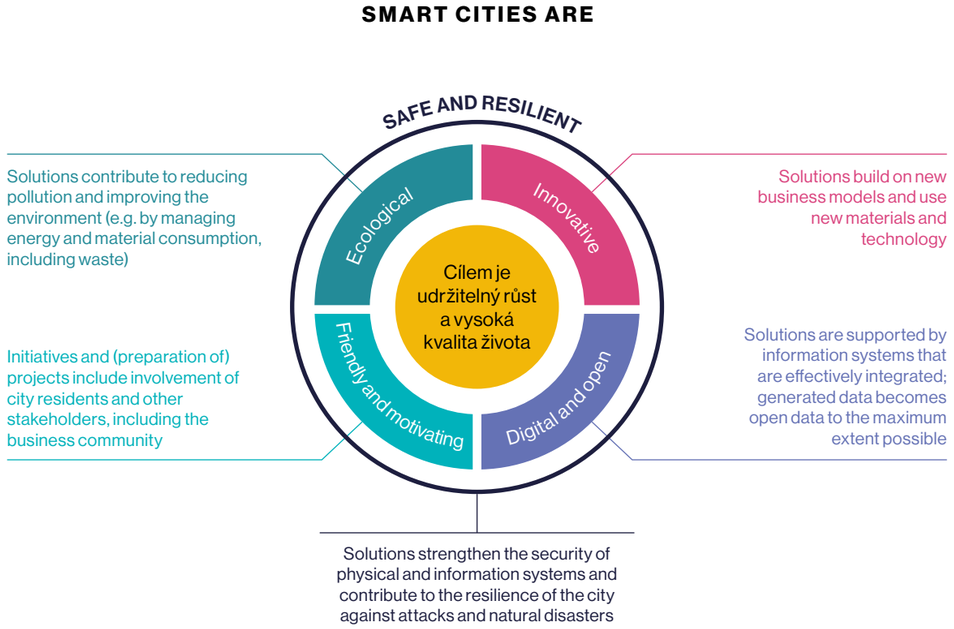
SMART CITY MANAGEMENT

Smart cities use the means of modern technology and digitisation not only to deal with emergencies but also with everyday situations. Innovative solutions help to better manage cities as such. Smart city management uses a range of sensors, from physical detectors to processing images from space satellites for more accurate weather forecasting or mapping the emissions and cities' temperature burden. Important data does not just flow from sensors installed in streets or buildings; your own vehicle or mobile phone is also a smart sensor. An example of a smart solution could be a sensor network implemented through the public lighting infrastructure, which, in addition to its primary function, has the potential to ensure the transfer of communication services across the city or could serve as a charging point for electric vehicles.

SMART CITY MEASUREMENT

The sustainability of cities and the degree of their resilience to external influences is also indicative of their competitiveness at local, regional and global scale. While there are a number of indicators that attempt to find a methodology that is applicable to as many cities as possible, most run up against the limits imposed by the increasingly frequent changes in society and the world. The criteria for each index and its indicators vary from region to region, so it is necessary to focus on comparing cities that are at least somewhat similar. These are usually characterised by some of their basic features such as geographical location, size, population or historical experience.

However, most indices agree in their methodologies to assess cities on the level of a few key areas, which are most often the economy, mobility, security or people and society and its social setting. Although it may not always seem so at first glance, smart cities do not only look at modern technology and its use in the digitalisation journey. Modern technology is the means by which modern smart cities seek to transform themselves to best serve their residents and provide them with a safe and sustainable living environment for the future. And the application of innovative solutions is precisely the particular way they are using to achieve their goal.



In the Czech Republic, the Smart Cities concept is under the responsibility of the Ministry of Regional Development (MRD). As part of the Smart Cities methodology, the Smart Cities Concept - Resilience through SMART solutions for municipalities, cities and regions was approved by the Government in May 2021. The ministry is responding to the need to cope with the consequences of the covid-19 pandemic and motivating cities and municipalities to apply smart methods to address new problems and challenges1. The aim is to offer municipalities modern solutions that will enable them to provide high quality of life for their residents. At the same time, new technological tools, innovations and the use of human and territorial potential will ensure greater competitiveness of the Czech Republic in the international environment.

In mid-May 2022, the government approved the „Implementation Plan of the Smart Cities Concept 2030", which deals with a concrete implementation process for cities and municipalities. The aim is to improve the quality of life of the residents in each region through specific measures offered in the plan. The concept also resonates the need to respond to the covid-19 pandemic and the increased need for resilience in cities and regions. Measures include an emphasis on autonomous mobility and renewable energy production, or support for municipal project preparation and the establishment of a network of advisors for innovation in the public sector[1]

1 https://budtesmart.cz/koncepce-smart-cities

SMART PRAGUE CONCEPT

The Smart City concept has been an established phenomenon in Prague since 2014. The original concept, which was created in cooperation with the Smart City Development Commission of the Prague City Hall and the Prague Institute of Planning and Development, discussing the specific conditions of the city and its potential for the application of Smart City trends from abroad, provided the basis for the Smart Prague 2030 Concept. The Concept undergoes regular revisions and subsequent approvals to ensure that Prague continues to move towards becoming a strong and prosperous Smart City. More details on the history of the application of the Smart City concept in Prague are provided in previous Smart Prague Index (SPI) Yearbooks.

The Smart Prague 2030 concept defines the following six areas: Mobility of the Future, Data Sector with a focus on utilising the potential of the Golemio data platform, Attractive Tourism, Smart Buildings and Energy, People and Urban Environment and Waste-Free City. Each of these key areas is further developed into the 2030 Vision with respect to best available practice and then into thematic headings for each of them. However, the concept does not consider each area in isolation, but sees them as an interconnected network of individual solutions aimed at fulfilling the direction of the concept as a whole. An integral part of this is the collection, evaluation and interpretation of data, which then serves as an irreplaceable source of information on the state of the city for residents, companies, the city itself, its companies and organisations. Thanks to this, it is then possible to ensure its operation in an informed way, to better evaluate priorities and prepare strategies in the direction of the Prague Capital City.

Within the Smart Prague concept, Operátor ICT, a. s. (OICT) acts as an innovation and project manager. Its goal is to deliver answers to individual challenges that our metropolis faces through the application of smart solutions to problems in the areas mentioned above. OICT uses innovative technologies to solve Prague's challenges and proceeds to the maximum extent possible, while at the same time respecting competence neutrality. After the pilot phase, OICT hands over the projects to the relevant entity of the City of Prague for the operational phase.

SMART PRAGUE INDEX (SPI)

The mission of smart cities is not only to apply innovative solutions to the problems facing the city, but also to direct it towards using modern means for its greater efficiency and prosperity of its residents. However, this requires constant feedback on how individual solutions are working for the specifics of the area. This is done through extensive evaluation of the status of the achievement of the envisaged objectives. In Prague, the implementation of the Smart Prague 2030 Concept is monitored by evaluating year-on-year changes in predefined indicators. And that is what the Smart Prague Index (SPI) is all about.

The whole concept of the SPI is based on the Cities in Motion Index (CIMI) developed by Ernst & Young. The CIMI ranks cities against each other on up to hundreds of indicators aggregated across several sub-themes. To ensure consistency and as much simplicity as possible, the SPI was designed to use the key CIMI index indicators that best serve to map Prague's progress towards becoming a smart city.

The starting point for creating the SPI methodology was the 5 + 1 strategic areas of the Smart Prague Concept, whose appropriate development is defined through specific, qualitatively set strategic objectives. Each of the defined strategic objectives is described within the SPI through specific quantifiable indicators and grouped into thematic headings inspired by the CIMI index. Although the indicators are defined for each of the strategic areas separately in order to capture the thematically most

important aspects in which the city should develop in a given area, their interrelation is also important, which then tells us how Prague is moving as a whole.

SMART CITY COMPETITIONS AND RANKINGS

The comparison is not only at the level of the city itself, but also at the regional and global level. The Smart City concept has been developing globally in recent decades, which is why there is a need to compare cities with each other. This can provide an appropriate indication of areas where a city is performing better than other smart cities. However, more important is the possibility to identify specifics where a city may be progressing more slowly than others, as well as solutions from which it can draw inspiration for its own journey.

The level of application of smart solutions and the associated maturity of smart cities is assessed by many rankings each year. These set up methodologies to compare cities around the world with respect to their regional specificities and level of development. At the same time, there are countless competitions that evaluate innovative smart city ideas and projects and reward the most inspiring examples. The purpose of these competitions is also to find out what is the practice in implementing smart solutions, allowing others to gain inspiration for leading their own Smart Cities projects.

CIMI index

Similar to how the cities around us are changing, and with it the view of what makes them truly „smart“, indicators that try to compare them and assess their evolution over time are also evolving. In 2023, the IESE Cities in Motion Index underwent a major overhaul. This correction was a necessary response to the update of the Euromonitor demographic data, which is an important source of data for the CIMI index. However, the number of cities assessed was maintained. The Index therefore examines 183 cities from all over the world and Prague is one of the 85 capital cities assessed.

The CIMI Index has also updated the indicators it assesses in its research. Of the nine key areas of research, the economy, mobility and transport, and spatial planning have undergone the biggest update. Other areas examined then include social cohesion, human capital, governance, environment, technology and the international profile of each city.

As in the previous years, Prague ranked among the 30% smartest cities of all the cities that were assessed in 2023, specifically ranking in the 50th position. Since the index has undergone a revision of its methodology and the previous positions of all included cities have been updated, Prague has improved compared to the previous years. However, it should be stressed that it is not possible to make an absolute comparison of the ranks achieved by cities year-on-year, as the CIMI index itself states.

When we assess Prague‘s position in individual categories for 2023, we must mention its 14th place in the environment. It was also strong in human capital (32nd place) and international profile (33rd place). Its weakest point, however, is the economy, but the 113th position of all cities surveyed can be attributed to the receding economic crisis related to the war in Ukraine.

However, Prague is the clear leader in its region. The CIMI index ranks Prague in the „Eastern Europe“ region, where it has taken the lead over Warsaw in Poland and Tallinn in Estonia for several years. The index also lists the areas of mobility and transport among its strengths, and highlights its strong position in terms of the quality of its workforce and education.

A new feature of this year‘s CIMI Index is the comparison of cities in the analysis of six clusters. Prague is included in the cluster of „Regional Centres of International Influence“, which show significant potential in key areas such as urban mobility, government efficiency and social cohesion. According to the CIMI index, these are the cities that seek to strengthen their long-term sustainability and optimise their technological infrastructure according to current Smart Cities trends. Prague is described as a city with a significantly growing international profile, which clearly marks it as a dominant player in the region thanks to its emphasis on development and innovation.

Smart Cities 2023

The 7th year of the Smart Cities competition organised by the Smart City Innovations Institute, a non-governmental non-profit organisation, brought several successes. In the category „Project for a city with 10 to 50 thousand residents“, where the competition was the most intense, the Expert Jury selected the project Electronic application for case management and coordination of social services of the Prague 7 municipal district.

Representatives from the academia, the public sector and the technology sector also awarded a special prize to the New European Bauhaus Stavanger, in which the OICT is directly involved through the International Projects Department, for its contribution to the Czech Republic‘s involvement in the context of the international Smart City ecosystem, out of a total of 122 projects submitted in 2023. This demonstrates the importance of collaboration at international level, which the NEB Innovation Team is working on intensively.

Quality of Life Index 2023

The Quality of Life Index compares 206 municipalities with extended powers, including Prague, based on a total of 29 indicators in three thematic areas: health and environment, material security and education, and relationships and services. In 2023, Prague is ranked 2nd overall in the Quality of Life Index, the same as it has been in recent years. However, it dominated in the category „relationships and services“, which includes access to services, transport, safety and activity and movement of citizens. Among the individual indicators, it ranked first in the index for the number of jobs offers on job portals or in the railway transport.

Time Out magazine Index 2023

In 2023, Prague placed 2nd in a ranking of cities where local residents rated public transport as one of the best. The poll surveyed the opinions of more than 20,000 respondents from over 50 cities around the world to find out how easy it is to get around the city by public transport. In Prague, 96% of its residents were in favour of public transport, and the UK‘s TimeOut magazine singled out the Prague Metro, among others, for its functionality and the design of its lines. Prague also came second in the „best cities for culture“ category, thanks to the range of cultural activities on offer in the city, including a wealth of affordable festivals and other cultural performances.

Golden Crest 2023

The Prague-Kolovraty municipal district placed 3rd in the category of „best website of a municipality which is not a municipality with extended powers“ in the 25th annual Golden Crest competition. In the category of „the best managed criteria of mandatory information in the category of municipality with extended powers“ was the municipality of Prague 12.

IMD Smart City Index 2023

The IMD Smart City Index is one of the world‘s leading rankings „smart cities“. The index is co-authored by the Institute for Management Development (IMD) and the Singapore University for Technology and Design (SUTD). The index ranks cities around the world based on their „smartness“, where „smartness“ is defined as the extent to which cities use technology to improve the quality of life of their residents. The rating is based on citizen voting to reflect how well cities are meeting the needs of their residents.

The index is divided into two main pillars: structure and technology. Structure ranks cities based on infrastructure and key services they provide to their residents. It includes factors such as health, housing, urban planning and environmental sustainability. Technology assesses how well cities use technology and innovation to improve the quality of life of their residents. This section includes aspects such as internet connectivity, digitisation of public services and the adoption of smart city technologies such as Internet of Things (IoT) sensors and intelligent transport systems.

The IMD Smart City Index also includes citizen feedback, a survey in which citizens rate how well technology is serving their needs and improving their lives. The evaluation focuses not only on technological infrastructure but also on the social and environmental aspects of urban life.

The IMD Smart City Index has undergone a major transformation in 2022. Until 2021, it based its methodology on the Human Development Index (HDI) at the state level. From 2023, the index uses new adjusted data that builds the assessment at the city level. It continues to examine more cities than it has done so far, with 141 cities now being compared from the original 118. In addition to the resulting position among these 141 cities in total and in each of the two pillars separately, the Index further ranks cities into groups just according to their HDI. Within these groups, the two pillars are then ranked on specific „letter“ scales.

Due to the significant adjustment of the methodology in the Index, it was also necessary to adjust and adapt the assessment from previous years. In the IMD Index results for 2023, Prague is ranked 14th overall out of the 141 assessed cities. For comparison, In 2021, Prague would have been ranked 10th out of 118 cities under the new methodology. However, its „letter“ rating has improved significantly, moving from A to AA in 2023 (categories are on a scale of AAA to D). This „letter“ scale shows how cities rate each other in each maturity group. Therefore, Prague ranks in the highest category.

INTERNATIONAL COOPERATION

The growing number of Smart Prague office projects with an international scope has meant the need for their systematic integration into the European context in recent years. The benefit of this international cooperation is the possibility of a broader exchange of information and know-how from pilot projects implemented across Europe. Moreover, international innovation projects contribute to the development of greater capacity, expertise and infrastructure in given areas. This global dimension also allows for a wider range of funding opportunities.

NEW EUROPEAN BAUHAUS

The New European Bauhaus is a creative and interdisciplinary initiative that connects the Green Deal for Europe to our living spaces and experiences. This initiative calls for a shared sustainable and inclusive future that is beautiful for our eyes, mind and soul. The NEB principles are directly based on the NEB-Star and CrAFt projects, which started in 2022.

The NEB Star project is coordinated by the Norwegian Technical University (NTNU) and implemented in cooperation with Czech Technical University CTU between 2022 and 2025. The aim is to support the application of NEB principles in European city projects through pilot projects in Prague, Stavanger (Norway) and Utrecht (The Netherlands).

The CrAFt (Creating Actionable Futures) project builds on the NEB Star project and focuses on collaboration with research organisations and the creative sector. The main objective is to develop international cooperation in the three so-called ‚test cities' which are Prague, Amsterdam and Bologna. These cities are further linked to a network of seventy ‚reference cities', with the test cities taking the role of the capital city of the project and the reference cities draw inspiration and learn from their best practices. Specific pilot projects will be implemented in Prague based on international experience.

PRAGUE NEB INNOVATION TEAM

The NEB Innovation Team continued its activities in 2023, not only in connection with the NEB-Star and CrAFt projects. Within this team, an open memorandum of cooperation was concluded between the participating entities. This formally confirmed and strengthened the already established and well-functioning coordination between the Prague actors already working with the New European Bauhaus on different levels. Representatives of municipal companies, state-funded institutions or universities have a unique opportunity to coordinate activities or planned projects linked to this initiative, which goes beyond their individual fields of activity.

ASCEND

At the beginning of 2023, OICT newly joined the ASCEND project. This project, funded by the Horizon Europe program, is aimed at developing the Positive Clean Energy District (PCED) concept and is coordinated by Lyon, France. In addition

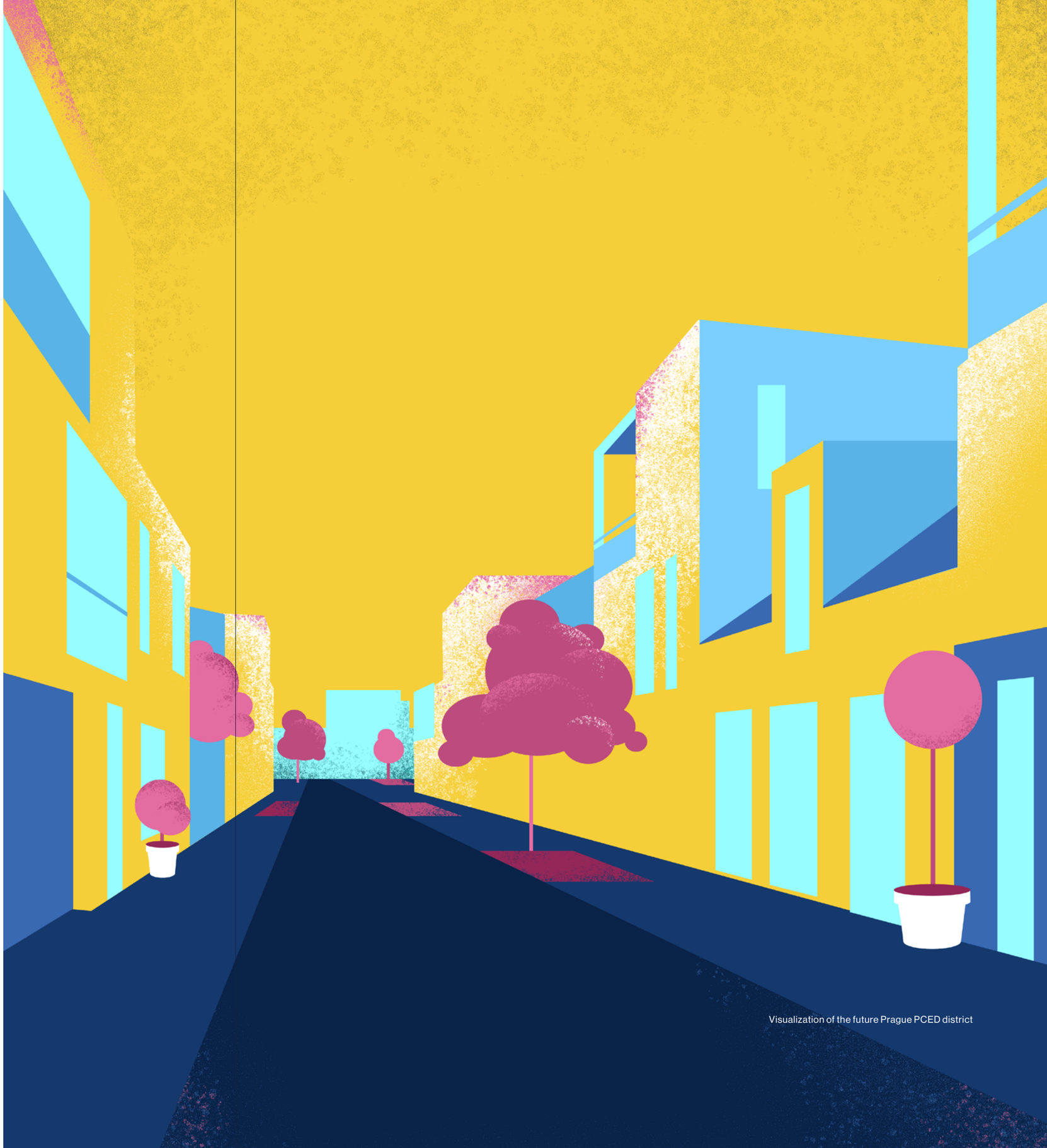
to the OICT, the Prague consortium consists of the Czech Technical University (UCEEB), the Prague Development Company (PDS) and the Prague Community of Renewable Energy (PSOE). The project started in January 2023 and will run for the next five years.

The focus of the ASCEND project is the pilot implementation of PCED districts in the cities of Lyon and Munich. As part of the project, Prague has the function of a ‚replication' city, whose task is to acquire know-how from tested models abroad and replicate them. The result of this effort will be the creation of an approach to the realization of PCED neighbourhoods in Prague and, at the same time, a proposal for their application in a specific development project in Dolní Počernice. A neighbourhood should be created there in 2028, which will not only be energy positive, but also climate neutral.

Source: CAMP (https://praha.camp/praha-zitra/project/7f04912d-7660-27bc-60fe-0f3a8aa5f775)

COMMUNICITY

Through the OICT, Prague further joined the European project CommuniCity in 2023. Through smaller pilot projects, it proposes an inclusive digital solution to specific socio-economic challenges of the involved cities. Prague participated in the second open call, which will subsequently include two smaller-scale projects. One of them concerns the collection of residents' feedback on local interventions in public space. The project is coordinated by Forum Virium Helsinki, a Finnish municipal company dedicated to innovative projects with an emphasis on social aspects.



Visualization of the future Prague PCED district

MOBILITY OF THE FUTURE

The direction of further transport development in Prague is subject to a systematic analysis of the existing situation, planned transport constructions and specification of current challenges. This is also the direction in which the area of the Mobility of the Future in the capital city is defined. One of the current and long-term challenges the Czech capital faces is the growth of the population of Prague and passengers who regularly commute to the capital. The mobility of the increasing number of people is thus increasing the demands on transport performance each year, including the transport of both people and goods.

The trend in transport performance is still growing and evolving. Modal split, i.e. the division of transport performance, helps the city to monitor individual trends and changes in society. These can be technological, social, health, etc. It is important from the city's point of view to maintain a certain balance of modes within the modal split that ensures the sustainability of transport in terms of space, finances and efficiency.

Public transport remains the main mode of transport in Prague, in fact, it became the second best public transport system in the world for 2023. From the perspective of transport planning, public transport is a strong foundation, what remains is to primarily solve the issue of the so-called first and last mile, i.e. the way to and from the public transport stop on every journey around the city. Typically, for the first and last mile, this involves walking, but other options have gradually been added, namely shared micromobility services such as shared bikes and scooters. This gives the user more options for choosing combinations of transport modes on their route.

The Smart Prague concept, brings a vision of Prague mobility that is clean, shared, intelligent and self-driving. This system includes, for example, modern check-in not only in public transport, which provides a wide range of services for passengers. These include, for example, purchasing fares in the PID Lítačka mobile app, searching for connections including their delays, paying for parking, searching for shared vehicles or combinations of transport modes on one route, so-called intermodality.

Further development of smart and autonomous mobility plans to make more use of data for adaptive real-time control of traffic lights at intersections, allowing better use of road capacity and active management of traffic flows with a preference for sustainable transport, especially public transport. The development of autonomous driving in public transport is also important and will allow for a reduction in the intervals between trains. Shorter train intervals will enhance the transport capacity. Full automation of train control is planned not only for Metro line D, which is currently under construction, but also for the existing metro line C.

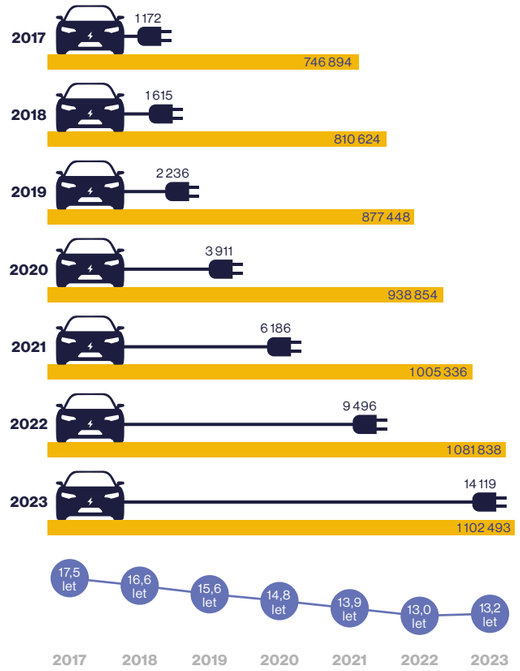
ELECTROMOBILITY

Electromobility should be perceived not only as an alternative to traditional internal combustion engines, but also as an innovative way of using the vehicles themselves. Cities and governments are increasingly promoting and developing this trend, particularly as a result of the need to locally reduce sources of emissions such as pollutants and dust particles in order to improve the quality of life of the residents. Electromobility is therefore becoming a key element in the transport sector, with a contribution to improving air quality and reducing dependence on fossil fuels.

Passenger Cars

For the purposes of this publication, an indicator is used to monitor all vehicles that meet the conditions for the ‚EL' abbreviation on the registration plate (RP), which includes hybrid vehicles that meet the emission limits.

The graphics below shows a gradual increase in the number of low-emission vehicles in the Prague Capital City, with a total of 14 119 that were registered in operation at the end of 2023, an increase of almost 50 percent compared to the previous year. However, there is also a growth in the number of all vehicles registered in the territory of the Prague Capital City and, unfortunately, the age of the vehicles has also increased over the last year. It is the age of the vehicles that indicates the potential for change over time, or, more precisely, the estimated time of the widespread impact of the introduced measures.



Number of vehicles on the territory of the Prague Capital City
Number of registered vehicles with the registration mark „EL"
Average age of vehicles on the territory of the Prague Capital City

Vehicles of categories M1 and N1 were counted, source Vehicle Register via the Data Cube

Electrobuses

Electromobility is being increasingly addressed by public transport providers themselves. While trains, trams and metros have been using this drive for more than a century, buses have also seen significant electrification in recent years. Many cities and transport companies are gradually switching to electric buses in an effort to reduce emissions and improve air quality.

This trend also supports the development of the infrastructure needed to recharge electric buses and integrate these vehicles into existing transport networks. The electrification of public transport thus represents a key step towards a more sustainable future, bringing not only environmental but also economic benefits through lower operating costs and less dependence on fossil fuels.

In 2023, e-buses travelled enough kilometres to circle the globe more than 15 times.

The data for Prague confirm the trend of gradual testing and introduction into service as part of the vehicle fleet renewal. Prague is also gradually returning to trolleybuses, which have been in trial operation with passengers on several lines since 2022.

	2017	2018	2019	2020	2021	2022	2023
Number of buses with electric drive (including trolleybuses)	2	2	2	5	23	36	38
Total number of buses (including trolleybuses) in the vehicle fleet of DPP (Prague Public Transit Company)	1 170	1 162	1 144	1 166	1 203	1 193	1 207
Total number of other buses PID contractors	934	1 022	1 350	1 516	1 889	1 956	2 049
Number of km travelled by e-buses (including trolleybuses)	60 755	45 940	116 660	168 930	55 377	410 907	617 902
Total number of bus kilometres	72 450 000	75 632 100	75 577 309	70 349 690	70 266 509	73 717 987	74 236 554
Number of vehicle-kilometres of DPP (Prague Public Transit Company) buses on the territory of the Prague Capital City	64 683 000	67 900 000	67 540 000	61 100 000	60 770 788	64 009 517	64 356 283
Vehicle-kilometres of city line buses outside DPP (Prague Public Transit Company) on the territory of the Prague Capital City	7 767 000	7 732 100	8 037 309	9 249 690	9 495 721	9 708 470	9 880 271

INFRASTRUCTURE

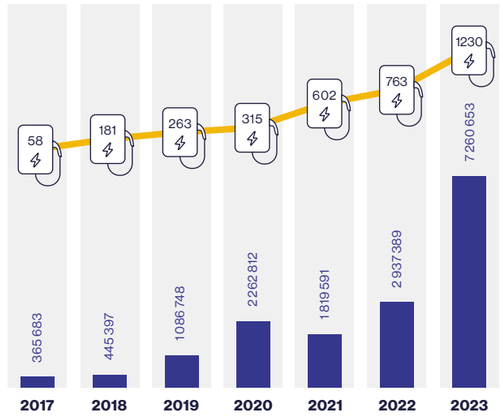
Charging infrastructure

As the number of electric and hybrid vehicles increases, it is essential to develop the infrastructure to enable their efficient use, including building charging stations and supporting research and development of new technologies. Electromobility not only contributes to environmental protection, but also opens up new opportunities for innovation and economic growth.

For this reason, Prague is monitoring not only the number of vehicles requiring charging infrastructure (see above), but also the expansion of the infrastructure itself. This is based on charging stations, which are divided into two basic types: fast charging stations (DC) and slow charging stations (AC). Another type of charging station, the so-called HPC (High Power Charging) station, is also a recent development. This is a DC charging system with up to 500 kW (500 A and 1 000 V). In 2023, a total of 5 of these were built in Prague.

Each type of charging station has its advantages and disadvantages. Fast recharging is required especially in places with a high traffic load, which is mostly transit. This means that people park, charge their car and then continue driving, aiming to stop for as little time as possible. To give you a better idea, we add that this is the equivalent of a standard gas station. On the other hand, slow charging has its use, for example, in residential charging, where the driver spends a longer period of time while the vehicle can slowly recharge, which can typically be at home, at work or when shopping in a shopping centre. There is a higher utilisation, i.e. a higher load, of the single charging stations at public fast stations in Prague. It can therefore be concluded not only that they are more popular with users but also that the development of electromobility as such is growing.

The 2023 trend continues to see further significant expansion of charging infrastructure, which is also more widely used. The expansion of infrastructure continues hand in hand with the interest in low-emission vehicles.



In about 4 hours the Temelín nuclear power plant can generate enough electricity to charge all the electric vehicles in Prague.

Between the years 2022 and 2025, the high scenario, according to the concept „Generel Development of Recharging Infrastructure in Prague“, predicts a total growing demand from 2 GWh (2022) to 26 GWh (2025) of electricity for about 16 000 vehicles. The real energy consumption therefore follows this increasing trend. In addition, visitors to Prague who do not have their vehicles registered in Prague can also recharge their vehicles.

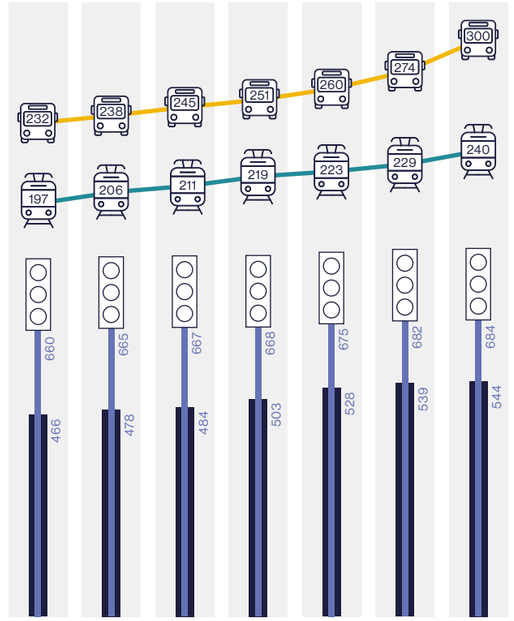
- Number of charging points
- Amount of energy consumed (kWh)

Traffic lights

Traffic lights (TLs) are one of the most important ways of traffic control today. TLs can have a static signal schedule, which means that the length of the signal is repeated over and over again in a selected direction and at the same interval. Another option is dynamic control of the TLs, i.e. a junction equipped with sensors. Such an TLs can then, according to predefined rules, adjust the signal schedule in favour of a particular direction (e.g. a busier direction or the arrival of a delayed public transport vehicle).

The data below shows the total number of TLs in Prague and the number of TLs connected to the Main Traffic Control Centre (MTCC). As part of the gradual renewal of traffic lights, the intersections are also being connected to the MTCC. This enables more efficient coordination and management of individual intersection solutions. The aim is to achieve smoother and safer traffic in Prague.

It also shows the number of TLs on the tram and bus network. These TLs are usually dynamic and respond to the current traffic situation. According to the current traffic and possible delays of arriving public transport vehicles, they adjust the signal plan and give preference to public transport vehicles.

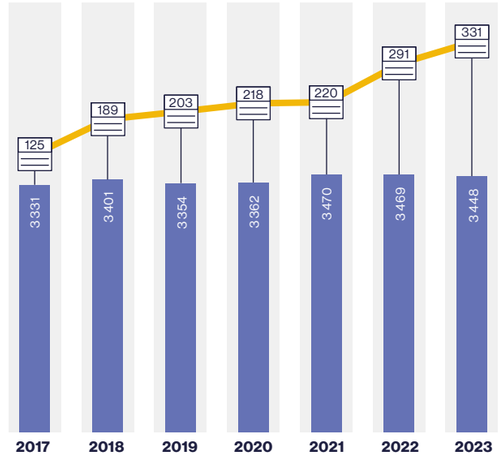


- Total number of TLs
- Number of TLs connected to MTCC
- Number of TLs with preference on the bus network
- Number of TLs with preference on the tram network

Device providing real-time departure information

The development of digitisation and online information is also taking place at public transport stations through devices that provide passengers with real-time departure information. The gradual renewal of public transport stops leads to an increase in the use of these devices at places that are very busy. This is the total number of all information panels providing on-line information on public transport departures (surface transport and metro).

- Number of devices providing real-time departure information located at public transport stops
- Total number of stops within the PID on the territory of the Prague Capital City



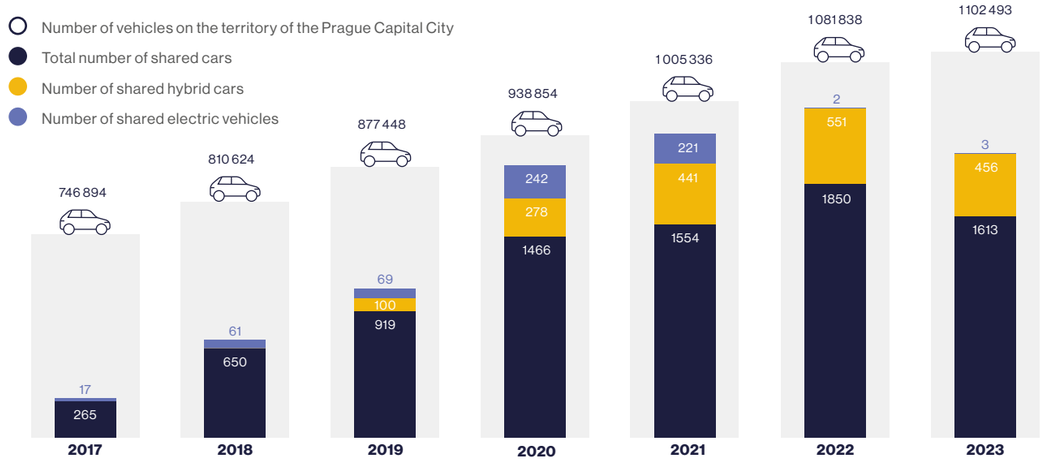
SHARED MOBILITY

Shared mobility is a modern way of using vehicles. Users can rent a vehicle from a service provider or from each other. These vehicles are always in circulation, therefore reducing the need for a permanent parking space. Vehicle sharing thus helps cities and their residents to save space in public places, as it is not necessary for one vehicle to occupy one parking space all day.

Modern cities are supporting the shared mobility trend in various ways. An example is the provision of free parking in paid parking zones when the vehicle is not rented. At the same time, cities are focusing on monitoring the fleet of car-sharing service providers and setting their benchmarks. This encourages the development of modern, safe, low-emission vehicles, while at the same time reducing the need for parking spaces, which is particularly important in historic parts of the city.

Data from shared mobility providers shows a 14% decrease in the number of shared vehicles for 2023. This slight decrease of about one-seventh of the vehicle fleet indicates the need for consolidation of rules and supply with demand in the Prague Capital City. At the same time, it can be caused by the gradual renewal of the vehicle fleet or the saturation of the market. Considering the positive effects of shared mobility, it is necessary to think about the ways of explaining the positive effects of this service for the city, its residents and visitors.

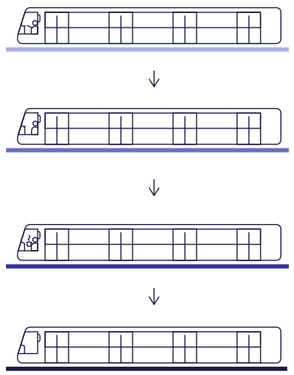
- Number of vehicles on the territory of the Prague Capital City
- Total number of shared cars
- Number of shared hybrid cars
- Number of shared electric vehicles



PUBLIC TRANSPORT

Autonomous control in the metro

Nowadays, we can see autonomous vehicles primarily off roads, most often on railways. Railways in particular have stricter rules than roads and therefore have the advantage of easier implementation of automatic vehicle control. For trains, the autonomous mode has the following stages automation:



AUTOMATION LEVEL 1:
automatic train security in operation with a driver

AUTOMATION LEVEL 2:
automatic train control in operation with driver

AUTOMATION LEVEL 3:
automatic train control in operation without drivers but with the presence of a train conductor

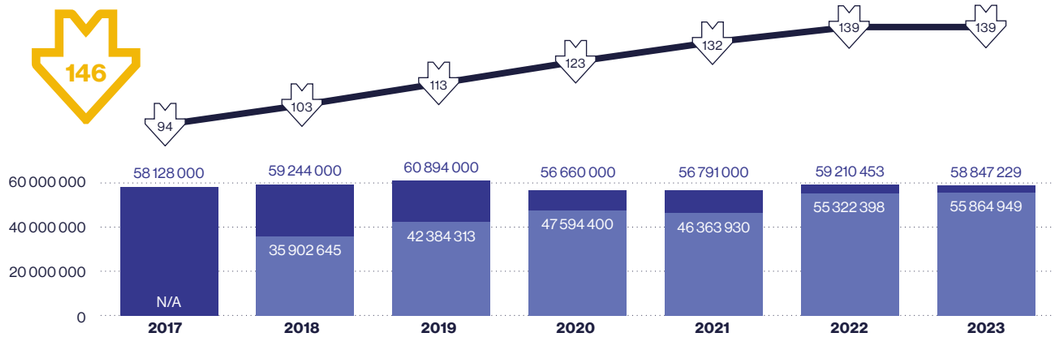
AUTOMATION LEVEL 4:
automatic operation completely without train staff

Automation level 4 is planned for the new Metro C carriages and Metro line D, which is currently under construction.

In the Prague metro, automation level 2 has already been implemented, specifically on lines A and C, and is gradually being implemented online B as well. This is the main reason for the gradual increase in the number of automated sets in the graph below. The automation online B also includes the replacement of the train protection device. The renewal of this technology not only increases the safety of the operation, but also enables a reduction in the time interval between trains, i.e. a reduction in the interval (increase in frequency of operation). However, this is also limited by the infrastructure itself - the metro route and the total number of trains.

The year-on-year comparison of 2022 and 2023 does not bring any major changes in the Prague metro system. Minor fluctuations in vehicle-kilometres travelled are due to closure activities and other incident events in the metro operation.

- Number of vehicle-kilometres travelled by public transport vehicles in autonomous mode
- Total number of vehicle-kilometres travelled by public transport/DPP vehicles - metro
- Number of autonomously controlled metro sets by automation level 2
- Total number of metro sets



If the metro maintains the average number of kilometres it travels per year, it could reach Jupiter in 10 years.

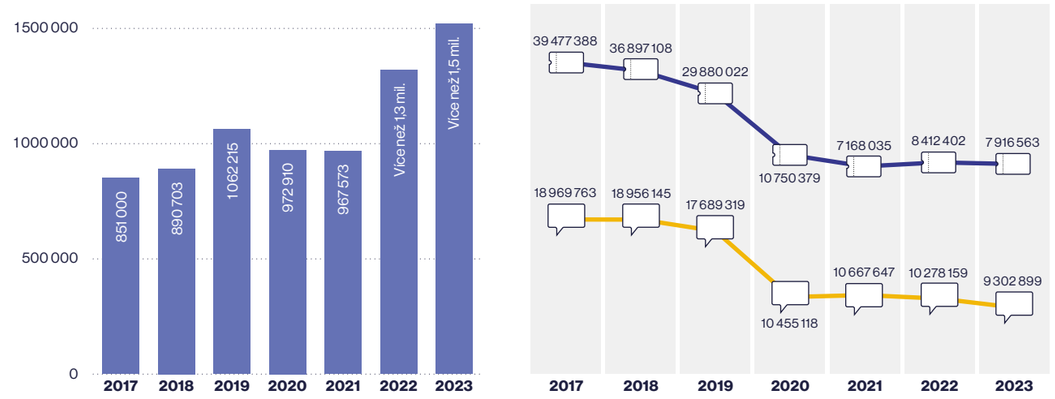
MOBILITY AS A SERVICE – MAAS

Accessibility of public transport

The accessibility of public transport in Prague is at a very high level, as proven by international surveys and evaluations, which place Prague's public transport in second place compared to the rest of the world.

The graph below shows the return of the growing trend of PID Lítačka mobile app users, which has reached over 1.5 million. The downward trend, i.e. a decline in usage, is evident for both paper and SMS (text message) tickets. In the medium term, it will be interesting to monitor the sales of paper tickets due to the use of contactless terminals for ticket purchase on vehicles.

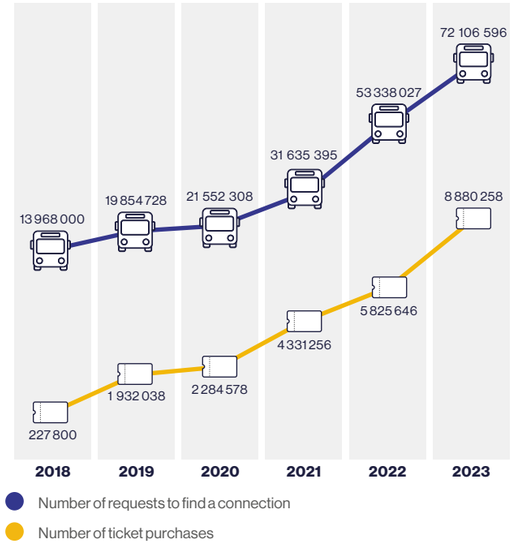
- Number of PID Lítačka users*
- Number of paper tickets sold
- Number of SMS tickets sold

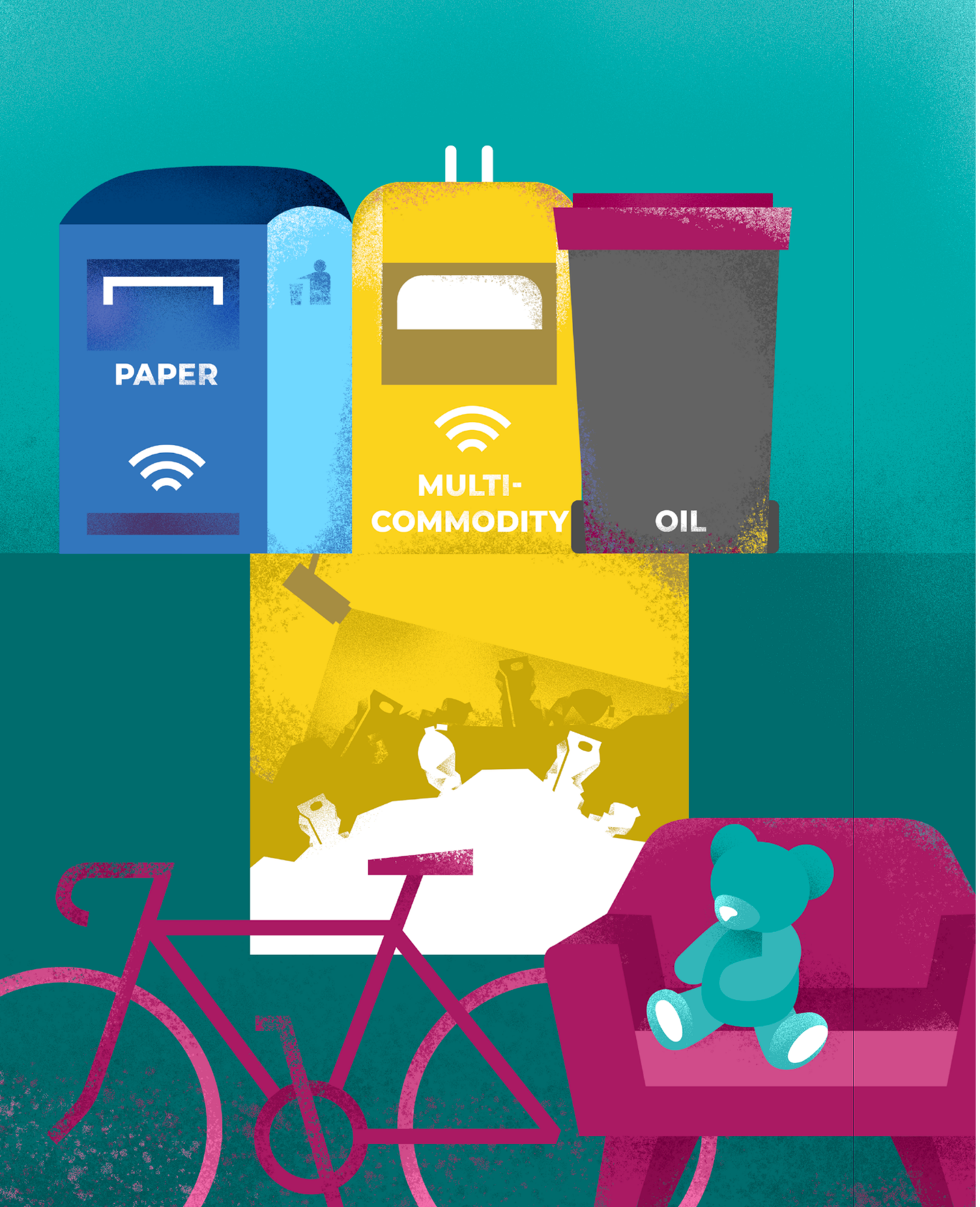


*PID Lítačka users: those who have an active coupon on any medium (Lítačka card, InKarta, digital coupon in the PID Lítačka mobile app, etc.)

Use of the city app for transport around the city

The PID Lítačka urban transport and fare-purchasing application continues to grow successfully among users, which is particularly evident in the number of searches for public transport connections. As the number of functions of this mobile app increases, so does its popularity among passengers. In the city app, the user can monitor the delay of public transport connections or purchase a travel document exactly for their route or for their friends and relatives. At the same time, a new-generation route finder was launched in 2023, in the form of a public test enabling its evaluation in real traffic. The next-generation route finder allows combining different transport modes and different providers, including private or shared bike, car, etc., on a single route (so-called door-to-door). The app guides the user to the nearest car park for the selected transport mode and brings many other improvements. Public testing is gradually helping to identify and then improve individual features and the comprehensibility of the app itself. It is thus a significant approximation of the MaaS concept (Mobility as a Service).





WASTE-FREE CITY

The fact that the world will never again be as our ancestors knew it is probably an undeniable fact. Just as the world around us is changing, so is the society that influences its shape. So it is us who hold the power to ensure, at least in part, that the environment in which we live and which the future generations will inherit, continues to be an ideal place for life for as long as possible. Recycling the waste we produce helps us to do this, among other things. The quantity and composition of waste is influenced not only by population development but also by changing consumer behaviour. As the use of delivery services, whether for eating out or for e-shopping has been increasing rapidly in recent years. Alongside rising living standards, the amount of waste produced by society is increasing, while at the same time more and more non-renewable resources and valuable raw materials are being used.

The primary objective of waste sorting is to reduce the negative impact of industrial production on the environment. If we want to keep our environment healthy and thriving for as long as possible, we need to think about what really belongs in the waste stream. In other words, it is essential that municipal waste does not contain components that can be reused, either by further processing, recycling or re-using.

The statistics show that a large number of households actively sort the waste they produce, and thanks to this there has been a year-on-year decrease in the production of mixed waste. It can therefore be concluded that 75% of the Czech population is not indifferent to the future of their surroundings, which is a great result, but we can work on it further. Thanks to waste sorting, a high percentage of all packaging placed on the market is recycled. Recycling or re-using are opportunities to prevent unnecessary waste.

Even though sorting waste at home may not completely save the environment from all the threats it faces from modern society, it will go a long way to reducing the negative effects of our lifestyle on the environment we live in.

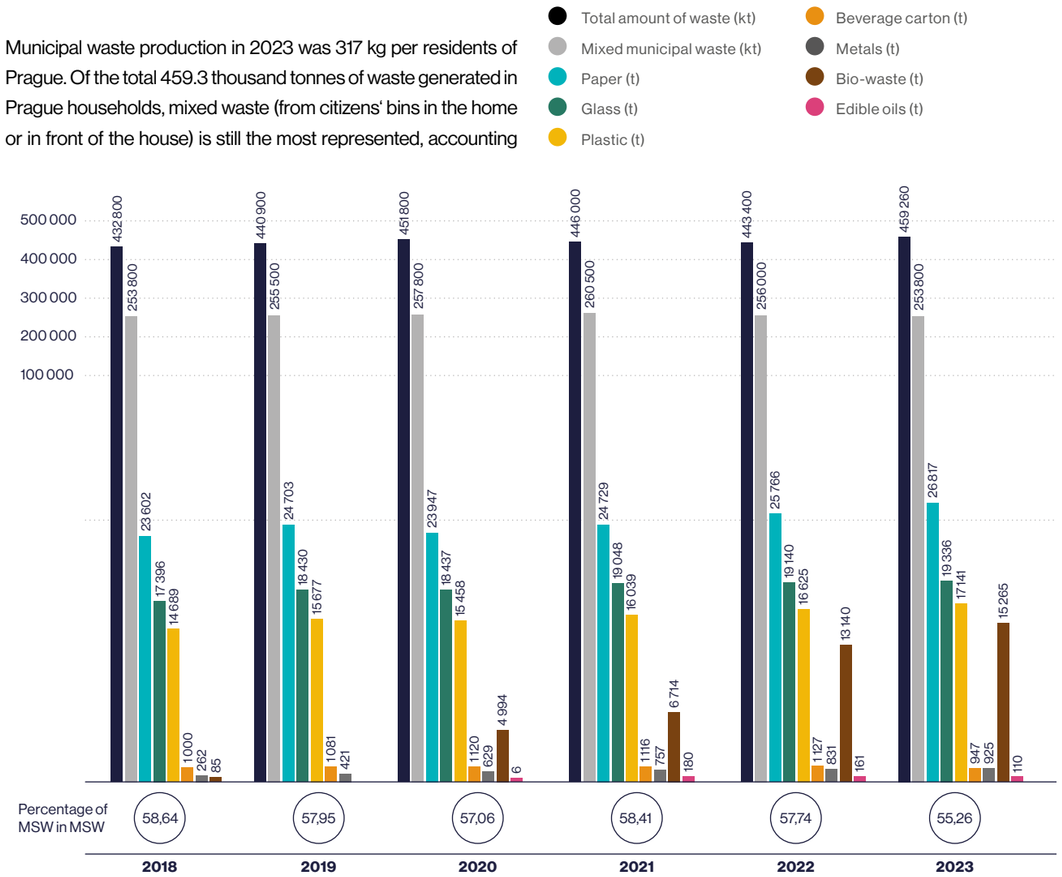
Sorting of municipal waste and its use

Depending on the requirements of the city and individual districts, the frequency of waste collection in the capital is continuously changing. The total annual cost of the system for the management of waste deposited by citizens in 2023 amounted to approximately CZK 2 183 million, of which less than thirty percent (CZK 648.7 million) was the cost of ensuring the management of discarded waste at public sites for sorted waste. The costs of collection, transportation and recovery/disposal of mixed municipal waste accounted for more than half of the expenditure on the management of waste from citizens (51% of the total). Compared to previous years, the costs in 2023 were increased by the subsidy provided for the operation of the Slivenec composting plant. Given the costs of running waste management in the Prague Capital City, it is necessary to coordinate all activities in a common strategy for responsible waste management, which will ensure efficient collection and material or energy recovery of the waste produced.

The *Mixed municipal waste (MSW)* indicator shows the production of waste from Prague Capital City citizens from containers placed at public sorted waste sites or from „residential“ sites. By

the end of 2023, there were 3,498 on-street sites in the city. The number of residential sites for sorted waste is increasing every year: 276 residential sites have been added compared to 2022. This brings the total number of sites to 3 332, with a total of 6 830 waste sorting points in 2023. If the residential sites are included, there are 177 residents of the capital city per sorted waste collection point, thus meeting the target set in the municipal waste management plan of providing one collection point for a maximum of 300 residents.

Municipal waste production in 2023 was 317 kg per residents of Prague. Of the total 459.3 thousand tonnes of waste generated in Prague households, mixed waste (from citizens' bins in the home or in front of the house) is still the most represented, accounting for just under 55%. The total amount of waste generated by the Prague Capital City has increased year-on-year, while the amount of mixed waste in black bins has decreased, which is positive news overall. At the same time, more recoverable components such as paper, plastic, metals, bio-waste and others were sorted compared to previous years.



The use of MSW and its components

Since the new Waste Act came into effect in 2021, there has been a trend to move away from landfilling and towards maximum sorting and recovery or recycling of waste, moving away from landfilling and thus meeting mandatory European targets. In view of the above, we are now increasingly hearing terms such as swap, re-use and energy recovery. Energy recovery is the use of waste in a similar way to fuel, either to generate energy or to extract the energy content of waste. To make it less simple, it must also be met that the waste used does not need another supporting fuel after it has been ignited and the heat generated must be used either for its own use or for other people.

The Prague Capital City aims to reduce landfilling as much as possible, most of the waste produced is used for energy recovery at the Waste to Energy Plant in Malešice (WEEE).

Here, the energy released during the incineration process of mixed municipal waste is converted into heat and electricity. The maximum proportion of landfilling for energy recovery of MSW has been set at 10 % by the Prague Capital City.

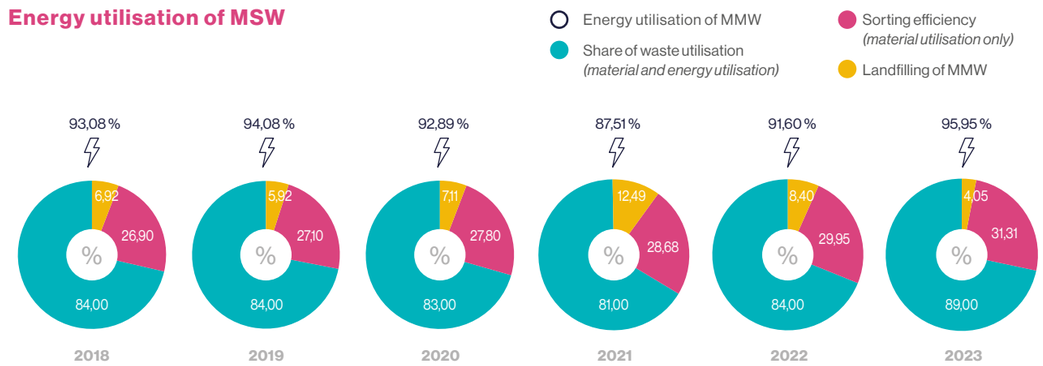
In 2023, a total of 268.7 tonnes of waste was treated at the WEEE, which is approximately 95% of the total amount of mixed municipal waste. As a result, the energy recovery rate of all waste has also increased year-on-year from 53% to 59% in 2023 (see infographic Energy recovery of MSW). In addition, some bulky waste, street litter and gastro waste are also used for energy recovery - but this goes to the biogas plant in Pribyšice near Benešov.

In 2023, the share of material recovery of all waste produced by the city was 31%. Its quantity increased by 10 thousand tonnes to 143.8 thousand tonnes in 2023. The increase in the amount of materially recovered waste is due to the collection of bio-waste through free containers delivered to citizens directly to their family or apartment houses. This move by the capital has repeatedly led to a reduction of biodegradable waste in the MSW, which in turn has led to a decrease in the total amount of MSW from citizens in household containers (in so-called black bins). The first decrease in the production of waste in black bins occurred last year, which was the first time since 2014.

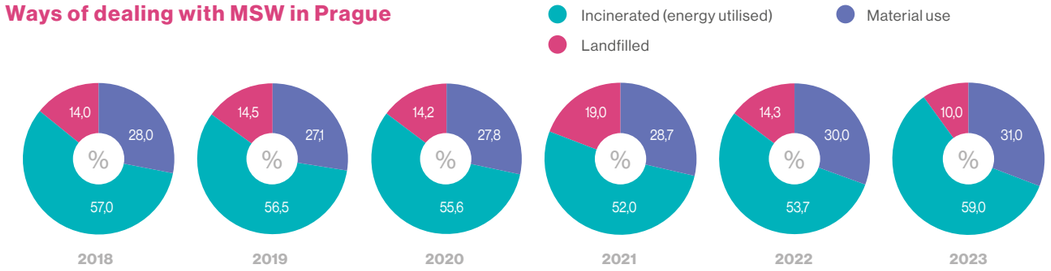
The kitchen scraps collection pilot project returned in November 2023 in a revamped form. During the period 2019-2021, the pilot project was carried out in the territory of three city districts - Prague 5, 6 and 7. During the duration of the pilot project, 39.59 tonnes of kitchen scraps were collected using gastro waste containers placed in 75 apartment buildings (approximately 1,000 households). Towards the end of 2023, it was decided to test the collection of kitchen scraps again, this time in eight urban districts, with the difference that the containers for kitchen biodegradable municipal waste (KBMW) are now placed at publicly accessible sorted waste sites - i.e. at the paper, multi-commodity (plastic and beverage cartons) and glass containers. These are 74 selected sites in the area of family housing in the eastern part of the metropolis with lower population density, where 240 litre containers with a sealing top rim and lid latch have been placed. As a result, a total of 2.28 tonnes of household kitchen waste was transported to the biogas plant for recovery in 1.5 months of the project's operation in 2023.

However, the collection of gastro waste is not new in the capital. Since October 2021, 28 schools have been able to benefit from free collection of gastro-waste from school canteens. In 2023, the interest in this free service, paid for from the city budget, was so great that 391 school establishments took part in the collection, from which 1 693 tonnes of waste were transported to the biogas plant.

Energy utilisation of MSW



Ways of dealing with MSW in Prague



All biological waste is composted - biologically used. Biological recovery is part of material recovery.

Material utilisation of waste

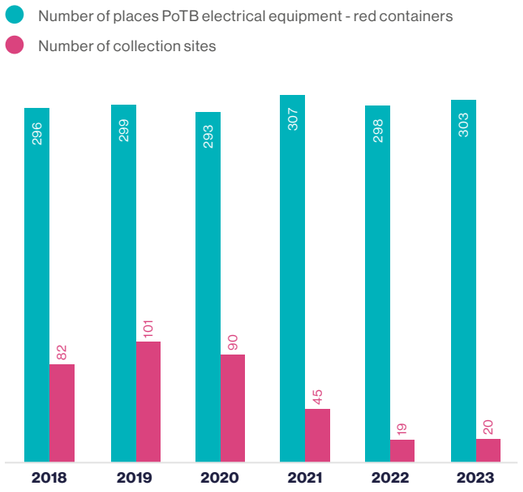
Material recovery puts waste material back into circulation as a secondary raw material, which often does not differ much in quality from primary raw materials.

The year 2023 was full of challenges for the collection yards (SD) operated by the capital. On December 31, 2022, due to ongoing construction on Rohanský ostrov, the collection yard on Voctářova Street in Prague 8, which was crucial for many residents to dispose of their waste free of charge, was closed. Although the city had to enter the new year with this challenge, it has managed to strengthen waste management options in other parts of the metropolis. Prague representatives managed to open two new collection yards during 2023, in the Prague 5 and 10 districts. This will ultimately increase the number of collection yards in the capital to 20 in 2023.

One of the significant changes that started to take effect at the Prague Capital City collection sites (CS) during 2023 is the change in the collection of tyres. Until now, tyres were collected under the waste collection system and a fee was required for collection at the collection site. However, this changed during the year and tyres began to be collected under the Point of Take-Back system (PoTB) - since then, there is no longer a charge for taking tyres to the collection site. This change has been a great success, as evidenced in particular by the number of tyres handed in. In 2022, a total of 257 tonnes of tyres were collected at the CS, and in 2023 this figure has doubled (549 tonnes), which is contributing greatly to the reduction of black dumps in the peripheral parts of the metropolis.

Thanks to the Point of Take-Back system (PoTB), the amount of electrical waste recovered from consumers for further material recovery is increased. Discarded electrical equipment is a valuable source of raw materials, especially precious metals, which would otherwise be disposed of in a less efficient way.

	2018	2019	2020	2021	2022	2023
Number of visits at stable collection sites	391 079	424 411	429 409	419 745	354 857	386 910
Quantity of bulky waste from LVC, CS, MCS (t)	34 205	37 585	40 627	39 805	37 282	37 871
Number of residents of the Prague Capital City	1308 632	1324 277	1335 084	1274 562	1286 120	1384 732



Due to the low interest of citizens, the mobile collection site service was discontinued in June 2021, which is reflected in the decrease in the number of collection sites from 2022.

A total of 4 680 large-volume containers (LVCs) appeared on the streets of Prague during 2023. These are allocated to districts according to their population, with each district having a minimum of 10 LVCs per year as a means of preventing the creation of illegal dumps. Representatives of the districts then decide on the location and dates of delivery. The total amount of bulky waste collected by collection yards or bulk containers in 2023 was 37.87 thousand tonnes. From June 2021 onwards, the recoverable components of bulky waste are separated from the bulky waste at the collection yards and from the LVCs delivered to the streets, thus reducing the production of residual bulky waste.

A total of 29.6 tonnes of old textiles were collected at the city's collection yards in 2023. All textiles are 98% used for material help. Unsuitable material is made into cleaning sheets for humanitarian purposes or used as alternative fuel for cement plants.

For the year 2023, a total of 3 700 toner cartridges were collected at the collection yards, of which 676 were suitable for refurbishment and the rest were sent for disposal by incineration as the refurbishment process was not possible.

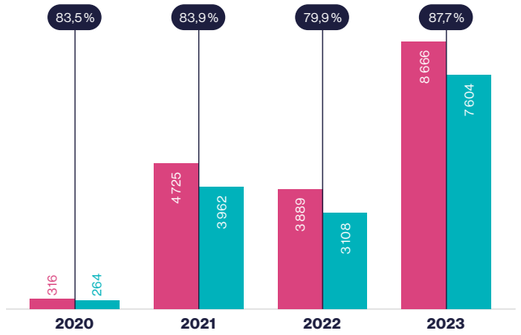
Utilisation of re-use points and points of take-back

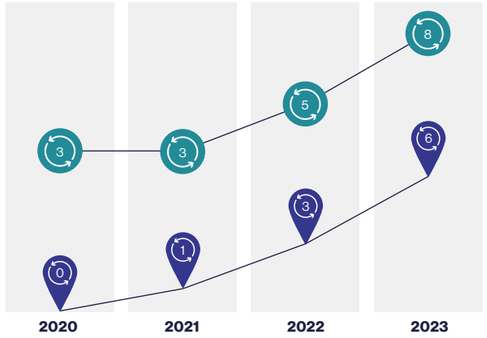
We will stay with the collection sites operated by the capital city for a little while longer, as the year 2023 was not only full of challenges, but also of further development. Three more collection sites of re-use points we added during the year, bringing the total number of these collection sites in Prague to eight. Re-use has been a big trend in recent years, as can be seen in the infographic. In 2023, the amount of material recovered through re-use points will more than double compared to 2022. According to the waste hierarchy, the use of re-use points and take-back points is the second strategic objective after waste prevention per se. The aim of re-use is not to throw away an item if it can be repaired or made useful to someone else. Re-using things is much more fundamental to reducing waste than reducing or recycling it. As part of its waste prevention strategy, Prague has expanded the number of free drop-off points for its residents in 2023 for items such as furniture, books and sports equipment - items that could be reused for the city's people in need.

Although the metropolitan authorities are trying to extend free services as close as possible to their residents, they are increasingly encountering the problem of black dumping sites during the renovation of houses and apartments. Despite all the efforts to simplify waste management, there are still many residents in Prague who do not use collection sites, but find it easiest to just take their waste to the nearest place for separated waste - the coloured waste bins. The amount of bulky waste cleared from the sites designated for the separate waste bins is thus increasing year on year, and this year up to 5 707 tonnes of bulky waste such as cupboards, chairs and household electronics were removed from sites not designated for this waste.

An alternative option for disposing of items that are still in good condition are Reuse Days or SWAP events. In recent years, the demand from society for events like this has been growing rapidly as the number of people committed to sustainable living continues to increase. For them, SWAPs are a highly desirable and effective alternative to buying new items. The Prague Capital City has therefore continued to organise Reuse Days in 2023, which are in great demand among the citizens of the metropolis, and in cooperation with six municipal districts has increased their number to six during the year. In total, Prague residents brought 4 078 kg of various items to these events, ranging from books to clothes to kitchenware and furniture. At the same time, 88% of the items were taken away by those who visited the days. The remaining items were handed over to organisations that will make further use of them or donate them to the ones in need.

- Material received (pcs)
- Material issued (pcs)
- Ratio of material issued to material received
- Total number of re-use points in the Prague Capital City
- Collected textiles in stable collection sites (t)





In 2023, the Prague City Hall continued to use data from sensor measurements placed in bottom-dump containers and underground containers for sorted waste. At the end of the year, additional sensors were purchased, which enabled Prague to monitor the filling of other types of sorted waste containers located in the streets. At the end of 2023, there were approximately 7 200 selected separated waste containers equipped with sensory solutions on the streets of the metropolis. The city uses the measured data from the sensors as one of the important bases for adjusting the frequency of collection. Thanks to the continuous evaluation of the data on the actual filling of the containers, it is possible to react flexibly by changing the frequency of waste collection and thus to direct waste management expenditure more efficiently. For this reason, it is planned to extend the sensors to other containers in the coming years.

Ecological collection vehicles and their use

The number of kilometres travelled is affected, for example, by newly established or relocated sites, the extension of collection to a new commodity or service, or traffic closures that necessitate changes to collection routes. The economic situation in society, the behaviour of users (natural and legal persons, municipalities, Prague City Hall), the introduction of new technologies, etc. also have a major impact. In view of the above it is possible to evaluate the predictive power of these indicators over a longer period of time. Over the last year, the amount of harvesting equipment has also been affected by the war in Ukraine, where the supply of materials is not as flexible. Another influencing factor is that the collection company Pražské služby a. s. is now 100% owned by the city (in-house status), making it a public contracting authority. This means that it now has to compete for contracts, even for the purchase of new collection equipment - the process of renewing collection equipment is thus prolonged.

The number of alternative (eco-friendly) powered collection vehicles is continuously changing in relation to the purchase and retirement of outdated machines. However, during 2023, the 4 transport companies together drove more than 640 000 km with alternative fuel vehicles, the highest in the last 5 years.

The waste collection company Pražské služby did not purchase new alternative fuel vehicles in 2023, but tested them very carefully, as evidenced by the approximately 575 000 kilometres driven with alternative fuel vehicles. These vehicles are considerably more expensive, so before acquiring such a vehicle, the collection company representatives want to be sure that the currently complicated recharging or fuel retrieval will be easier and more seamless, as it is not possible to disrupt the waste collection schedule. In view of the EU's increasing pressure to reduce emissions, the representatives of Pražské služby have for now at least upgraded its collection equipment with class 6 vehicles, which have extremely low emissions..

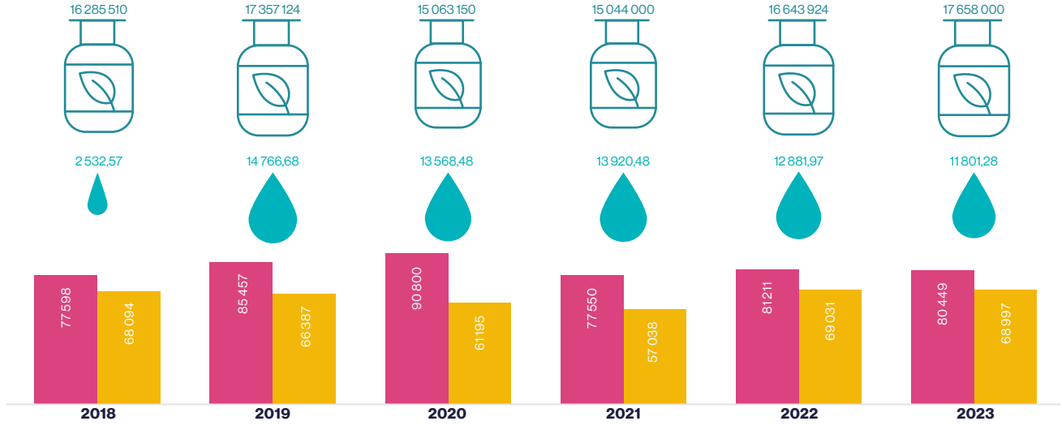
SEWAGE SLUDGE CONVERSION INTO RAW MATERIALS AND AMOUNT OF ENERGY PRODUCED

Sewage sludge utilisation

Untreated sludge must first undergo a hygienisation process to significantly reduce the content of pathogenic organisms and thus the health risks. In other words, only sanitised sludge can be used. Hygienised sludge is generally considered to be sludge in which the indicators of pathological organisms have been reduced to the required values. The application of sludge is one of the alternative ways of adding a certain amount of organic matter and nutrients to the soil and thus providing protection against erosion. The amount of sludge dewatered is related to water consumption or the amount of wastewater treated. The lower the water consumption, the less dewatered sludge is produced from wastewater treatment. The increased biogas production corresponds with the higher sludge production at the WWTP and the higher amount of imported waste entering the digesters.

In mid-September 2023, the company Pražské vodovody a kanalizace, a. s. (PVK) started producing biomethane and injecting it into the gas distribution network. In 3.5 months, 60 313 Nm3 of biomethane was delivered to the distribution network from PVK.

- Biogas volume (Nm^3)
- Liquid waste received and treated by WWTPs in the territory of Prague Capital City (t)
- Hygienised dewatered sludge from wastewater treatment (t)
- Amount of electricity and thermal energy produced within the WWTP (MWh)



The central wastewater treatment plant in Prague is 99% self-sufficient in both electrical and thermal energy consumption

PVK workers dealt with a total of 4 487 water network accidents in 2023, which is 613 (15.8%) more cases than in the previous year. Compared to 2022, the average time for a single water supply interruption from a single accident decreased from 10 hours and 27 minutes to 8 hours and 29 minutes, which is about 2 hours less time with no water flowing. Of the total number of accidents, 72 fell into the so-called Category 1, which includes accidents in which the supply to more than 1 000 residents is interrupted, or those that impact health facilities or other important facilities. The most common causes of accidents were corrosion of materials, in 72.9% of cases, while 22.2% were due to ground movement (e.g. due to frost).

Although the number of accidents increased by about 16% year-on-year, the average time of interruption of water supply by one accident decreased by 2 hours year-on-year - this the same as the length of a journey from Prague to Brno.

Just under 5% of accidents were caused by external fault or material defect.

SMART BUILDINGS AND ENERGY

Energy, as one of the key areas of the Smart Prague Concept, stands on the threshold of change. The entire energy sector is moving in a direction that is designed to ensure a safe and reliable supply of energy obtained in an environmentally friendly way. In 2023, the extreme volatility of the energy market has become apparent, hitting consumers' wallets the hardest. On the other hand, there has been a huge surge in interest in renewable energy sources to ensure the independence of the European Union's energy supply. In fact, Europe has begun to move away from natural gas and oil supplies from Russia, looking for substitutes from other sources and putting pressure on reducing energy consumption.

In 2023, energy prices on the stock exchange gradually decreased. However, the impact on end consumers is gradual and will only become apparent in the following years. The Czech government has moved away from energy market regulation and launched significant energy saving subsidy projects for companies, municipalities and households.

For municipalities, and even more so for the Prague Capital City, which owns a huge number of buildings, such a development of supplier prices is an incredible burden. It is therefore necessary to approach the energy solution of buildings conceptually, to look for savings and local production possibilities. In this direction, the Prague Capital City is moving forward in addressing the energy ecosystem through smart building pilot projects, centralised energy purchasing, the search for energy savings and the construction of renewable energy sources.

Electricity consumption in the Czech Republic has fallen by 4.1% compared to 2022, that is 58.7 TWh. It is the lowest in 14 years. An even sharper decline is seen in the consumption of natural gas, which has fallen by 10.4% to 73.7 TWh. A similar situation can be seen in the supply of heat from the thermal energy supply system (TESS), which has fallen by 9.4% to 67.8 PJ.

This development is due not only to the reduction of energy consumption for heating and hot water, but also thanks to the favourable weather in the winter months. The support of energy saving measures and the boom of local photovoltaic power plants (PV) in particular is also evident. However, this places new demands on the distribution system, which must respond to the need for storage and grid stability.

In general, electricity consumption is expected to continue to grow due to new construction, the development of telecommunications networks and electromobility. Based on 2023 developments, much more emphasis will be placed on a stable and secure supply, especially from local renewable sources. The Smart Prague 2030 concept responds accordingly to these challenges in the form of efficient and sustainable energy in healthy and intelligent public buildings.

Increasing requirements for low energy consumption are contributing to the development and implementation of modern technologies in construction, industry and households. Since the end of 2021, all have been required to reduce energy consumption or cover their own consumption from renewable energy sources (RES). This is achieved by installing heat pumps, photo-

voltaic power plants on the roofs of buildings, etc. Modern systems for monitoring and controlling energy consumption and flows in the building are an integral part of this, so that energy consumption, and thus the building's carbon footprint, is as low as possible.

Modern technologies reduce energy consumption, but also ensure the quality of the indoor environment that affects our health. However, these technologies are not only installed in new buildings, but especially in existing buildings, which can be supported by subsidies such as the New Green Savings Programme, the Operational Programme Environment (OPE), the Operational Programme Technology and Applications for Competitiveness (OPTAC) and others.

Public lighting is also an important consumer of electricity and can take on additional functions, for example, to support the development of electromobility or air quality monitoring.

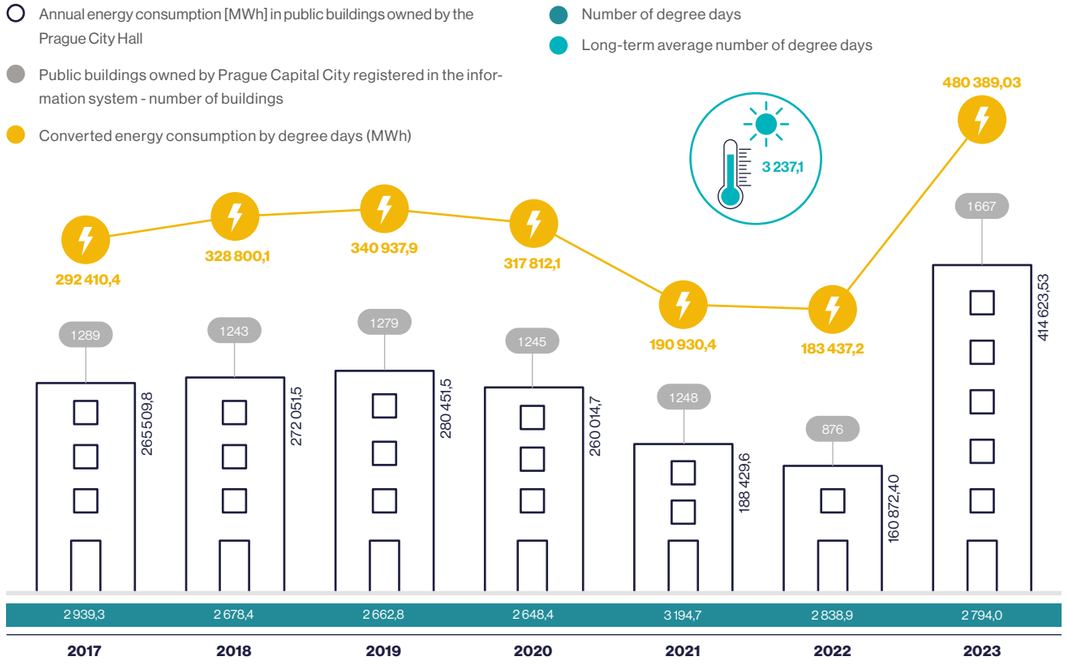
The Prague Capital City must set an example for other cities and municipalities and continue to support the development of low-energy buildings with a high-quality indoor environment, the use of modern technologies and the production of energy from renewable sources.

Energy consumption in public buildings (energy performance)

The indicator monitors the energy performance of public buildings in terms of energy consumption and refers to buildings and consumption points registered for centralised energy purchasing. Compared to previous years, the data structure has been modified and the number of monitored buildings has increased, therefore it is not possible to compare the energy consumption of a given sample of buildings year-on-year. The database now contains 1 667 buildings, which affects the resulting indicator.

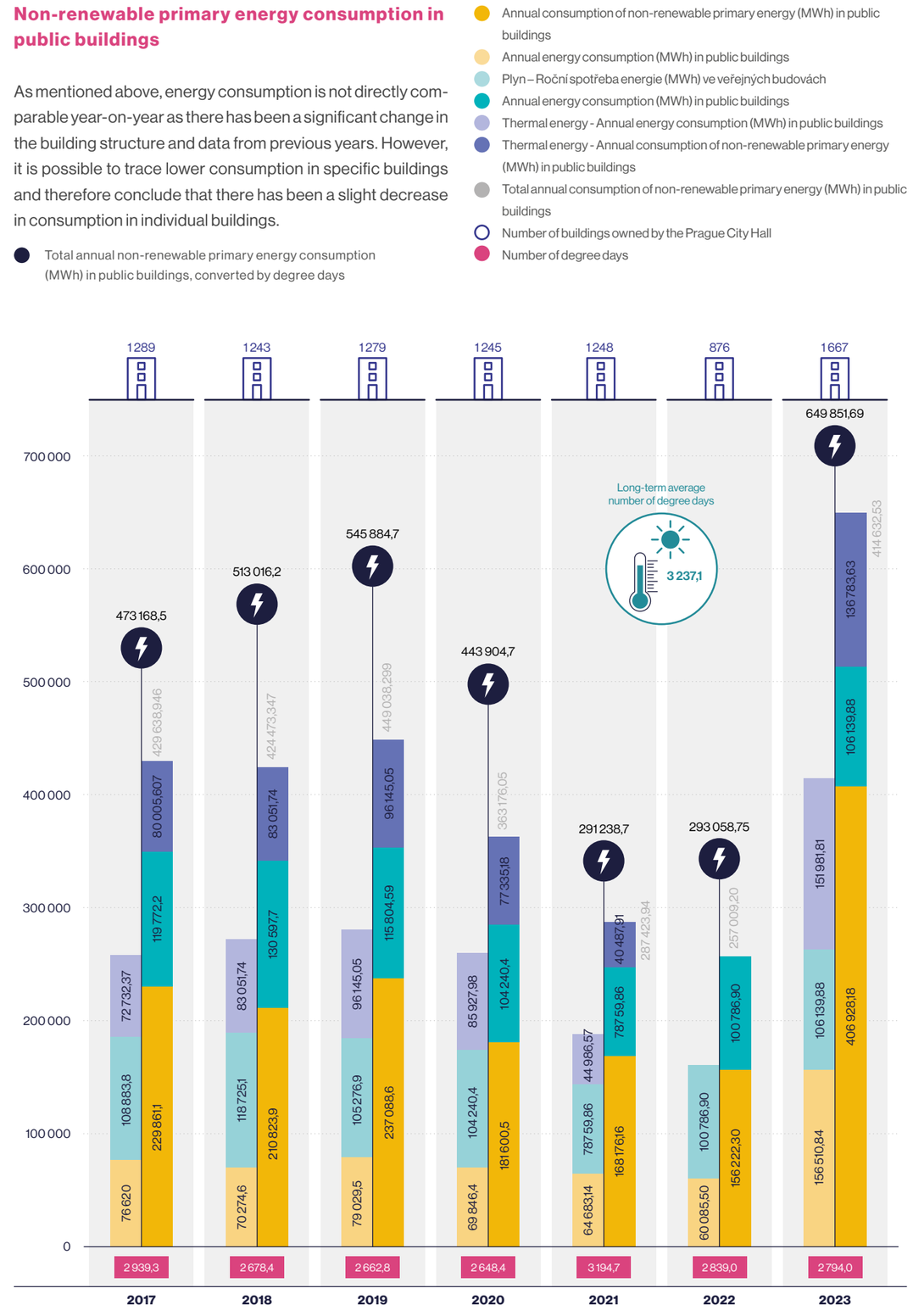
By looking at the data in more detail, especially in the natural gas consumption of individual buildings, it is possible to trace a reduction in consumption. The reduction in natural gas consumption is mainly due to a significant increase in the price of natural gas and efforts to achieve operational energy savings.

The average number of degree days in the long term is 3 237 (Prague - Karlov, 1961-1990). The number of degree days in 2023 is 2 794.0. The basis of the degree day method is the ability to trace the outdoor temperature from meteorological data. The calculation of heating degree days is used to determine the characteristics of the heating season - the number of heating degree days and the number of heating days - and is one of the procedures used to design, evaluate and compare heat sources and appliances. The calculation is conducted over the database of daily average outdoor air temperatures..



Non-renewable primary energy consumption in public buildings

As mentioned above, energy consumption is not directly comparable year-on-year as there has been a significant change in the building structure and data from previous years. However, it is possible to trace lower consumption in specific buildings and therefore conclude that there has been a slight decrease in consumption in individual buildings.

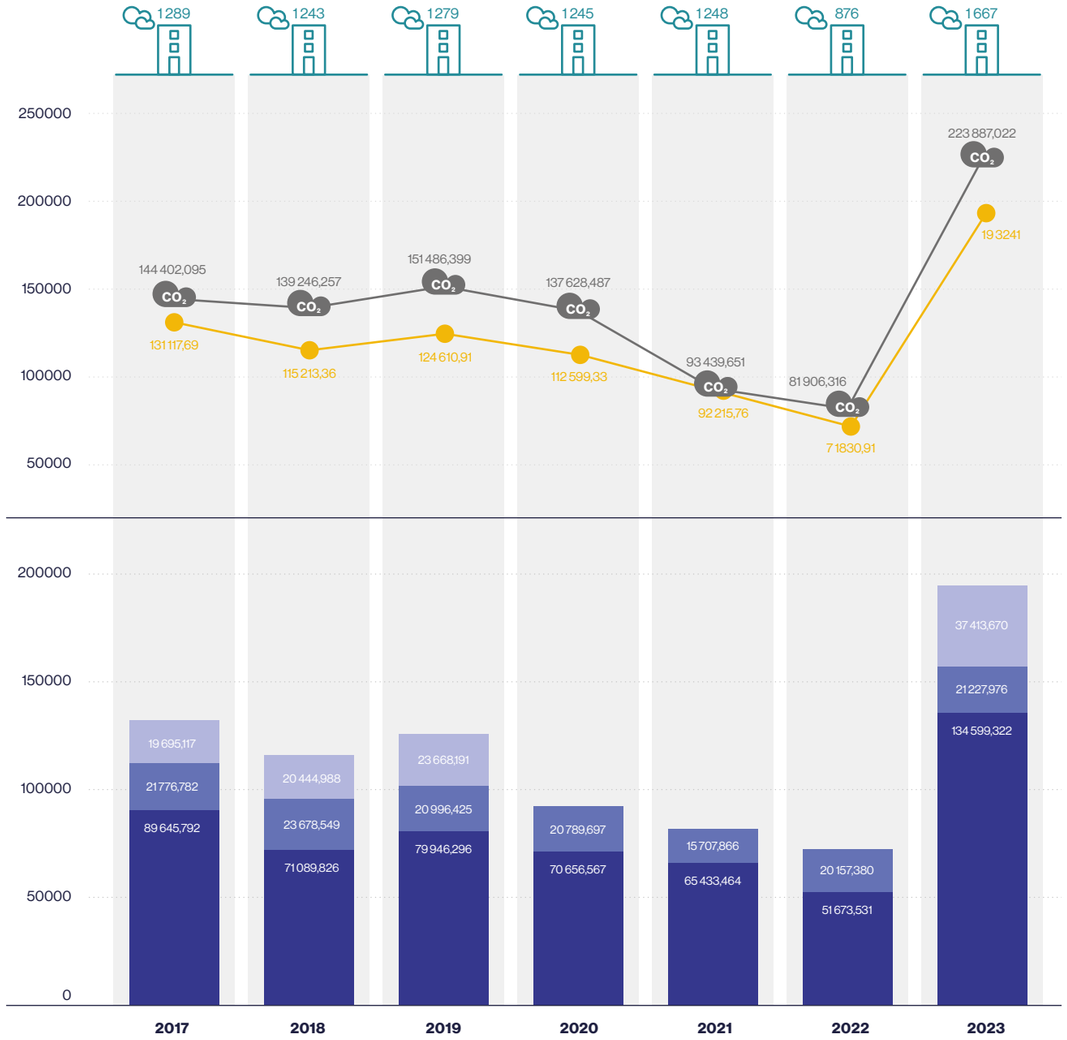


Carbon footprint of public buildings

The data of this indicator refer to the consumption points registered in the Prague Capital City energy tool. The carbon footprint is based on energy consumption. Its value is obtained by knowing the energy consumption of individual energy carriers and then recalculating it according to a table based on Decree No 140/2021 Sb., on energy audit. The increase in the value of the resulting indicator is mainly due to the increase in the number of monitored buildings.

- Number of buildings owned by the Prague City Hall for which statistics are calculated
- CO_2 emissions in public buildings related to energy consumption – converted to degree days
- CO_2 emissions in public buildings related to energy consumption
- Consumption-related CO_2 emissions in public buildings energy – energy thermal energy
- Consumption-related CO_2 emissions in public buildings energy – energy carrier gas
- CO_2 emissions in public buildings related to energy consumption - energy carrier electricity

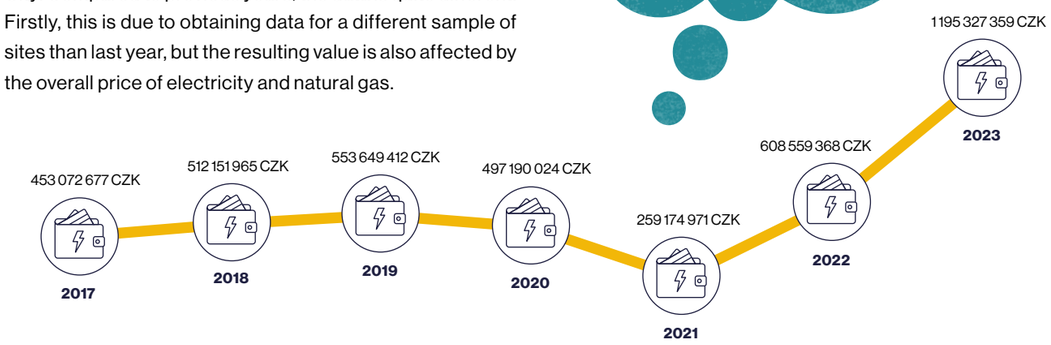
Long-term average of the number of degree days 3 237,1



Energy costs (in CZK)

Costs for electricity and natural gas in 2023 for consumption points registered in the energy tool of the Prague Capital City. Compared to previous years, the data is quite different. Firstly, this is due to obtaining data for a different sample of sites than last year, but the resulting value is also affected by the overall price of electricity and natural gas.

The public buildings in Prague consumed in 2023 as much natural gas as would be sufficient to heat up more than 5,300 households with an average consumption - that makes one small town!



Energy performance class of public buildings

Nowadays, so-called building performance energy performance certificates (EPC) are issued to assess the energy performance of buildings. In the EPC document, the energy performance of a building is divided into several classes. The energy performance class is indicated by the written designation A to G, whereby the designation A is given to extremely efficient buildings and the designation G to extremely uneconomic buildings. The validity of the EPC is 10 years, so there are only minimal changes in the indicator, as a new EPC is only prepared in the case of major changes to the completed building. For buildings larger than 500 m2, the EPCs were processed in 2013, so they will be gradually renewed and we should see larger differences in the coming years. In 2023, the Prague City Hall started the process that will lead to ISO 50001 certification. Part of this process is to consolidate all the EPCs created into a single database. All activities should be completed by the end of 2024, therefore this indicator will be presented again in the next Smart Prague Index.

Public buildings with green building certification

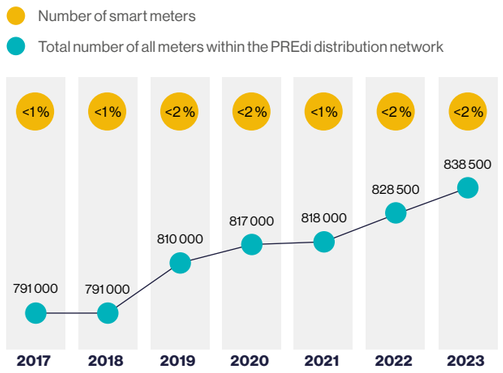
Certification systems are used to assess and evaluate buildings in the field of sustainable construction. A number of such tools have been developed in different countries around the world. They are becoming increasingly important from an ecological and marketing point of view, as well as from the point of view of operating and life-cycle costs in general. Certification provides a comprehensive assessment of a building. It can give investors or tenants an idea of the potential operational savings and marketing benefits, and can also serve as a motivating factor. Certification is also an appropriate tool for the public sector to meet the requirements of energy efficiency, not only for newly constructed buildings but also for existing buildings.

There are currently no energy-active public buildings in Prague, however, we can observe the number of public buildings that have energy monitoring and intelligent control at a high level of automation. Currently there is no unified record of buildings owned by the Prague Capital City with an energy monitoring system in place, but the OICT is working on pilot energy projects to map and provide this information in the future. As of 2020, the number of buildings that would fall into this category in Prague remains unchanged and currently stands at 56. The Prague Capital City continues to work on establishing processes that will lead to the final ISO 50001 certification. These processes also include energy monitoring of buildings owned and managed by the Prague Capital City. In the future, this indicator can be expected to be of increasing importance..

Degree of digitisation of the electricity distribution system

The indicator monitors the degree of readiness of the electricity distribution network of Prague - the distribution network of PREdistribuce a. s., (PREdi) - to use services associated with smart network capabilities.

The total number of meters on the distribution network means the number of consumption sites. A smart meter is one that has at least remote readout function. As can be seen from the table below, the total number of electricity meters in Prague is increasing year by year. This fact is due to the continuous, new construction. It is highly probable that this trend will continue in the coming years. In addition, legislative requirements for the installation of smart meters are going to start to take effect in the coming years.



Degree of digitisation of distribution systems

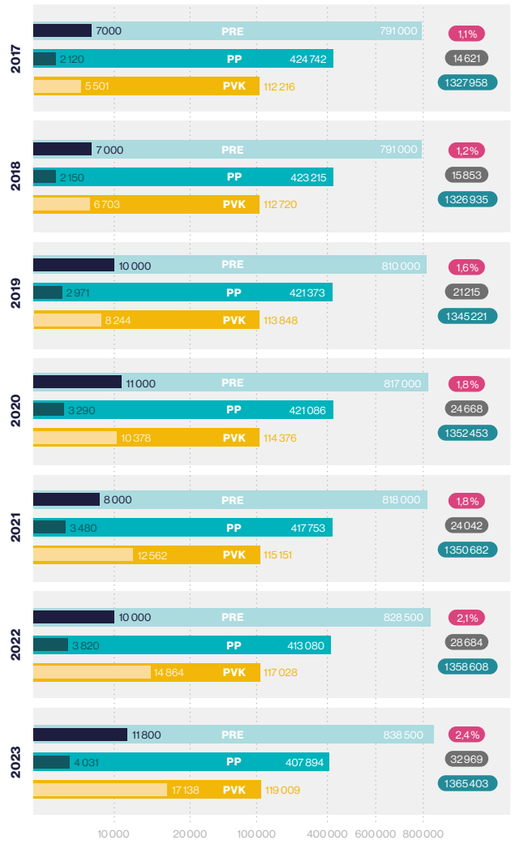
The indicator extends the previous category to capture the degree of digitalisation of all distribution networks in Prague. Last year, for the first time, the indicator exceeded 2 %. The level of digitisation will continue to increase in the coming years, which is due to both customer requirements and, in particular, legislative requirements.

In 2023, the number of smart meters at Pražská plynárenská, a. s. saw an increase. The wider use of smart metering is, in short, a trend that will continue.

The total number of meters at Pražská plynárenská, a. s. has again recorded a decrease, mainly related to customers in the Household category. Most often it is the customers who have cancelled their gas cookers and do not have any other gas appliances at home.

The number of smart meters of PREdistribuce, a. s. is increasing. In addition, much more significant growth is expected in the coming years as the legislative requirements related to smart metering are gradually implemented.

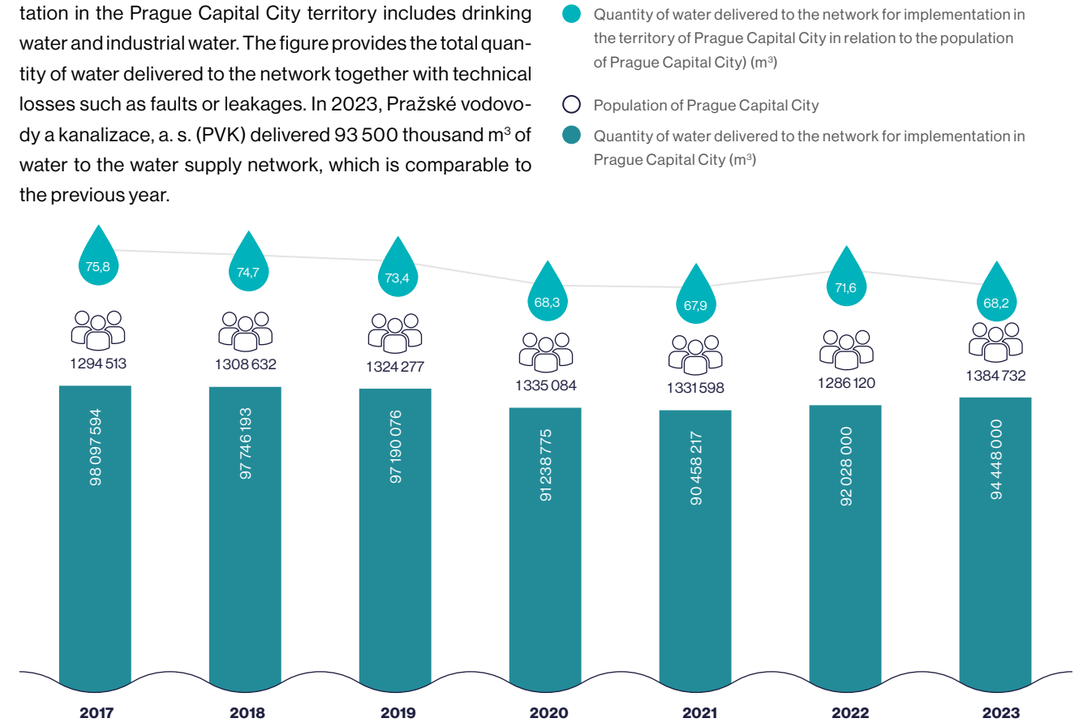
The proportion of water meters with remote reading is increasing every year. In 2023, the total number of remotely read water meters was 17 138. Since 2020, PVK, a. s. has succeeded in increasing the number of smart meters by more than 2 000 units per year.



- % of smart meters within the distribution network of PREdi, Pražská plynárenská distribution, PVK
- Number of smart meters
- Total number of meters
- Number of smart meters PREdistribuce, a. s.
- Number of smart meters Pražská plynárenská, a. s..
- Number of smart meters PVK, a. s.
- Total number of meters PREdistribuce, a. s.
- Total number of meters Pražská plynárenská, a. s.
- Total number of meters PVK, a. s.

Water consumption

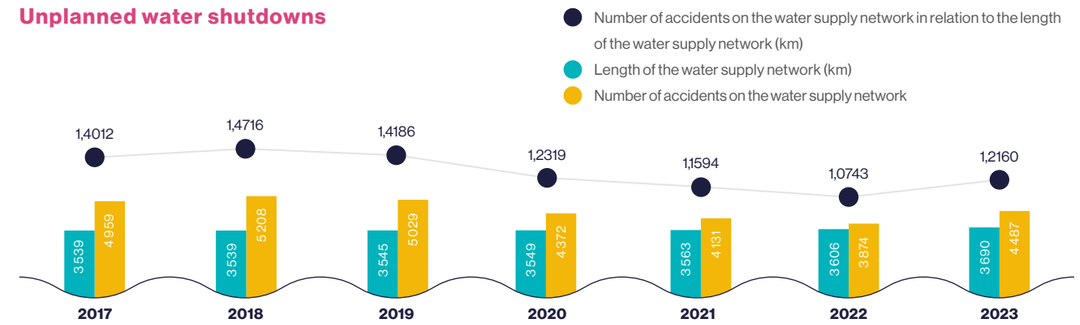
The amount of water supplied to the network for implementation in the Prague Capital City territory includes drinking water and industrial water. The figure provides the total quantity of water delivered to the network together with technical losses such as faults or leakages. In 2023, Pražské vodovody a kanalizace, a. s. (PVK) delivered 93 500 thousand m³ of water to the water supply network, which is comparable to the previous year.



Utilisation of grey water for energy – public sector

	2017	2018	2019	2020	2021	2022	2023
Amount of water preheated by grey water energy (m³)	N/A	N/A	N/A	8 712	7 895	5 195	3 261
Total water consumption in public sector buildings (domestic hot water and cold water in m³)	1 506 823,820	1 187 699,670	1 385 154,701	1 141 642,5	251 838,780	N/A	1 101 345

Unplanned water shutdowns

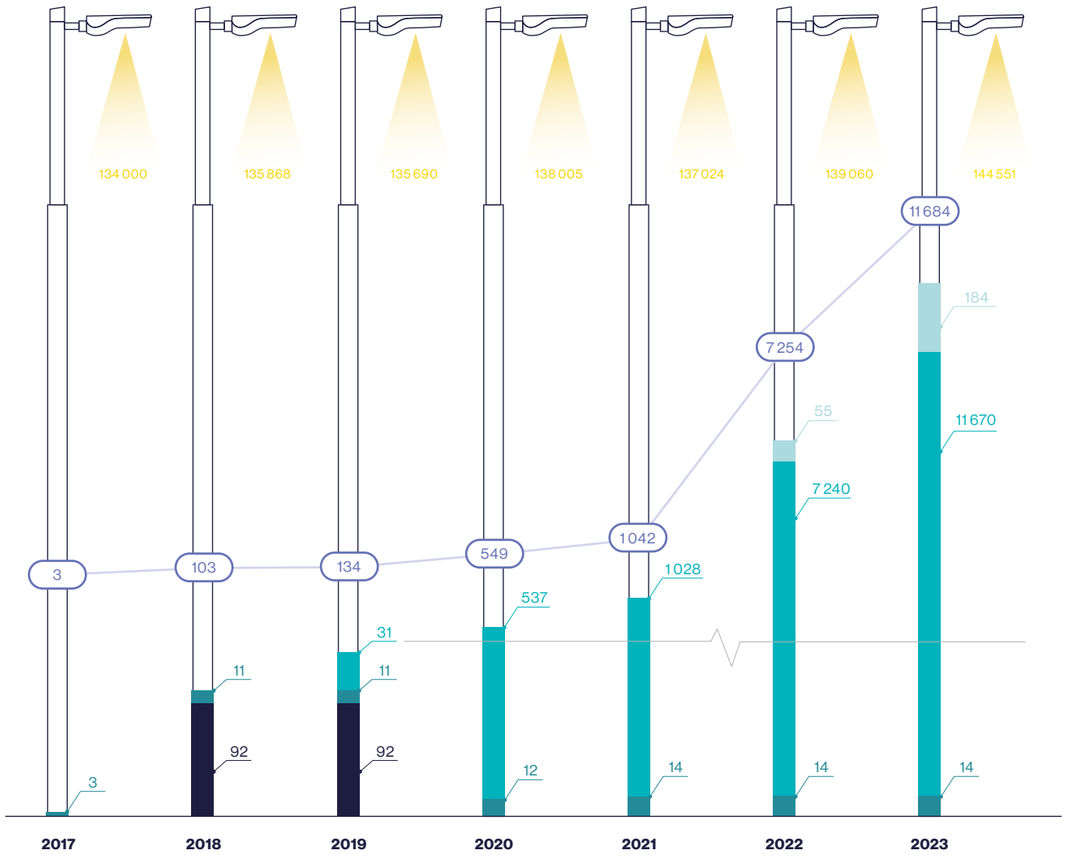


Intelligent lighting

The indicator is aimed at capturing the degree of public lighting (PL) modernisation.

In 2023, more than 4 000 new smart lamps were installed. The smart lamp can communicate remotely with the control room and reduce its intensity during the night. Some of the poles can also change their intensity depending on pedestrian movement or work during the night to change the light's chromaticity temperature.

Technologie hlavního města Prahy, a. s. (THMP) continues the trend of restoring the original poles and implements several pilot projects. Dynamically controlled public lighting is being tested in a number of Prague parks. The original existing sodium lighting is being replaced with more efficient LED luminaires with communication interface and control. This technology will allow testing of night-time dimming of public lighting.



Decentralised solar electricity generation

In 2023, the trend of a sharp increase in installed PV power plants continued. Compared to the previous year, the number of PV plants installed in the distribution zone of PREdistribuce almost doubled. Installed power increased by almost 30 MW. From the average power data, it is clear that these are micro-resources with an installed power of up to 10 kWp.

On the territory of Prague Capital City there are a total of 12 other micro sources of electricity with a total output of 23.13 MW, of which two are sources of landfill gas (5.65 MW), one source of sludge gas (5.40 MW), eight sources of hydropower (12.08 MW) and one wind power source (0.002 MW).

	2017	2018	2019	2020	2021	2022	2023
Amount of installed capacity of solar power plants on the territory of Prague Capital City (MW)	22,927 MW	22,823 MW	22,388 MW	23,39 MW	25,872 MW	36,465 MW	66,135 MW
Number of electricity sources installed on the territory of Prague Capital City	1 223	1 242	1 481	1 724	2 052	3 205	6 557
Average of the installed solar power	0,019 MW	0,018 MW	0,015 MW	0,014 MW	0,013 MW	0,011 MW	0,010 MW

ATTRACTIVE TOURISM

Prague is a place where history, culture and innovation meet. It‘s a city you want to visit and a city you want to live in. The proof of this is the growing number of residents in the metropolis and the number of tourists who visit it every year. It is for them that the capital strives to be the best place to live and holiday, which is why it focuses particularly on innovation in the area of services.

In 2023, the city hosted a large number of cultural events, as it does every year, which, unlike the offer of historical monuments, is constantly changing according to the trends of modern times. Prague, like other world capitals, is thus presenting completely new concepts of entertainment. However, our capital city also thinks about traditions and holidays, which are linked to popular annual events.

Prague offers cultural activities from spring to winter and has an immense number of sights worth visiting. There are also various exhibitions, concerts, sporting events and other events with diverse themes throughout the year.

In spring, visitors are welcomed every year by the traditional Matějská funfair, and markets open on Prague‘s embankments and in the squares of individual city districts. With the sunny days’ arrival, locals and tourists alike flock to the botanical and zoological gardens. The summer also sees a busy season of theatre and music festivals, accompanied by other outdoor events. The renewed concept of summer cinemas, the Prague Kinobus, sports and cultural events by the Vltava River and street festivals accompanied by gourmet experiences are also popular.

In autumn, visitors return indoors, where a wide programme of concert halls and auditoriums, theatre performances and diverse exhibitions await. Fans of gastronomy and wellness will also enjoy the cooler months. The winter season is inherently linked to Advent, one of the most popular times to visit the city. Prague is highlighted for its Christmas markets, but tourists also flock to the capital at this time for themed concerts, exhibitions and other Advent events.

Among the novelties of recent years is the unconventional exploration of Prague, whether it is exploring the city by bicycle, scooters, mini hot rods or buggies. Visitors can also discover sights through augmented reality, video mapping or with the assistance of robotic guides.

A large number of events are free, so everyone can enjoy them. E.g. Kinobus (mobile summer cinema), exhibitions, courses in Prague libraries (for children and adults), annual events (e.g. Czech Television anniversary, etc.), food festivals or other sports and community events.

In 2023, the Transport Company of the Prague Capital City held the 16th year of Kinobus and organised 44 screening evenings during the summer holidays. More than 20 films were screened in 11 Prague locations.

Using big data in tourism

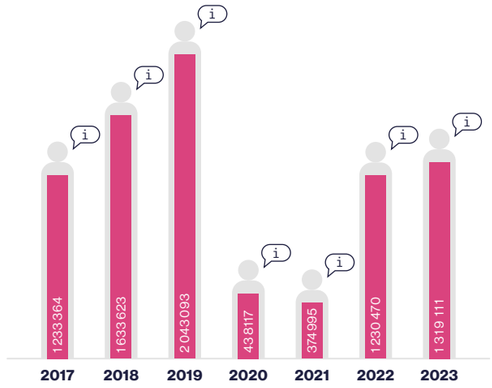
Tourism development can be targeted to relevant users through the collection and analysis of related data. Analysis of anonymised information from mobile operators helps to better target and improve services for visitors and map the tourism situation in individual Prague locations. This includes data on the approximate location, quantity and country of origin of SIM cards combined with GPS information, data on payment card usage, statistics on accommodation facilities, etc. This leads to an overall increase in the level of tourism.

Thanks to the City Possible platform, which is already used by more than 300 cities, the capital city has access to payment data reflecting cardholder behaviour, which is used to target marketing campaigns for visitors to the city, for example by the city company Prague City Tourism, a. s. (PCT).

Feedback from tourists

Tourist feedback is key to improving services in the city. The following graph shows the number of interactions with visitors to the capital through the information centres where PCT monitors their feedback.

Number of interactions in information centres



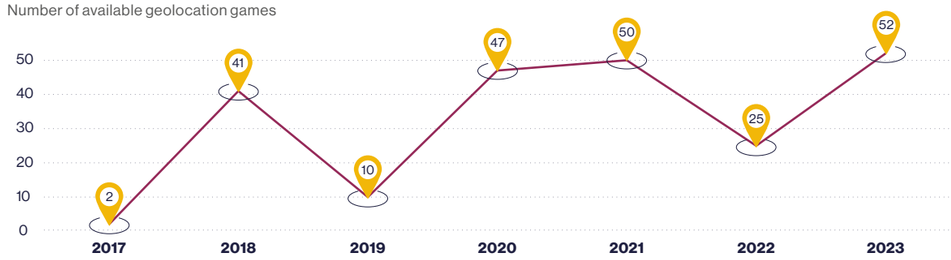
One of the oldest weather stations in Europe, which has been measuring temperature continuously since 1752, is the one in Prague's Klementinum.

Geolocation games

Geolocation games are a fun and knowledge-based activity in which people travel to a destination according to GPS coordinates and designated points. These games can be well used in tourism, e.g. as thematic route planning, and are especially aimed at young travellers and families with children. The stories have different focuses and plots.

In Prague, the GeoFun geolocation game with twenty-four routes and the Hidden Stories game with twenty-eight routes are currently freely available. The companies also offer private or corporate games with individual settings. The principle is not only to find individual destinations, but also to complete the tasks that await the player after reaching these locations.

Number of available geolocation games



According to the Guinness Book of Records, Prague Castle is the largest castle complex in the world with an area of 7.28 hectares.

Sensory visitor counting

Sensor-based counters can use various technologies to detect the presence of a person, allowing the city to monitor the movement of people in a particular location. This also helps them to analyse changes in the environment and manage the area in general.

In the second half of 2021, the Pedestrian Traffic Intensity project, aimed at monitoring pedestrians, particularly with regard to the concentration of crowds in public space, went into routine operation. Three technologies were tested during the pilot operation: Wi-Fi sensors, pyroelectric sensors and advanced video analysis on existing cameras of the city camera system (CCTV). After the successful pilot operation, we collected data at the following locations: Rašínovo nábřeží (embankment), Charles bridge, intersection of Na Můstku and Rytířská streets, Stromovka and U Výstaviště street – under the railway viaduct. The number of monitored sites remains unchanged in 2023.

2017–2019	2020	2021	2022	2023
0	5	5	5	5

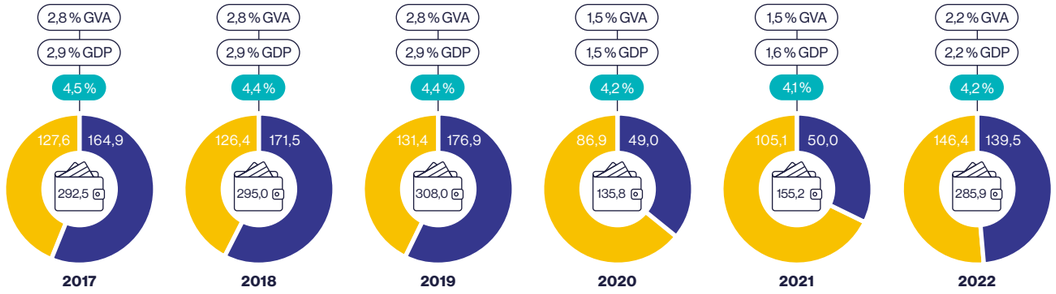
Number of places using sensors to count visitors

Tourism productivity

Prague is not only visited by tourists from foreign countries, but also from all parts of the Czech Republic. Their ratio is then displayed in another indicator that aims to approximate the productivity of tourism. To do this, it uses indicators relating to tourism expenditure, with a breakdown between expenditure by foreign visitors (foreign inbound tourism) and expenditure by domestic visitors (tourists from the Czech Republic). The ratio of the two indicators shows the ratio of the productivity of these groups of tourists relative to the overall result.

For further illustration, we present the percentage share of tourism in gross value added (GVA) and gross domestic product (GDP) on a year-on-year basis..

- Domestic visitor expenditure in billion CZK
- Expenditure of foreign visitors in billion CZK
- Total visitor expenditure on tourism in billion CZK
- Share of tourism in employment
- Share of tourism



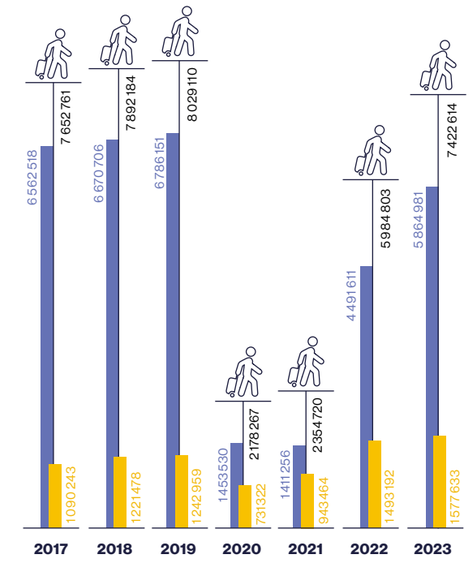
Data for one year back, i.e. for 2023, will be published in SPI 2024, which will allow to assess the situation with respect to the end of the covid-19 pandemic.

Number of visitors

The tourism traffic load of the capital is monitored in different areas (values), for example through the total number of visitors or the number of overnight stays in mass accommodation establishments.

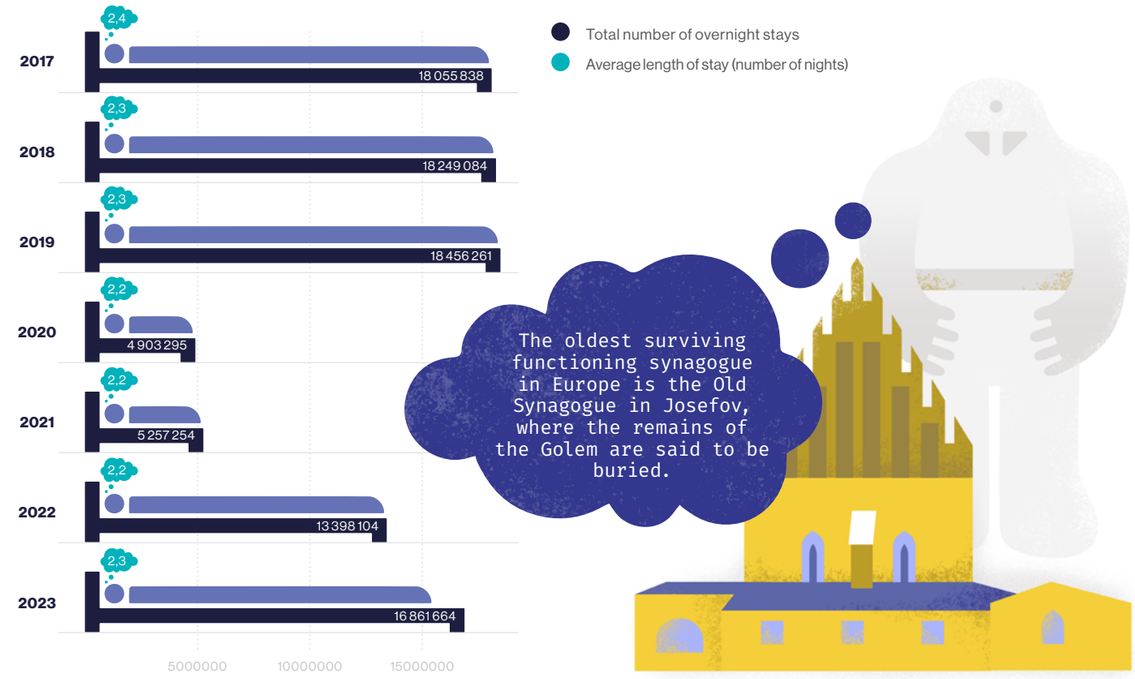
The number of visitors to the city each year is a very important indicator. It reflects not only the overall tourism situation, but also the capital's efforts to increase its attractiveness among European capitals. In 2023, the number of visitors to the capital rose by 24%, and the capital is also seeing a steady increase in domestic visitors.

Most foreign visitors came to Prague from Germany, the USA and Great Britain. According to data from the Czech Statistical Office (CSO), tourists spend on average 2 to 3 nights in the capital.



- Number of domestic visitors
- Number of foreign visitors
- Total number of visitors

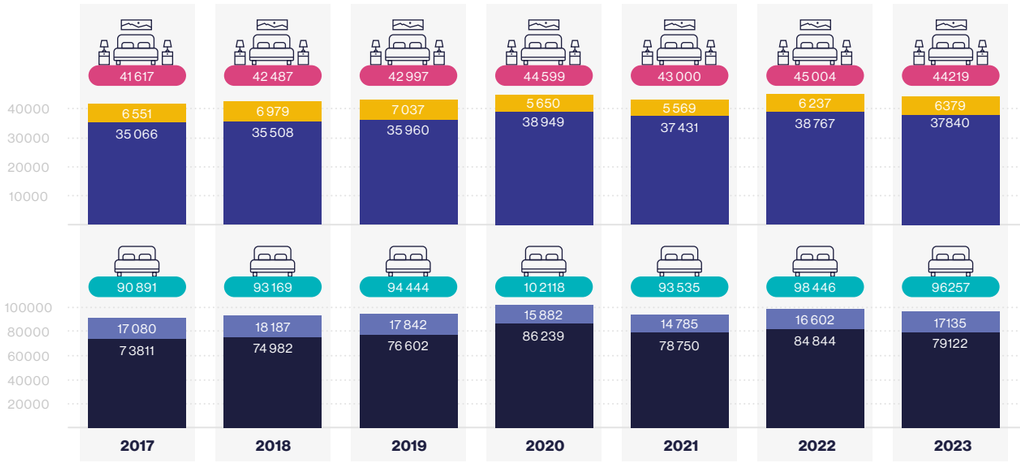
Number of nights



Number of rooms and beds

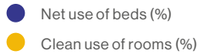
The overview compares the number of rooms and beds in hotel-type and other accommodation establishments. The number of beds in these accommodation establishments is also monitored year-on-year. The statistics do not include alternative accommodation facilities such as private accommodation or AirBnB.

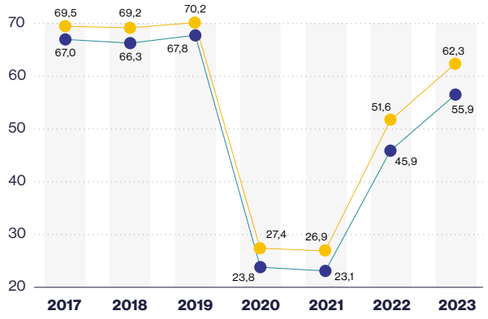
- Number of hotel type rooms
- Number of rooms of non-hotel type
- Total number of rooms (all accommodations)
- Number of beds in hotels
- Number of beds in other accommodation facilities
- Total number of beds



Room occupancy

The room occupancy rate indicator describes the use of beds and rooms in accommodation facilities in Prague. In 2023, room occupancy registers a slight increase. Comparing the last few years, we can see the effects of the covid-19 pandemic and the gradual stabilisation of tourism in the last 2 years.

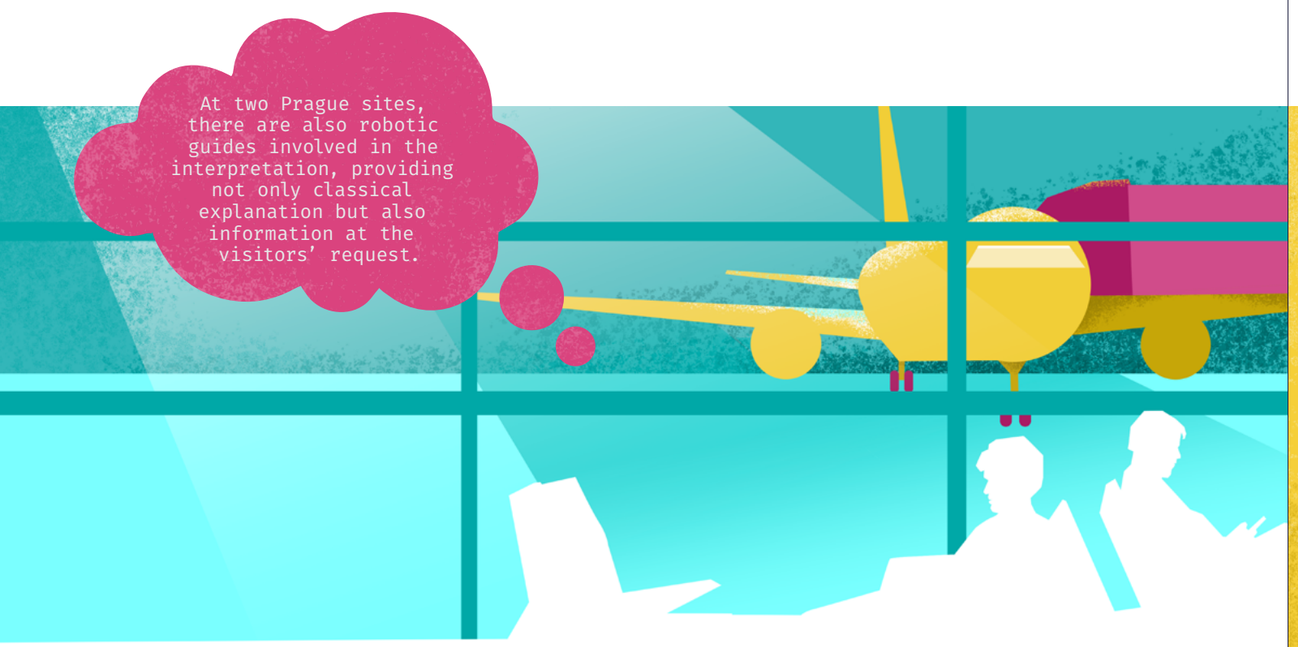




Prague Visitor Pass

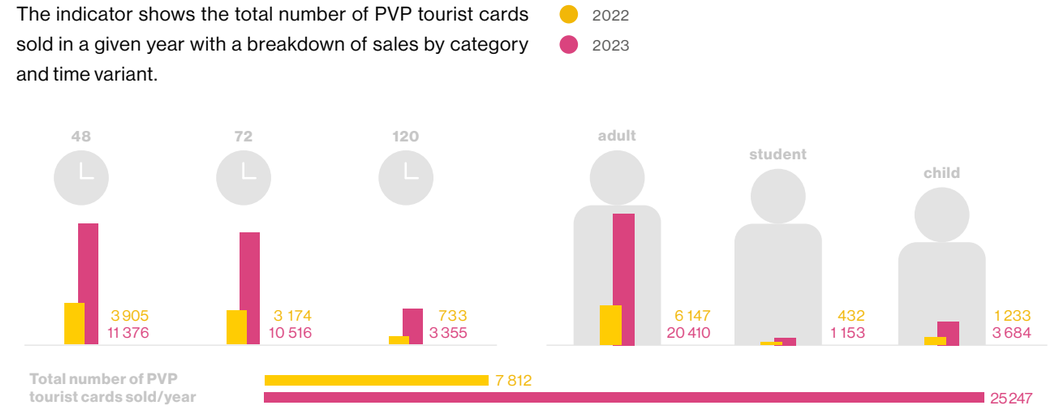
In June 2022, the City of Prague, together with Prague City Tourism, a. s. and Operátor ICT, a. s., launched the new Prague Visitor Pass (PVP), a comprehensive system including complete information, sales and check-in functionalities. A web and mobile application with an e-shop as well as a check-in system at participating monuments and attractions have also been created. The PVP is available both in the physical form of a plastic card and as a modern e-pass in the mobile app. It is available in three categories (child, student, adult) and three validity options (48, 72 or 120 hours). The card makes visiting Prague much easier, especially for foreign tourists. In addition to free or discounted admission to interesting tourist attractions throughout the capital, the PVP also offers free use of public transport and bus transport to the airport (Airport Express).

In 2023, the Prague Visitor Pass achieved a significant success, with its sales exceeding 25 000 units after a covid decline in tourism. 35 partners entities and institutions are cooperating on the project and the PVP benefits offer already includes more than 70 acceptance points. A positive trend for 2023, with regard to sustainable tourism, is the continuous increase in the ratio of e-Passport (i.e. PVP in the mobile app) usage compared to physical cards. The year also saw an increase in the share of the 120-hour PVP variant in total sales compared to 2022, showing that visitors are spending more and more time in Prague. Business development collaborations with partners to expand PVP sales channels also continued. Important partners in this area are online sales platforms (OSPs) and local and foreign entities such as hotels, travel agencies and carriers/airlines.



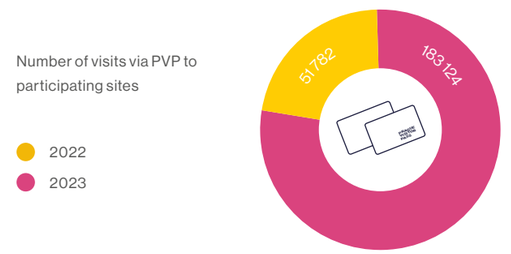
Prague Visitor Pass Sales

The indicator shows the total number of PVP tourist cards sold in a given year with a breakdown of sales by category and time variant.



Visitor numbers at the participating attractions

The indicator shows the total number of visits made via the PVP tourist card to all participating attractions, which has increased from 55 to 86 since the card was introduced in June 2022.



Usage by carrier

The Prague Visitor Pass can be used via two types of carriers. It is either a plastic card on which the customer has the voucher loaded at selected sales points, or a modern e-pass can be used via a mobile application.

PEOPLE AND URBAN ENVIRONMENT

A city can‘t be smart if it doesn‘t put its residents first. Modern technology is then only a means to create a safe and sustainable place where people thrive and develop into a strong and modern society. Innovative solutions in the urban environment impact the daily lives of its citizens, whether it is providing the most accurate information on public transport, digitising office services, or simple devices in public spaces that maintain urban greenery.Městská mobilní aplikace

Although 2023 was supposed to be a year of relaxation and a return to life as we were used to it before the covid-19 pandemic, most of the world had to contend with economic problems caused by ongoing global conflicts. Fortunately, the economic problems have not affected the ability of the districts to use the Participatory Budgeting facility, as the funds allocated to it have started to reach pre-pandemic levels again, with almost a third of all proposed projects reaching the implementation stage.

At a time when people may feel a higher level of uncertainty caused by the political or economic situation, it is the city that can provide its residents with a sense of security and use the resources of the modern world to maximise their quality of life. An example of this is the increasingly popular smart lighting, which saves electricity and reduces light smog in the city thanks to sensors and automatic adjustment of lighting intensity. The main advantage of variable lighting in more remote areas of the city is also to increase the safety of the residents in those locations. In Prague, the number of smart lamps increased by more than 60% in 2023, which is clear evidence of the city‘s efforts to improve the comfort of its citizens and to use innovative and environmentally friendly devices.

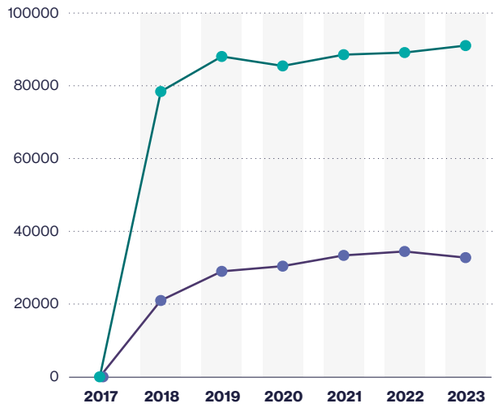
The safety of the city‘s residents is also ensured by a city-wide camera system, while the network of devices enabling automatic detection and prediction of risk phenomena is also strengthened. Prague also uses sensor solutions and smart devices to improve the quality of life of its citizens in the areas of health and sport. However, the city is open to new ideas for the development of Prague as a smart city, which can be submitted by its citizens through various digital platforms. While smart cities are characterised by the use of innovative solutions and smart technologies, it is always the people, or the residents, who come first.

Every day, Prague residents can use a variety of devices that make their everyday lives easier, whether it is smart lamps, some even equipped with electric car chargers, smart trash cans that detect their fullness thanks to sensors, or microclimate sensors that map the state of the environment in which they live. Passengers can find out real-time information about public transport or complete necessary agendas via digital portals without having to spend their free time in a queue at the public office.

However, the residents of the capital city also have facilities in their surroundings that anyone might not at first glance classify as innovations, but which improve their quality of life. Vertical gardens and community growing are examples of how easily a city can look after its environment, where its citizen always comes first.

City mobile app

The My Prague (Moje Praha) mobile app recorded a two percent increase in its user base in 2023. It now accounts for more than 6.5% of the capital's population. In 2023, the citizens of Prague continued to make extensive use of the services offered by the app, such as a clear overview of P+R car parks and parking zones, information about offices, municipal police stations and collection sites, including opening hours and key contacts, as well as an overview of cultural events taking place in the capital. The mobile app continues to expand the range of services for citizens and encourages them to actively submit ideas for improvement.



Number of My Prague users
Number of Change.it users

CHANGE.IT (ZMĚŇTE.TO)

OICT took over the management of the Change.it (Změňte.to) mobile app in mid-2019. Since then, it has maintained a stable user base of more than 30 000 users, who annually submit approximately 13 000 suggestions for improving public space and reporting defects in Prague. The suggestions go through the app to the municipality's staff and its subordinate organisations, which can then respond to the users' suggestions and change the city in the image of its citizens. The Change.it mobile app also includes the possibility of rating authorities, which can receive constructive feedback. Striving to improve for the benefit of its citizens is one of the essential features of smart cities..

PRAGUE CITIZEN PORTAL (PORTÁL PRAŽANA)

The digitisation of municipal agendas is an important part of a smart city. The Prague Citizen Portal (Portál Pražana) is gradually enabling the city's residents to process them online from the comfort of their own home. The number of agendas handled by the Portal is gradually increasing, as is the number of users who make use of the digitised services each year. In December 2022, the possibility of online registration at the counters was also newly launched, which reduces waiting times when traffic agendas need to be processed. The functionality was gradually made fully available to users during 2023, when the Prague Citizen Portal saw a massive influx of visitors who use these services extensively.

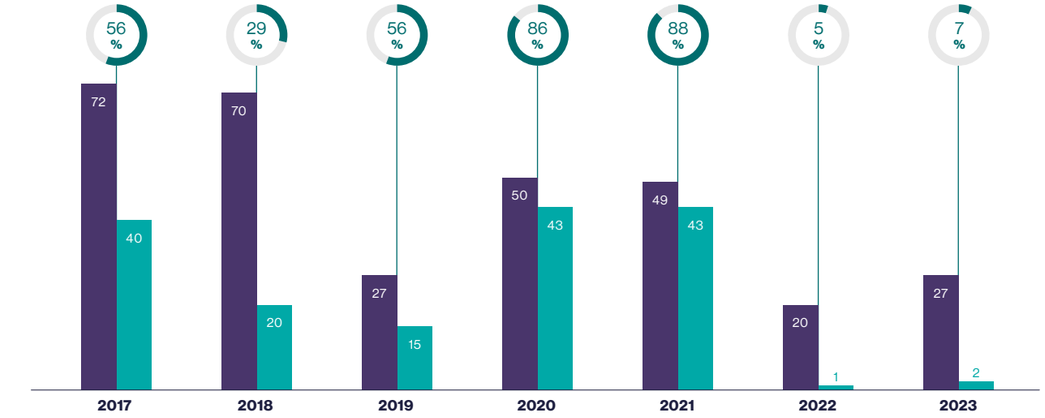
The number of visits in 2023 more than six times increased compared to the previous period, which is also due to the opening of the Portal's so-called public part. This is nothing else than the possibility to use the Prague Citizen Portal without the need to log in, which is otherwise done through a bank identity or data box. Given the increasing number of services available to users, it can be assumed that the number of visitors to the Portal will gradually increase in the coming years.

The increase of new agendas that can be solved via the Portal also further contributes to this matter. The dog agenda, through which it is possible to pay the fee for a dog or register its chip, grew in 2023 and is now available to 12 municipalities, with more planning to join. The popular municipal waste agenda has also been available to businesses since the end of the year, which should bring in another significant group of users.

	2020	2021	2022	2023
Number of visits	**N/A**	**63 600**	**61 044**	**393 276**
Number of digitised forms	3	15	25	33
Number of digitised services users	967	38 402	32 113	32 224
Number of applications processed/ number of submissions	4	1 876	4 330	4 134
Number of online registrations	N/A	N/A	7 048	177 364

City website I Have an Idea (Mám nápad)

Since 2017, the I Have an Idea (Mám nápad) web portal has been accepting suggestions from citizens for projects with the potential to improve the capital. Each idea received is evaluated in the Smart Prague office and together with city representatives and experts from the academic sphere, the possibility of its implementation in Prague is assessed. Ideas with a real potential to contribute to the development of the city are then presented in the form of project plans to the city or relevant city organisations, which can then proceed with its implementation. Although interest in using the platform has declined in recent years, seven more proposals were received in 2023 than in the previous year. Two proposals were then approved, one in the area of Future Mobility, the other focusing on the Urban Environment and its residents.



Number of all ideas received
Number of approved ideas
Percentage of relevant projects success

Prague Innovation Marathon Kick Up Prague (Nakopni Prahu)

Kick Up Prague (Nakopni Prahu) is a roughly five-month competition similar to a hackathon, whose main goal is to involve the public in the city and give them the opportunity to come up with ideas for improving life in Prague. The competition is organised around several thematic areas, such as Environment and Energy Management, Data and Digitalisation, Mobility of the Future and City for People. The competition is open to teams of two to four people; living or residing in Prague is not a requirement.

By 2023, four editions of the competition had already been held, with public interest in participating increasing year on year. Each year, three winning innovative projects, selected by an expert jury, emerge from the competition and receive financial and project support from the city. The Smart Prague project office then assists with the implementation of their projects.

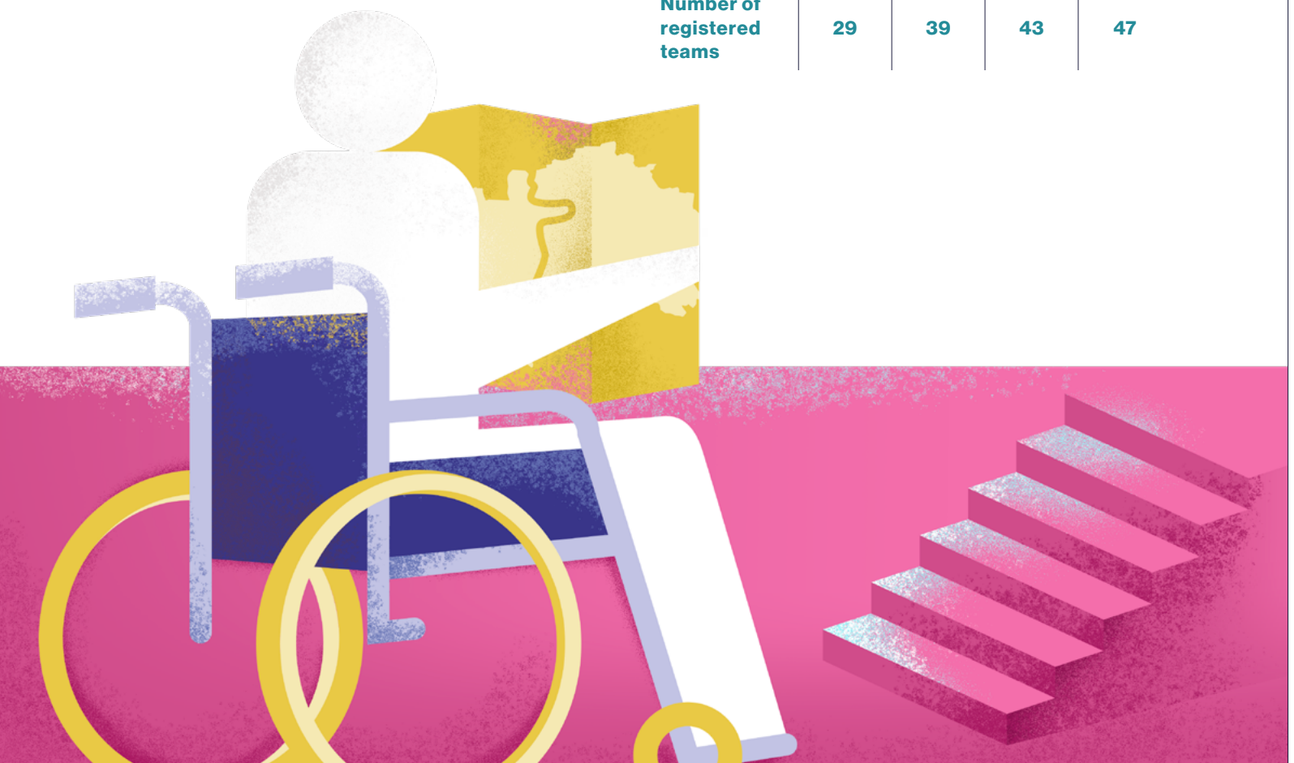
In 2023, the winning projects were Oculus Bee (Waste Digital), Food Database (Databáze jídel) and Muuv. The first-place team, Waste Digital, entered the competition with a project that aims to monitor the cleanliness of sorted waste container sites by placing AI-enabled sensors in public spaces. During the six months of project support, the team managed to negotiate with the City of Prague Technology to place the sensors on public lighting poles. The Waste Digital team also developed the sensor hardware and AI model during the last phase of the competition.

The second place went to the team with the Food Database project, which is an idea by two students to reduce food waste from school canteens through better food selection via a web app. During the last phase of the competition, the team worked on setting up a creative and marketing strategy. The project has undergone a significant transformation in the 6 months of project support and after consultation with marketing specialists from OICT, the project has been given a new name „Na tácu“ (On the Platter) and a new logo. The team managed to establish cooperation with school canteens where the Na tácu (Food Database) service was successfully deployed.

The third project, Muuv, worked on developing a map and navigation for people with reduced mobility, which includes both disabled people and parents with a baby in a pram, for whom getting around the capital can be a challenge. Working with OICT, the team has defined a total of 6 objectives. This was based on defining the different user personas that would typically use the solution to move around the city. City companies such as the Technical Administration of Communications and the Institute of Planning and Development also collaborated with the team on the project, with whom the team successfully defined the next steps for the development of the application in the following year.

The next edition of Kick Up Prague starts in the spring of 2024.

	2020	2021	2022	2023
Number of registered teams	**29**	**39**	**43**	**47**

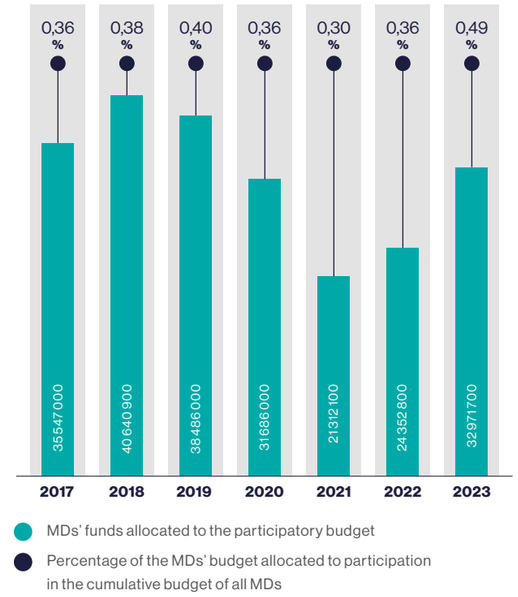


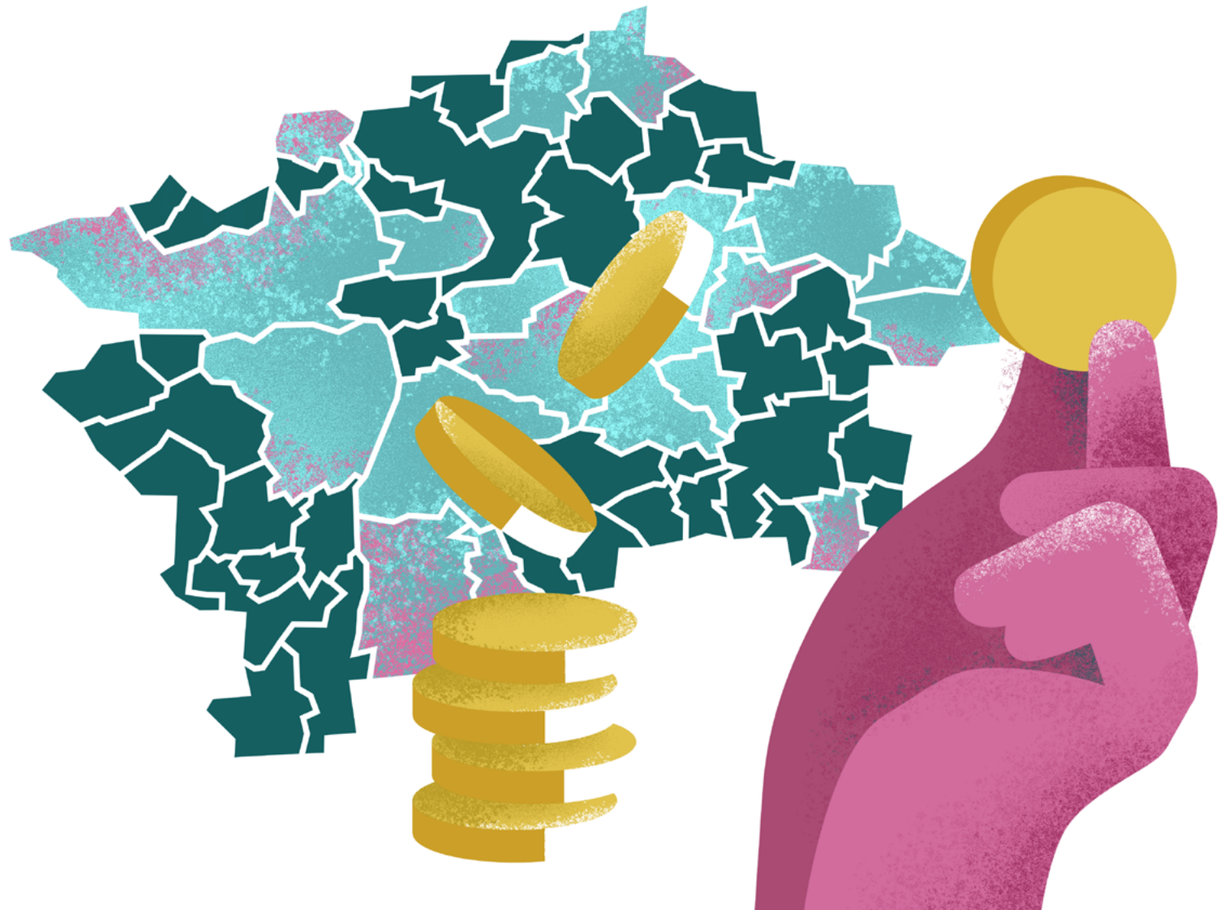
Participatory budget of the municipality

The residents of the capital city have the opportunity to actively participate in decisions on the use of public funds allocated for the development of urban districts. In 2023, 20 Prague districts used the participatory budget tool as in the previous period, but the number of proposed projects increased by more than a tenth. Of the 307 project proposals submitted, 96 were selected for implementation in 2023, 14 % more than in the previous year. The amount of funds allocated to the projects selected under the participatory budget also increased by 35 %. Thus, the participatory budget funds in 2023 amounted to almost 0.5% of the total budget of all municipalities, a record high since the beginning of the evaluation. This indicates that there is an interest from the public to participate in deciding the future direction of their urban district and to take an active part in its development.

Municipal district (MD) with participatory budget (20): 3, 4, 5, 6, 7, 10, 12, 14, 15, 20, 21, Čakovice, Dolní Měcholupy, Dolní Počernice, Ďáblice, Klánovice, Kolovraty, Libuš, Suchdol, Štěrboholy.

Financial means of participation





Smart City

The smart city seeks to simplify the lives of its citizens through a number of innovative solutions, which are largely various sensor systems that either extend the functionality of existing public space elements or replace them altogether. These „smart elements“ then serve as information providers in the urban environment, helping residents to make the most of the city‘s infrastructure, increasing their safety and comfort. At the same time, they help to collect data on the state of public space, the analysis of which can then be used to come up with new solutions to the problems facing the city. Examples include waste collection solutions or the provision of intelligent lighting.

In 2023, the first prototype of a low-maintenance plant installation with an intelligent maintenance system that takes care of the plants itself according to their needs appeared in the metro station A „Můstek“.

19 smart technologies supporting sports and leisure activities

↔ 0 %

15 smart solutions to promote health in the city

↑ 15,4 %

68 greenery growing communities

↑ 6,25 %

95 urban green spaces with smart solutions

↑ 23,4 %

135 sensors or stations measuring the state of the environment in public space

↓ 19,3 %

4 835 cameras integrated into the Municipal CCTV system

↑ 0,4 %

35 locations with bicycle and pedestrian counting technology

↔ 0 %

285

1 039

11 vertical gardens in the built-up area of Prague

↑ 22,2 %

11 684 smart lamps

↑ 61,1 %

5 660 smart waste bins with sensors (in the framework of OICT projects)

↑ 465,8 %

56 smart bins of the city districts

↔ 0 %

GOLEMIO DATA PLATFORM

We know that data helps to make important decisions. And where else can they have more impact than in Prague, which affects the quality of life of hundreds of thousands of people.

The data platform of the Prague Capital City - Golemio - is a service provided by OICT mainly to the Prague City Hall as well as to Prague companies, organisations and municipal districts. The purpose of the Golemio Data Platform is to receive data from a wide range of sources (primarily through APIs), process it and publish it for the needs of its users in Prague. In practice, these are the most diverse types of data and tasks, such as data on transport (public, motor, cycling, pedestrian), health, public procurement of the Prague City Hall and others, which are provided to users through dashboards in the Golemio BI service, data exports or APIs. The data is then made available to the general public via open data on the Prague portal **opendata.praha.eu** or newly via the Prague „data" website **data.praha.eu**. Via the Golemio data platform, a team of experienced experts is able to provide technical consultation in all relevant areas, advise on the creation of assignments and assignment documentation, design metrics and KPIs, as well as provide analysis and other data-related services.

The Golemio data platform team is an integral part of Smart Prague projects, which processes, analyses and makes data from these projects available (including Prague's largest Smart City project - Smart Waste Collection). However, the sources and range of data processed are much wider. In close cooperation with ROPID and IDSK, i.e. the organisers of public transport in Prague and the Central Bohemian Region, a unique system has been created and is still being developed, which aggregates in one place data on the current location of public transport vehicles from all operators, be it trams, buses, trolleybuses, trains, metro or ferryboats. This data is made available to the general public both through the **mapa.pid.cz** website and in the form of an open API for use in any application (the data is acquired by Google or Seznam), including, of course, the PID Lítačka mobile app and its new next-generation route search engine, which was launched for test operation in 2023. At the same time, API also serves as a source of data for information boards about departures in Prague (bus stops, tram stops and train stations) and the Central Bohemian Region, which significantly reduces the cost of expanding the network of information boards.

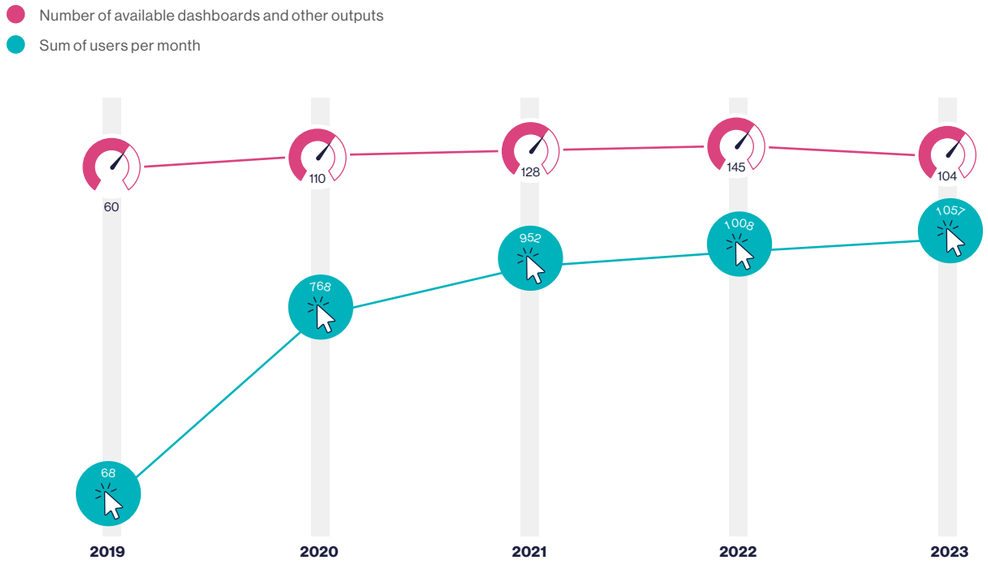
In 2023, the development and launch of the open--source Local Catalogue of Open Data (LKOD), which operates in Prague at opendata.praha.eu, was followed not only by its further development, such as its connection to the IPR geoportal, but also by the creation of a new tool, a website for the general public, focused on data from various areas of Prague's operation. This website, data.praha.eu, allows the Prague City Council and municipal companies to easily publish various types of data, either through simple graphs or more sophisticated visualisations created through PowerBI. One of the new outputs, which is available to the general public via data.praha.eu, is data from the IPR project processing location data of mobile operators. These outputs provide the opportunity for the public to analyse, for example, the directionality of commuting, especially between Prague, or its individual parts, and municipalities in the Central Bohemian Region, as well as the way of using the metro, including transfer connections,

and in general the dynamics of the population of Prague and the Central Bohemian Region. For TSK, we have extended the project of using data from the WAZE mobile navigation application, where data is now available to Prague on a much wider area scale than before, so that this data can be used for better analysis of the traffic situation and the impact of various events (accidents, closures, construction or traffic measures) on traffic. As part of the implementation of measure no. 10 of the Anti-Corruption Strategy of the Prague Capital City 2022-2027, we have started the processing and automatic rating of public procurements of the Prague City Hall so that individual contracting authorities would have a better basis for further improving the quality of the public procurement process..

GOLEMIO BI WEB APP

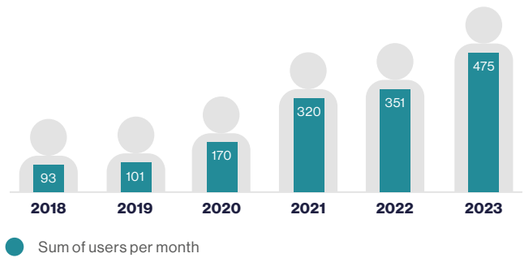
The Golemio BI web application is the primary interface for accessing outputs over data for clients of the Golemio Data Platform, i.e. primarily for the Prague City Hall, municipal organizations and municipal companies. Thus, the number of users is one of the key indicators, as every single output contained within Golemio BI has specific users for whom it has been prepared. Over the course of several years of existence, Golemio BI has become a tool routinely used across the city: within the Prague City Hall it is used by both political representation and officials across many departments, as well as being used to access data from a range of projects by a wide range of city organisations and companies, such as ROPID, TSK, social service providers and many others.

Through the Golemio BI web application, users are provided with access to data outputs, primarily dashboards, i.e. de facto to simple applications allowing a view of the analysed data in numerical or graphical form, but also map applications displaying selected data and export modules for subsequent data analysis, for example in Excel.



GOLEMIO OPEN API

Some of the data sources (including, for example, real-time information on PID vehicle locations and delays) are also available as REST APIs through the Golemio portal. The public API was launched in autumn 2019.

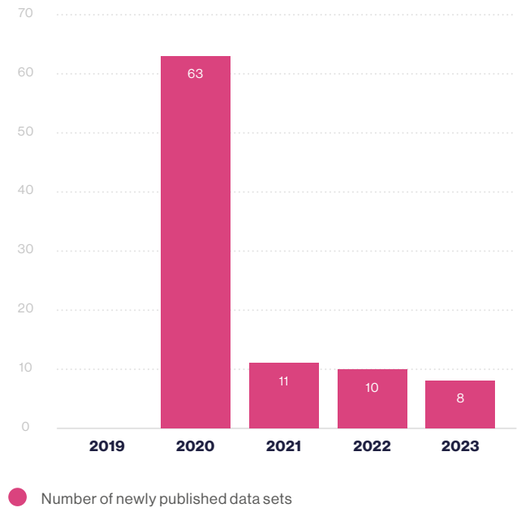


OPENING DATA FOR THE PRAGUE CITY HALL

The Golemio data platform provides, based on a contractual relationship, the role of data opening coordinator for the Prague City Hall. In 2023, a total of eight new datasets from four areas were published on the Open Data Portal of the Prague Capital City:

- budget and invoices,
- traffic violations,
- organisation of the Prague Capital City,
- voting and remuneration of city councillors.

In 2023, activities leading to the fulfilment of the Open Data Strategy of the Prague City Hall for the period 2021-2025 continued. This strategy was approved by the Prague City Council and the Golemio data platform participated in its preparation.



ABOUT THE SMART PRAGUE OICT TEAM

Similar to the way smart cities are not indifferent to their residents, the residents are not indifferent to the future of their city. The future of Prague is being actively addressed by the Smart Prague project office team, which is working on the possibilities of using innovative methods to address the challenges facing the city, in cooperation with Prague City Hall, city companies and other partners.

The team includes internal and external specialists and experts in the fields of project management, data analysis and innovation implementation in the city. Smart Prague projects help to respond appropriately to the challenges of the City of Prague in a variety of areas, whether it is new trends in mobility, challenges related to climate change, efforts to improve the quality of life in the metropolis or solutions to the efficiency and operation of city buildings.

The Smart Prague Project Office has been in operation for eight years and in 2023 the Prague City Council Commission for the Development of the Smart Cities Concept in the Prague Capital City approved two new project ideas and nearly twenty projects are currently being implemented. Last year, the team was also joined by experts on international cooperation issues, and the newly formed NEB Innovation Team continued to grow during 2023. Over time, its importance has been proven through its involvement in international projects, which was also recognised in the Smart Cities 2023 competition.

The Smart Prague Office follows the Smart Prague 2030 Concept in its activities. It evaluates how well it is implementing this concept through a series of indicators that measure Prague's progress in key areas where it should develop as a „smart city". The annual Smart Prague Index then provides a comprehensive overview of how it is performing.

Any efforts to improve the quality of life of the city's residents would not fulfil their potential without cooperation at the local, regional and international level, where Prague and the Smart Prague team draw inspiration from innovations implemented in other smart cities and from knowledge about the current direction of Smart Cities in the world. With this goal in mind, the team organises countless work groups and various meetings with representatives of city organisations, cities and municipalities in the Czech Republic and abroad every year. The team also actively participates in domestic and international conferences and trade fairs.

One of the leading international trade fairs that Smart Prague attended in 2022 was the Smart City Expo World Congress in Barcelona. Following the review of the Smart Prague Index 2022, the team was given the opportunity to present the methodology and work behind the annual SPI at the fair in autumn 2023. This only confirms the importance of reviewing the set indicators, which allow for a clear report on whether Prague as a smart city is moving in the right direction and making good progress in implementing the Smart Prague 2030 Concept.

The seventh edition of the annual Smart Prague Index shows how Prague is doing on its way to a successful and sustainable future, which it is trying to achieve by gradually applying smart and innovative solutions to ensure the best possible place for its citizens to live. Even though Prague in 2023 was struggling with the economic consequences of conflicts in the world, it has convincingly moved forward and demonstrated its strong position in the region as well as in the world, as evidenced by the indices assessing its position as a smart city among other world capitals.

Among the areas in which Prague was recognized as the most advanced is clearly mobility. This is demonstrated by the completion of the new generation route finder implementation as part of the PID Lítačka mobile application, which is used by hundreds of thousands of passengers every day on their journey around the capital. The launch of this next-generation search engine, which combines elements of public, private and shared mobility, at the turn of 2023 and 2024 will be a clear demonstration of Prague's strong position among other smart cities in the world.

The year 2023 brought many innovations into the lives of Prague's citizens that make their everyday lives easier. And thanks to the commitment of the Smart Prague project office team to finding and implementing new smart solutions that will move the city further towards an even „smarter" version of itself, it is clear that the next year will again bring even more in the field of innovation.


www.smartprague.eu