oict.
smart prague

2023

YEARBOOK

SMART PRAGUE INDEX

oict.

CONTENT

David Procházka

Daniel Mazur

Dear readers,

I am very pleased that you are now holding in your hands the new edition of the Smart Prague Index for 2022. This is the sixth edition of this analytical document, which is being produced by a team of experts f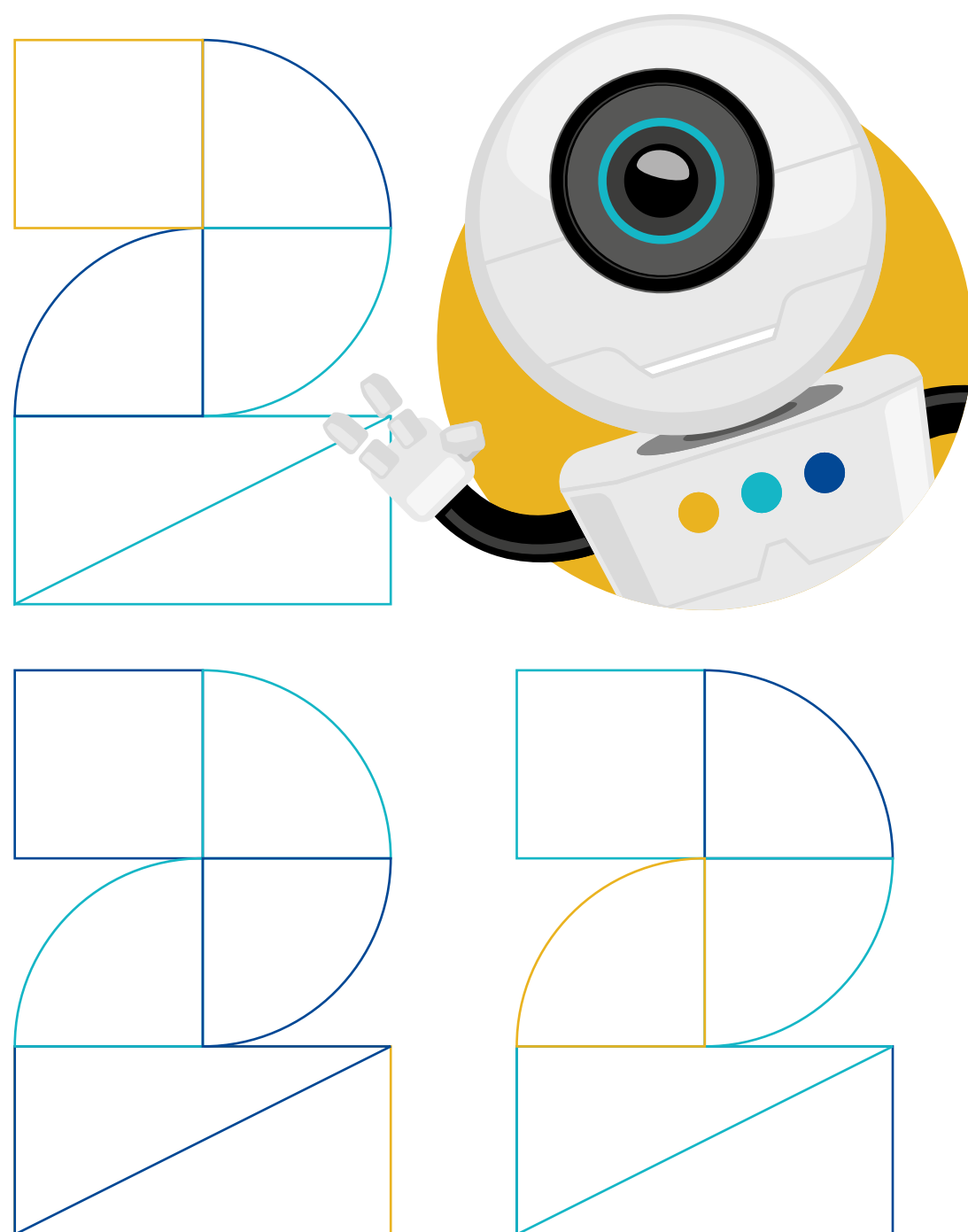rom the city's company Operátor ICT, Plc. The document evaluates and describes in detail the fulfilment of the objectives set out in the Smart Prague 2030 strategy, using a precise methodology that allows for the measurement of specific indicators of individual innovation projects.

I am very pleased, for example, with the expansion of facilities at public transport stops informing about the remaining time until the arrival of the nearest connections. At the beginning of 2022, there were 220 such devices across the metropolis. At the end of the year, there were already 291 of them. It can certainly be argued that we have been able to find the exact times of connections in our city's PID (Prague Integrated Transport) Lítačka app for more than two years but I believe that this information should be available to everyone, regardless of whether or not someone owns a smart device. I understand the attitude of those who do not want to use technology and expect traffic information to be available at as many stops as possible. We perceive this demand and will meet it this year. Our philosophy is that everyone should be able to access information in the way that is closest to them.

However, this year's Smart Prague Index will also provide you with information on the development of projects in the six priority areas that are the focus of the Smart Prague 2030 Concept. These areas are Mobility of the Future, Waste-free City, Smart Buildings and Energy, Attractive Tourism, People and Urban Environment and Data.

I wish you an inspiring read, and I hope you enjoy this year's yearbook as much as I did.

RNDr. Daniel Mazur, Ph.D.
Prague City Councillor responsible for ICT, innovation, science and research

Dear readers,

Using the latest information and communication technologies, we are trying to turn Prague into a more pleasant place to live. We are developing public space to bring greater comfort to residents and visitors to the metropolis with an emphasis on long-term sustainability. At the same time, one of the main challenges we face in the long term is the growth in the number of Prague residents and those who regularly commute to the capital. This is constantly increasing the demands on the city's infrastructure, including those for the transport of people and goods. It is up to us how to cope with this.

Part of the Smart Prague concept is the vision of a Prague mobility future that is clean, shared, intelligent and self-driving. Modern check-in in public transport provides a wide range of services for passengers, from searching for connections, including their delays, to purchasing fares in a mobile app through payment channels.

The number of users of the PID Lítačka mobile app last year reached well over 1 million. The number of users abandoning traditional paper tickets in favour of digital tickets has also increased. In 2022, more than 5.8 million purchases of travel documents were made via PID Lítačka, an increase of more than 1 million year-on-year. Yet in 2018, "only" 120 000 were made. In addition, the number of connection searches rose by almost two-thirds last year. The popularity of the city's mobile app continues to grow, which makes me very happy as chairman of the IT and Smart City Committee.

I believe that you will also find a number of innovative solutions, ideas and challenges in this year's edition.

David Procházka
Chairman of the IT and Smart City Committee
of the Prague City Council

Welcome to the annual "Smart Prague Index", a guide to the dynamic world of innovation and technology shaping our beautiful metropolis. Prague, the ever-growing heart of Central Europe, is constantly adapting and evolving to offer its citizens and visitors cutting-edge services, infrastructure and living conditions. The Smart Prague initiative is a key part of this transformation and is embedded at the heart of our urban policy.

As part of the Smart Prague initiative, our city places great emphasis on sustainability, digitalisation, innovation and, above all, on people - Prague's residents and visitors. Our visionary projects and programmes in these areas not only bring improvements in quality of life, but also contribute to economic growth and sustainability. Prague is becoming a smart city that is ready for the challenges of the future, whether it is smart transport, sustainable housing, digital services or innovative education. We are proud of how far we have come and look forward to what lies ahead.

Yours Prageek
A robot and digital guide to the world of technology
and innovation in Prague

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

Dear readers,

The year 2022 was marked by the expansion of our product portfolio and intensified cooperation with foreign countries.

Thanks to the dedication of the OICT team in cooperation with Prague City Tourism, the Prague Visitor Pass project was launched. The multi-purpose card, with which the capital city offers tourists a range of services from public transport to admission to tourist attractions, takes the form of both a physical card and a mobile application, and over the past year has become very popular not only among foreign tourists. Since its launch in June 2022, nearly eight thousand of these cards have been sold by the end of the year.

Other successful projects include Smart Waste Collection, where we have managed to significantly increase the number of sensors and chips in waste bins and thus significantly improve waste management in Prague. Many foreign cities, including Barcelona in Spain, have expressed interest in our system and experience with its operation.

Cooperation with foreign partners, sharing of good practices, as well as participation in international projects were the main motivation for the establishment of the new International Cooperation Department, which can already boast significant successes. The main ones include the award of two projects funded by the prestigious Horizon Europe programme, thanks to which we work with cities and research organisations across Europe. Through the AS-CEND project, we are working on innovative projects in the field of smart and energy-plus neighbourhoods together with the Prague Development Company and the CTU. Prague is also part of the New European Bauhaus flagship cities thanks to the NEB-STAR project.

Personally, I very much appreciate the cooperation with partners from municipal companies or the Prague City Hall. Thanks to them, we have been able to implement the Smart Prague concept during 2022, develop new projects (international and local) and work to make Prague a better place to live.

The yearbook you are now reading is the result of the work of our team, who believe that the future of the city lies in sustainable development and improving the quality of life. Developing the Smart Prague concept is a key part of achieving this vision, and I appreciate your time in studying it.

With friendly regards,

Petr Suška, MSc
Vice-Chairman of the OICT Board of Directors
and Director of the Smart City and Innovation Unit

Smart City is a term that has been around since the second half of 1990s and has been used by many industries since then. At its core is a vision of how cities of the future should not only look and function but, more importantly, serve their citizens and visitors. Over the last two decades, more and more cities have been looking at how to implement the smart city concept. The aim is to harness the potential of information and communication technologies to address the multitude of issues faced by cities and thus achieve the most sustainable development possible. It is therefore not just about using modern technologies and their versatile applications. Modern smart cities also try to find ways to harness their potential and build an environment in which society can thrive.

SMART AND RESILIENT CITY

Smart, sustainable and resilient – that is what cities should look like to make them the best places to live in the 21st century. Quality of Life (QoL) is one of the important measures of urban competitiveness. Dozens of cities around the world try to make good use of modern technology to better connect all their parts. To do so, they use data, information and knowledge to put into practice innovations and solutions for a more resilient and sustainable future. In this future, we should see cities that are able to cope with external pressures, whether environmental, economic or social, but at the same time develop and prosper in a stable way.

In the context of smart and resilient cities, there is also talk of a fourth industrial revolution. This is mainly associated with digitisation and the associated changes in society. These are not just changes in the industrial sphere but the world is becoming increasingly interconnected, and we are also talking about the Internet of Things, Services and People. Cities and urban societies are also adapting to this. We often talk in the context of the digital revolution about Society 4.0, which uses modern technologies for its development.

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 offer their inhabitants new opportunities for development and growth but, at the same time, they have to face global threats. These come from many sides. 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.

While previous years were significantly affected by the COVID-19 pandemic, 2022 faced not only this fading crisis but also new threats from the war in Ukraine. This has tested the resilience of many cities and highlighted the need to ensure their own sustainable security. This is where the role of modern technologies comes into play, providing a greater range of options for quality prediction and prevention but also avenues for better optimising interventions and dealing with crisis situations and emergencies.

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 temperature burden of cities. 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.
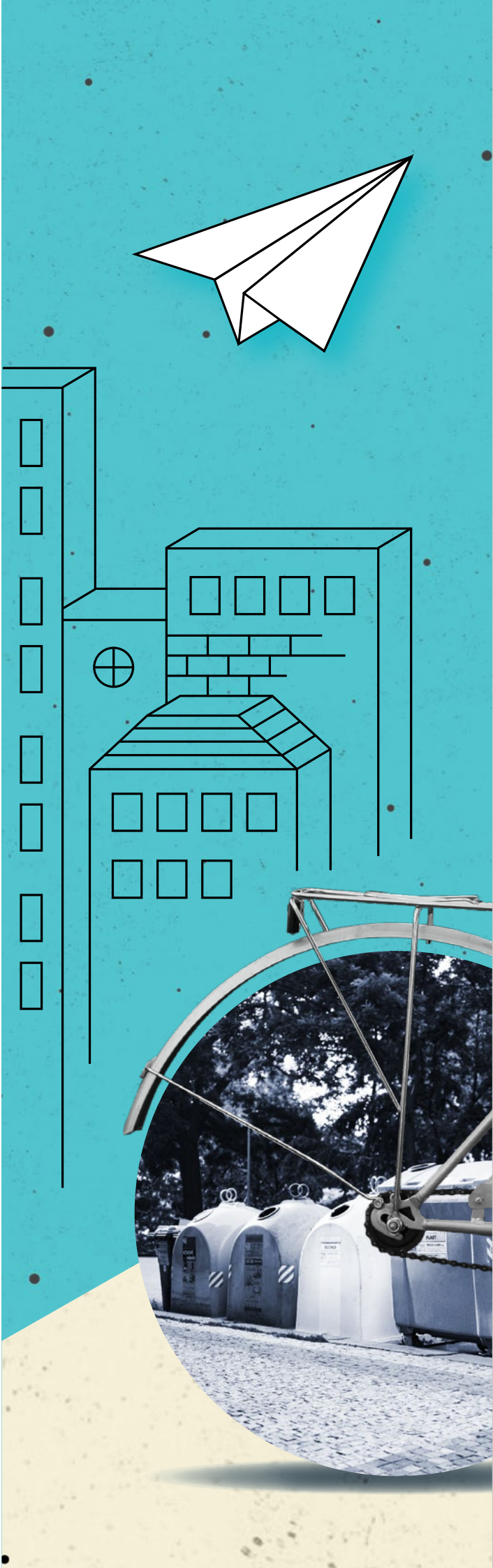
Cities using smart solutions for their management based on data analysis can then react more flexibly to the current situation and thus exploit the potential of adaptive management algorithms. These replace the original pre-defined dynamic plans and come with a more efficient coordination of the management of entire territorial units. The flexible response to change is then another demonstration of the increased resilience of smart cities.
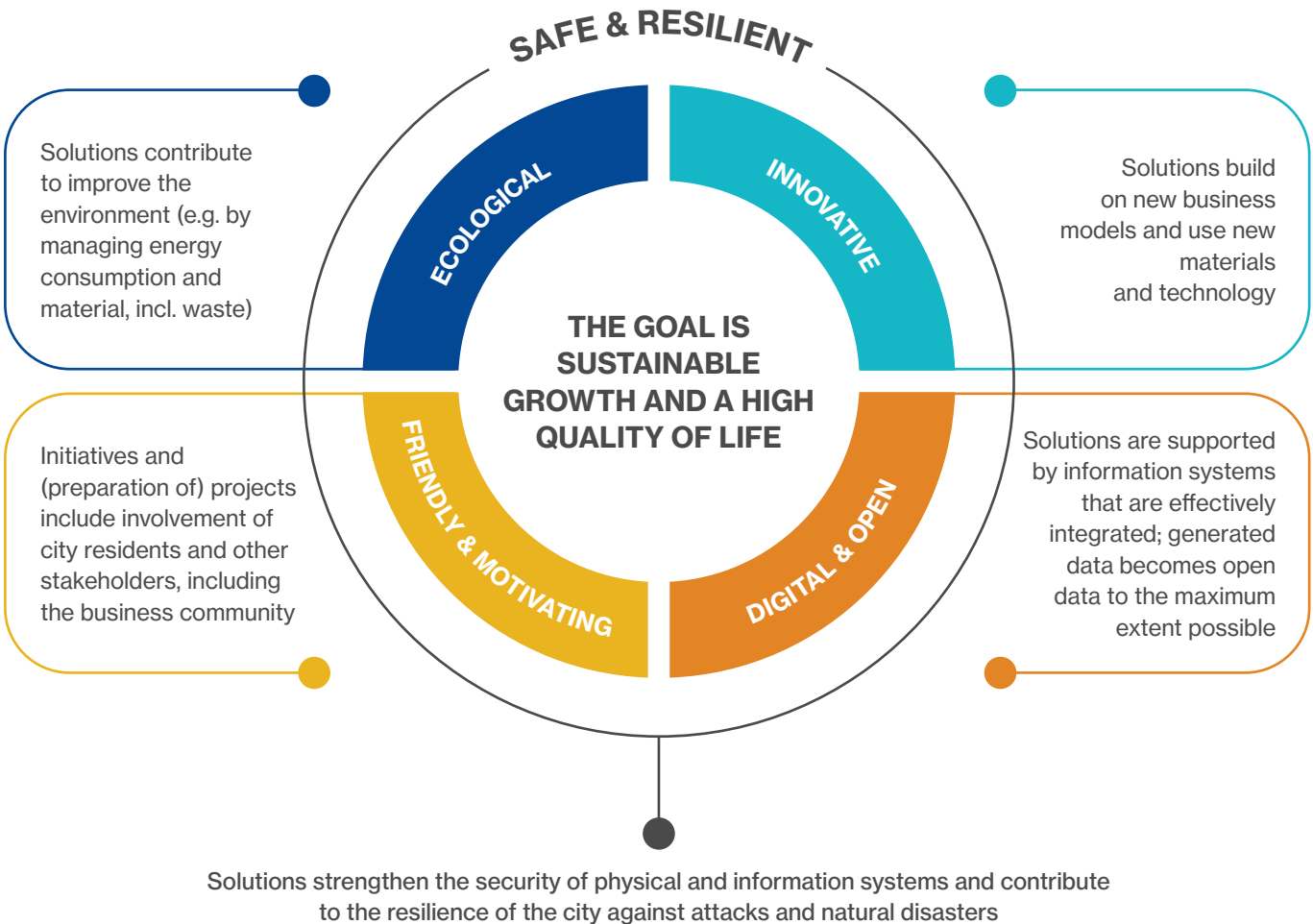
SMART CITY MEASUREMENT

The resilience and sustainability of cities also indicates the level of competitiveness of a given smart city on a global scale. There are a number of indices that attempt to compare cities against each other but creating a reliable single measurement is not possible. The criteria for individual indicators and indices as such vary from region to region. Hence, 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 or population.

There are a number of Smart City Indexes and each tries to apply a more or less similar methodology to compare the level of "smartness" of individual cities. Most of them come up with several groups of indicators, among which the most frequent is the evaluation of the digitalization of city processes and the assessment of its sub-functionalities, whether it is security, energy or mobility.

As already mentioned, smart cities do not focus only on modern technologies as such, but primarily on their application in an effort to improve the quality of life of the inhabitants, i.e. the users of these innovative solutions. Therefore, many indices also address the issue of social cohesion. Each year, dozens of smart cities are evaluated at global and regional level in an effort to find the "best" ones.

SMART CITIES ARE

SAFE & RESILIENT

ECOLOGICAL — INNOVATIVE — DIGITAL & OPEN — FRIENDLY & MOTIVATING

THE GOAL IS SUSTAINABLE GROWTH AND A HIGH QUALITY OF LIFE

Solutions contribute to improve the environment (e.g. by managing energy consumption and material, incl. waste)

Solutions build on new business models and use new materials and technology

Initiatives and (preparation of) projects include involvement of city residents and other stakeholders, including the business community

Solutions are supported by information systems that are effectively integrated; generated data becomes open data to the maximum extent possible

Solutions strengthen the security of physical and information systems and contribute to the resilience of the city against attacks and natural disasters

In the Czech Republic, the Smart Cities concept is under the responsibility of the Ministry of Regional Development. In May 2021, the Smart Cities Concept - Resilience through SMART solutions for municipalities, cities and regions was approved by the government as part of the Smart Cities methodology. The Ministry is thus 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 challenges[1]. The aim is to offer municipalities modern solutions that will enable them to achieve quality living conditions for people in a good environment. At the same time, thanks to new technological tools, innovations and the use of human and territorial potential, the Czech Republic will be more competitive in an international environment.

In mid-May 2022, the government approved the "Implementation Plan of the Smart Cities 2030 Convention", which deals with a concrete implementation process for cities and municipalities. The aim is to improve the quality of life of the inhabitants in each region through specific measures offered in the plan. Thus, the concept resonates with the need to respond to the COVID-19 pandemic and the increased need for resilience in cities and regions. Among the measures, there is an emphasis on car mobility and renewable energy production, or support for project preparation by municipalities and the establishment of a network of advisors for innovation in the public sector[2].

[1] https://budtesmart.cz/koncepce-smart-cities
[2] https://budtesmart.cz/implementacni-plan

SMART PRAGUE CONCEPT

SMART PRAGUE

The implementation of the Smart City concept in Prague dates back to 2014 (you can read about the history, organisation and management of the projects in previous SPI yearbooks). Currently, the objectives of the Smart Prague 2030 Concept, which was created in connection with the defined priorities of the city, are being fulfilled. These were set by the Strategic Plan of the Capital City. These were then further examined in relation to the possibilities of applying technological trends.

The concept defines six areas: the Mobility of the Future, the Data Community, Attractive Tourism, Smart Buildings and Energy, People and the Urban Environment and the Waste-Free City. Each of these key areas is further elaborated into the 2030 vision with respect to best practice and then into thematic headings for each of them. These are not stand-alone solutions for each key area but a system interlinked with the city-wide Golemio Data Platform, enabling the evaluation and interpretation of the data obtained not only by citizens and companies, but also by Prague itself. The Data Platform manages and evaluates city data as a whole, providing city officials with a comprehensive overview of the city's operations.

Within the Smart Prague Concept, Operátor ICT, Plc (OICT) acts as an innovation and project manager. It uses innovative technologies to solve Prague's challenges and proceeds to the maximum extent possible, while at the same time respecting competence neutrality. It also takes into account the context of other development projects related to the digitisation of the office. After the pilot phase, the OICT hands over the projects to the relevant entity of the City of Prague for the operational phase.

SMART PRAGUE INDEX (SPI)

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 maximum simplicity, the CIMI index's key indicators were designed for the SPI.

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.

SMART CITY COMPETITIONS AND RANKINGS

With the development of the Smart City concept, the need to compare individual cities or sub-projects and to share applied solutions is also increasing - the Smart City system and rankings assessing the maturity of cities, i.e. the level of application of smart solutions, allow cities to compare each other. Nowadays, many events are held to reward the most interesting and innovative ideas and projects that have been implemented in the past within cities in the field of Smart Cities. The purpose of these competitions is also to find out what is the practice in the implementation of smart solutions further providing lessons and inspiration for the management of other cities.

CIMI index

After a one-year hiatus, the IESE Cities in Motion Index, a comparison of more than 180 cities around the world, was released again in 2022. The level of "smartness" of cities is assessed and compared on more than 100 indicators in nine thematic areas such as economy, mobility, international profile, technology, territorial development and environment.

Since 2017, Prague has regularly ranked at the top, specifically in the top quarter of all cities assessed. However, due to the methodology and processing of the annual rankings, it is not possible to establish a year-on-year comparison. The IESE (Instituto de Estudios Superiores de la Empresa, Institute of Higher Business Studies) itself officially explains this by the variability in the number and type of indicators selected and cities surveyed from year to year.

In recent years, the index shows Prague's improvement especially in the areas of mobility and technology, while the environment and social cohesion, which looks at the coexistence and relations between different groups in society, have shown a consistently high level. In 2022, there is a noticeable decline in the level of the economy, which can be explained by the problems associated with the energy crisis caused by the war in Ukraine. Even so, Prague in 2022 ranked 43rd out of 183 cities surveyed.

With a clear lead, Prague leads the group of cities in the region of "Eastern Europe", where it is regularly ranked in the top position every year. This region includes not only the countries of Central and Eastern Europe, but also the Baltic States and the Balkans. At the same time, Prague is consistently presented as a city with a very high level of international recognition, evaluating, among other things, the city's tourism strategy and its attractiveness for foreign visitors.

Smart Cities 2022 (Chytrá města 2022)

The competition is announced by the Smart City Innovations Institute in cooperation with the Ministry for Regional Development, the Association of Towns and Municipalities of the Czech Republic and the Association of Regions of the Czech Republic. Among the 2022 winners, the "Building of the New City Hall of Prague 12" was ranked first among the special awards of the Expert Jury of the competition, awarded for its contribution to environmental protection.

Quality of Life Index 2022

The Quality of Life Index compares 206 municipalities, 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 the Quality of Life Index, Prague is ranked second behind the city of Říčany in 2022 for the umpteenth time. The capital took the first place in the category "Relationships and Services".

Time Out Index 2022

Following on from last year's first place among the most beautiful cities on the planet in the British Time Out magazine's poll, Prague is ranked third in 2022. It also ranked sixth out of the 53 Best Cities in the World in 2022.

Each year, the poll asks thousands of people around the world their opinion of their home city. Questions cover not only public transport, safety and the environment, but also accessibility and the variety of cultural activities. Respondents particularly appreciated the increasing attractiveness of the city and the standard of living, including the availability of public transport, which was positively evaluated by 96% of the respondents.

Golden Crest 2022 (Zlatý erb 2022)

Within the 24th year of the Golden Crest competition for the best websites of towns and municipalities, electronic services and Smart City, which evaluated 242 towns and municipalities, the Prague - Kunratice municipal district took second place among municipalities and the project Mobile monitoring of selected elements of public space in the capital city of Prague took third place. The third place was taken by the Smart Prague project.

Parking lot of the year competition (Parkoviště roku)

As part of the sixth edition of the Parking Lot of the Year competition, the P+R garage Černý most took first place in 2022 in the category Parking lots and garages, which evaluates all parking facilities in the Czech Republic, assessing the level of equipment with modern parking systems and user accessibility for different categories. Among the innovations, the second place was taken by the Catalogue of Solutions of the Czech Parking Association and the third place was taken by the first data platform and marketplace for parking MyParking.io.

IMD Smart City Index 2022

The IMD Smart City Index is one of the world's leading rankings of "smart cities". The index is co-authored by the Institute for Management Development (IMD) and the Singapore University for Technology and Design (SUTD) and 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. 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 citizens. 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 will use new adjusted data that builds the assessment at the city level. It will continue 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 will further rank cities into groups just according to their HDI. Within these groups, the two pillars are then ranked on specific "letter" scales. Prague is expected to belong to the first group, but data for 2022 will not be available. The next assessment based on the IMD Index will not take place until 2023.

The growing number of Smart Prague projects has prompted the need to place them more broadly in the context of European cities. International innovation projects enable the sharing of experience and know-how from pilot projects implemented across Europe, while building capacity, expertise and infrastructure in the given thematic areas. Last but not least, involvement in these projects makes it possible to finance these activities.

In 2022, Prague has newly joined two international consortium projects funded by the Horizon Europe programme of the European Commission. It has thus started a close cooperation with several other European cities on specific projects with the central theme of the New European Bauhaus (NEB). In the years to come, the aim will be to further expand the portfolio of international projects to cover a wider range of topics.

NEW EUROPEAN BAUHAUS

"If the European Green Deal has a soul, then it is the New European Bauhaus which has led to an explosion of creativity across our Union," said European Commission President Ursula Von der Leyen when introducing this new European movement. The NEB combines art and culture, sustainability and inclusiveness to make our living space more accessible and beautiful, while being environmentally friendly and technologically modern.

New European Bauhaus Stavanger (NEB Star)
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 and Utrecht.

Creating Actionable Futures (CrAFt)
The CrAFt (Creating Actionable Futures) project builds on the NEB Star project and focuses on collaboration with research organisations, the creative sector and the development of international co-working. The project involves three "test" cities, including Prague, and a network of sixty reference cities. Specific pilot projects will be implemented in Prague based on international experience in order to test their functionality in a locally specific environment.

PRAGUE NEB INNOVATION TEAM

Due to the involvement of Prague in both of these projects, there is a need for systematic coordination in the future. This led to the creation of the NEB Innovation Team in mid-2022, which took a firm position in the hitherto spontaneously driven activity within the international projects. The new European Bauhaus goes beyond the scope of individual organisations and departments, and therefore requires coordination and cooperation across city actors such as city companies, municipal departments, universities and others. In the coming years, there are plans to expand the number of innovation teams for other interdisciplinary areas.
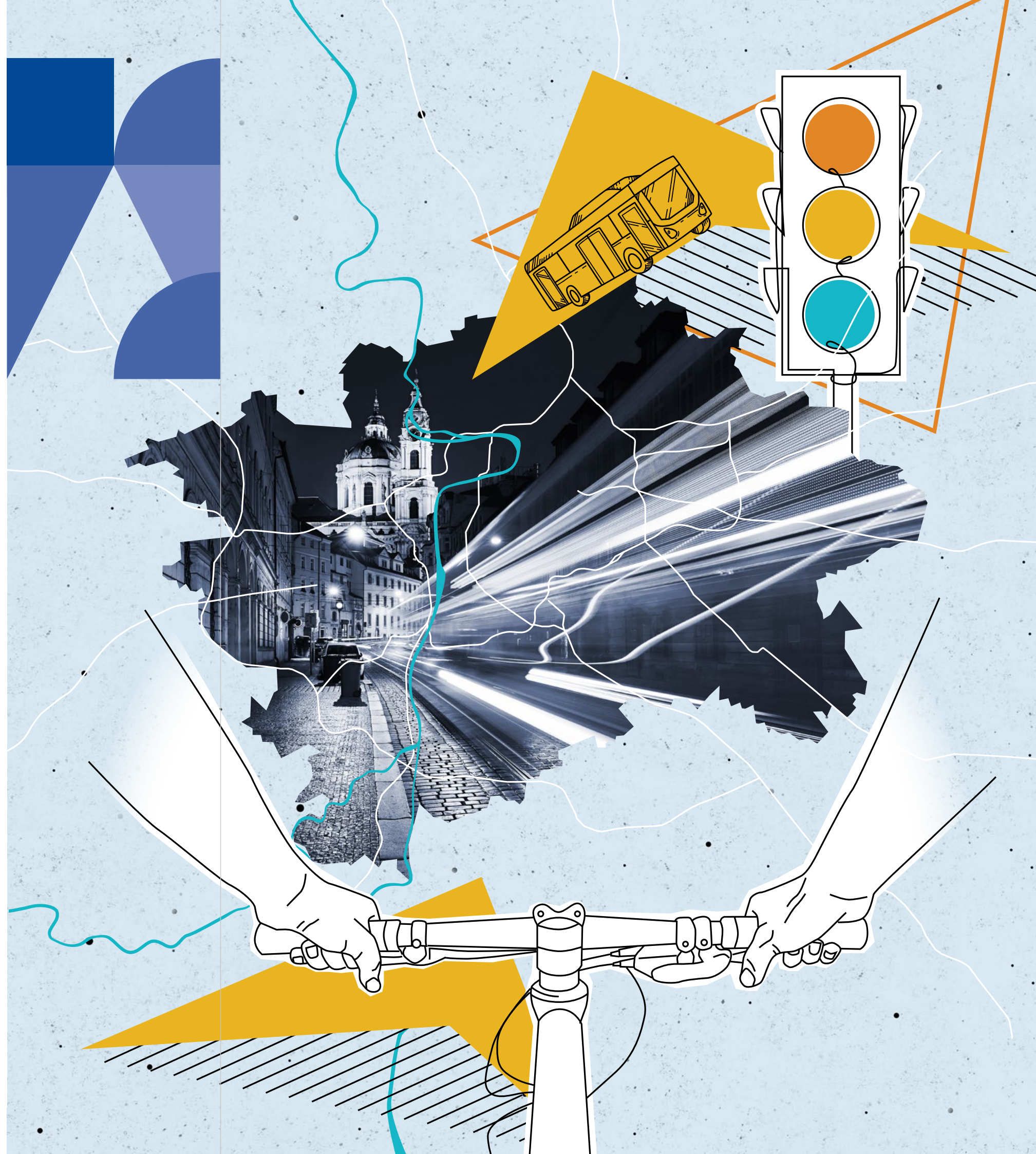
MOBILITY
OF THE FUTURE

The City of Prague regularly and systematically analyses transport and specifies current challenges that define the direction of further development, i.e. the Mobility of the Future. One of the main and long-term challenges is the growth of the population of Prague and those who regularly commute to the capital. This increases the demands on transport of people and goods.

Demand for mobility is on an upward trend, which is also evident in the rate of motorisation. This increases the pressure to ensure sustainable measures in Prague's transport, such as the preference for using public transport or the development of catchment car parks targeting commuters. Such measures contribute to changes in the modal split, and are also supported by changes in society, be it technological development or an emphasis on healthy lifestyles.

The Strategic Plan for Sustainable Mobility of Prague and its Surroundings (SUMP), which was approved by the Prague City Council in 2018, is a strategic document that includes a comprehensive list of necessary measures in the area of transport. The SUMP was adopted by the Prague City Council in 2018. The SUMP defines the direction of mobility in the capital city and the Prague agglomeration area until 2030 through strategic objectives such as reducing the carbon footprint or spatial the difficulty of transport.

The Smart Prague Concept, following the SUMP, brings a vision of Prague mobility that is clean, shared, intelligent and self-driving. This system includes, for example, modern check-in in public transport, which provides a wide range of services for passengers, from payment channels for purchasing fares in the PID Lítačka mobile app to searching for connections, including their delays. As part of further development, Mobility as a Service (MaaS) concept including alternative modes of transport (such as bikesharing or carsharing) will be introduced. Modern applications such as PID (Prague Integrated Transport) Lítačka or Moje Praha (My Prague) also allow paying for parking in P+R (Park&Ride) car parks and paid parking zones.

Another part of the Smart Prague concept is the promotion of autonomous mobility, shared mobility and electromobility. Electromobility, for example, is supported within the Smart Prague Concept by the conceptual development of a network of charging stations throughout the city called the Generel Development of Charging Infrastructure in the Capital City of Prague by 2030. 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. The development of autonomous driving in public transport, or metro trains, is also important and will allow for a reduction in the intervals between trains. Full automation of train control is planned for Metro Line D.
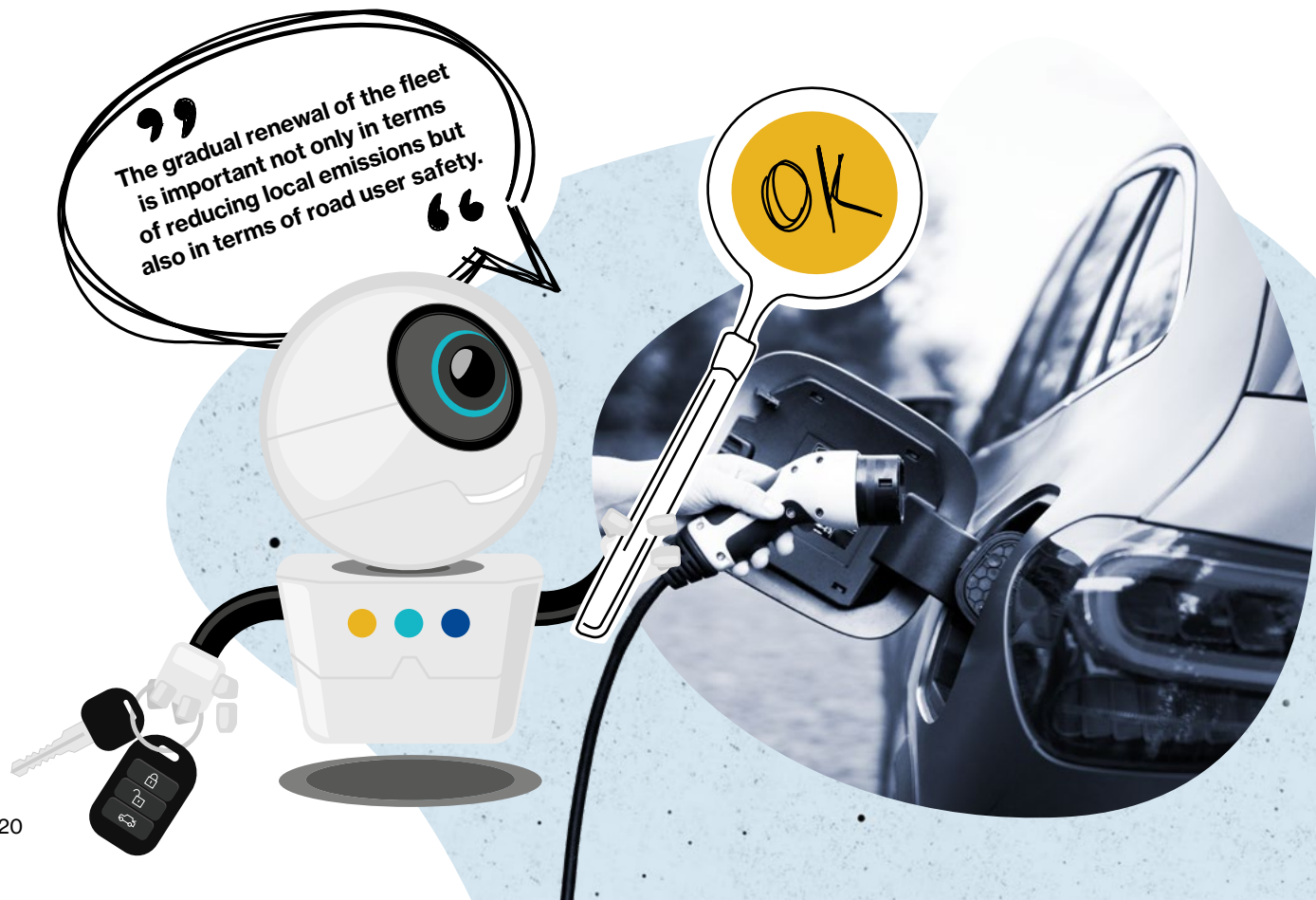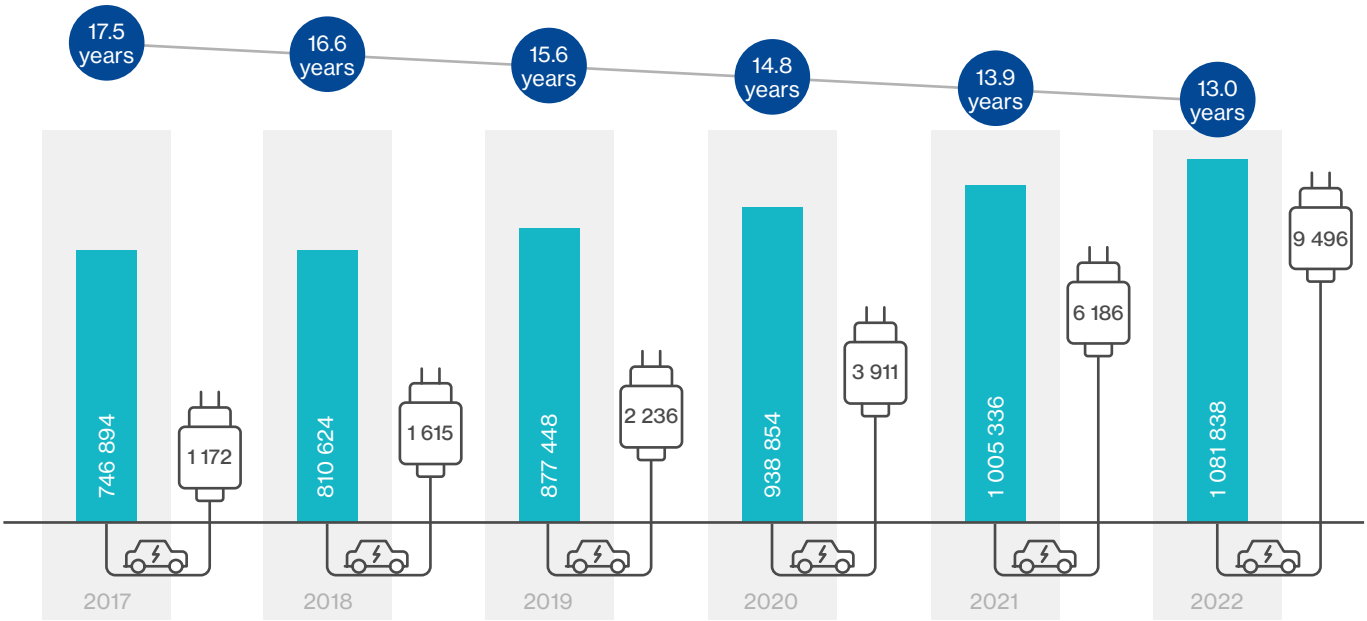
ELECTROMOBILITY

With electromobility, we cannot only perceive the alternative propulsion of the vehicles compared to the traditional combustion engine but we also need to perceive the alternative use of the vehicles themselves in the same comparison. This is a current trend promoted not only by cities but also by states, especially to reduce local source emissions (pollutants and particulates). 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 graph below shows a gradual increase in the number of low-emission vehicles in the Prague Capital City, with a total of 9 496 in operation by the end of 2022. However, there is also a growth in the number of all vehicles registered in the territory of the Prague Capital City. The age of vehicles on the territory of the city is gradually decreasing and is currently around 13 years old.

- ⬤ 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

Note: source Vehicle Register -> Vehicles of categories M1 and N1 calculated according to the Vehicle Register via the Data Cube

	2017	2018	2019	2020	2021	2022
Average age (years)	17.5	16.6	15.6	14.8	13.9	13.0
Number of vehicles	746 894	810 624	877 448	938 854	1 005 336	1 081 838
Number "EL"	1 172	1 615	2 236	3 911	6 186	9 496

"The gradual renewal of the fleet is important not only in terms of reducing local emissions but also in terms of road user safety."

CHARGING INFRASTRUCTURE

The charging infrastructure, or rather the expanding possibilities of public charging of electric vehicles, is seamlessly linked to the topic of electromobility. In Prague, therefore, not only the number of vehicles requiring charging infrastructure is monitored but also the expansion of the infrastructure itself. Its basis is charging stations, which are divided into two basic types:

⚡ fast charging stations (DC)   🕐 and slow charging stations
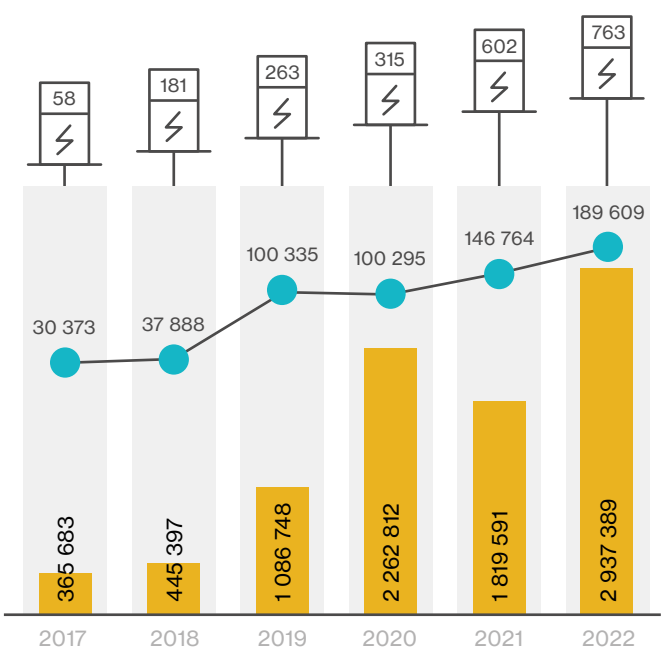
Each type of charging station has its advantages and disadvantages. Fast recharging is required especially in places with a high traffic load, which is mostly transit. This means that people park, recharge and then continue driving, with the aim of stopping for as short a time as possible. To give you a better idea, we add that this is the equivalent of a standard gas station. Conversely, slow charging has its uses, 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 shopping centres. 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 data in the table for 2022 are not comparable with previous years in the same form. This change is due to the new single-source approach that OICT provides data. This affects the categorization of charging stations, i.e. slow and fast charging. However, this source has provided summary data, which is shown in the infographic below the table.

Despite the limited amount of available data, a growing trend is evident. Absolute values have almost reached 2021 levels, although the data are not complete. There was also a significant increase in slow charging stations in 2022. Infrastructure is therefore still growing despite the delays caused by the COVID-19 pandemic.

	2017		2018		2019		2020		2021		2022	
Type of station	⚡	🕐	⚡	🕐	⚡	🕐	⚡	🕐	⚡	🕐	⚡	🕐
Number of recharge points	16	42	35	146	92	171	121	194	241	361	118	575
Number of recharges	17 650	12 723	26 946	10 942	72 787	27 548	72 019	28 276	77 990	68 774	54 515	52 802
Quantity removed energy (kWh)	224 509	141 174	324 116	121 281	818 133	268 615	1 857 053	405 759	1 178 921	640 670	1 072 889	606 089

From the aggregate data (this is not a simple sum of data, but also an addition to it) shown in the graph, it is clear that the trend in the development of charging infrastructure is still growing, and at quite a fast pace. In absolute terms, the amount of energy recharged has increased by around two thirds.

The high scenario according to the concept "Generel Development of Recharging Infrastructure in Prague" predicts a total demand for 2GWh of electricity for 10 000 vehicles in 2022. The actual energy demand therefore exceeded the predictions for the most optimistic scenario, which foresees 10 000 electric vehicles and plug-in hybrids in Prague in 2022. In addition, visitors to Prague who do not have their vehicles registered in Prague can also recharge their vehicles.

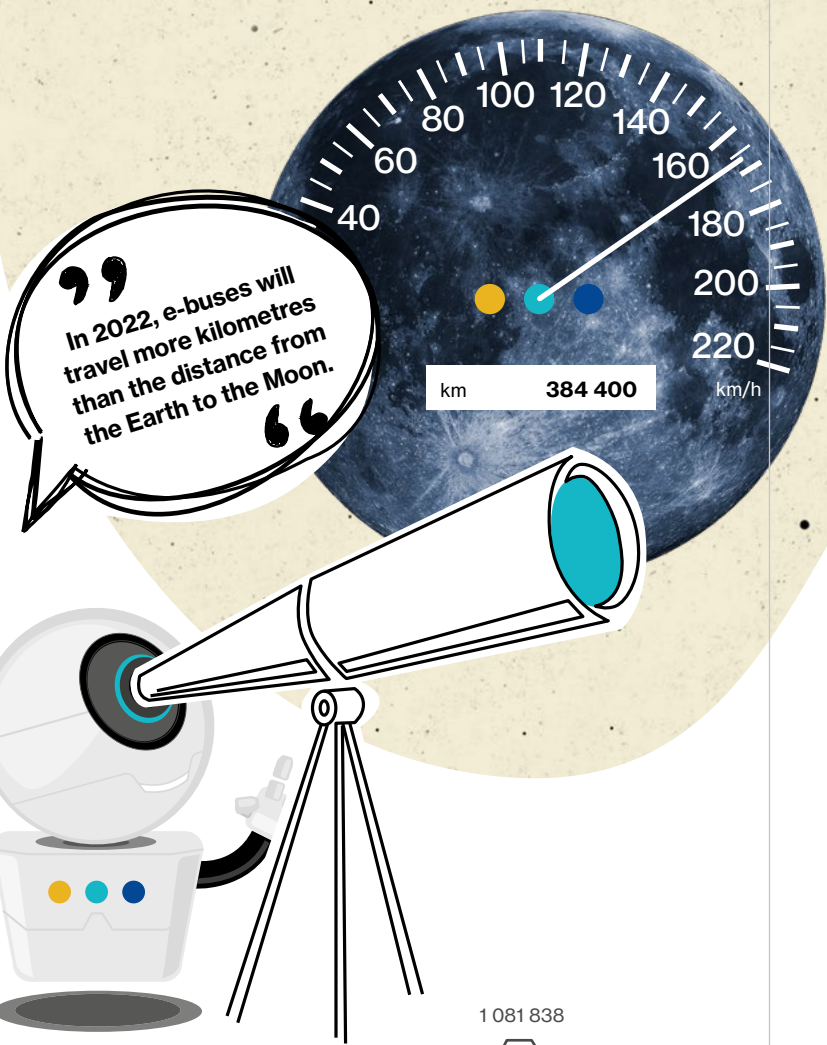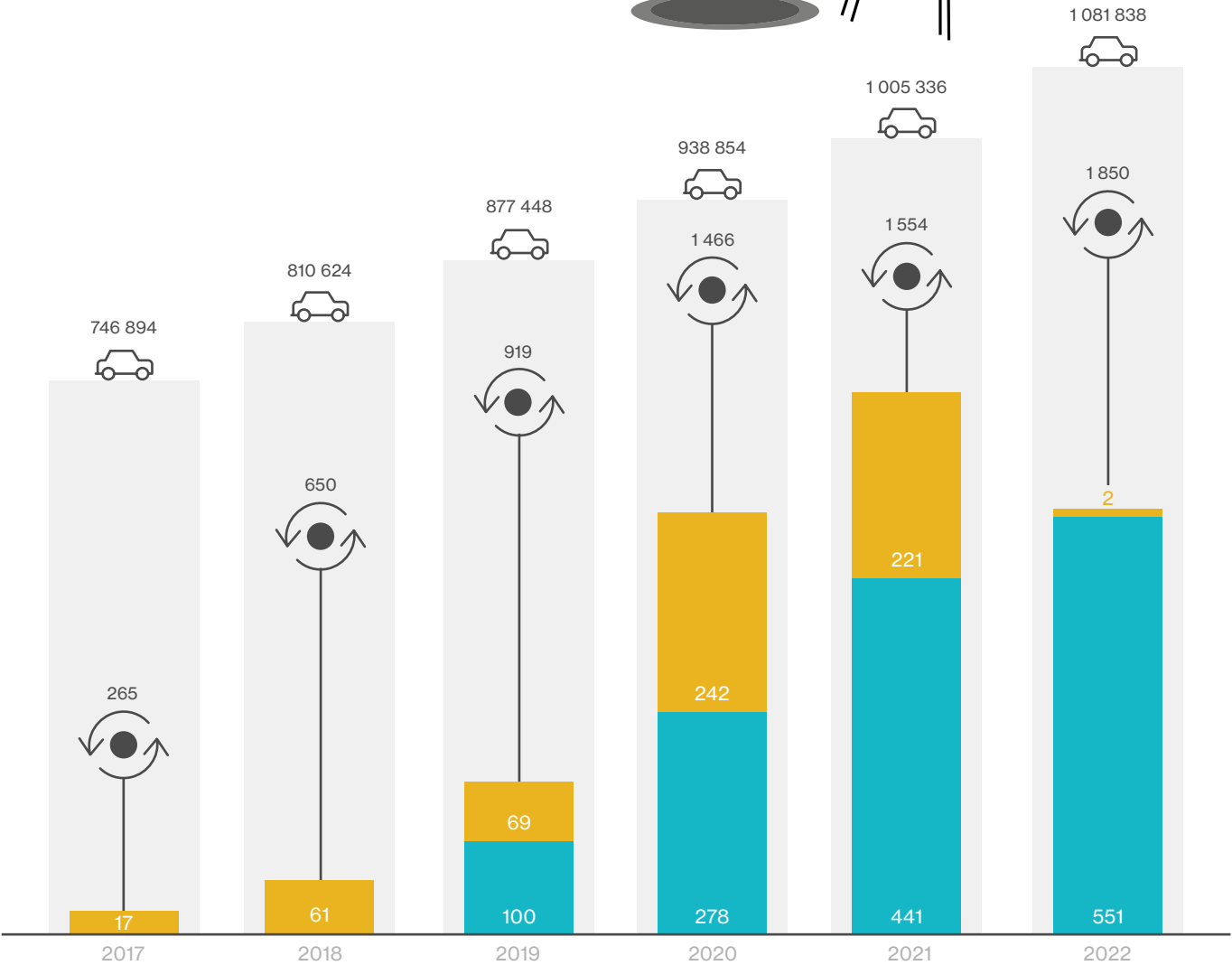|	2017	2018	2019	2020	2021	2022
Number of charging points	58	181	263	315	602	763
Number of recharges	30 373	37 888	100 335	100 295	146 764	189 609
Amount of energy consumed (kWh)	365 683	445 397	1 086 748	2 262 812	1 819 591	2 937 389

- 🟡 Amount of energy consumed (kWh)
- ⚪ Number of charging points
- 🔵 Number of recharges

SHARED MOBILITY

Shared mobility is a new way of using vehicles, where users can rent vehicles from the service provider or from each other. These vehicles are always in circulation, therefore reducing the need for permanent parking. 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 carsharing 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 districts.

Data from shared mobility providers show a further increase in the number of shared vehicles. There is a significant decline in electric carsharing in 2022 due to the closure of Revolt and GreenGo, which offered only electric vehicles, but the number of hybrid carsharing vehicles continues to grow and accounts for around a third of all carsharing vehicles.

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

In 2022, e-buses will travel more kilometres than the distance from the Earth to the Moon.

km 384 400

ELECTROBUSES

Electric mobility is also being addressed by public transport providers themselves. Not only trains, but also trams and metros have been using this drive for a long time, and gradually the trend of electrification of part of the bus fleet is also taking place.

In the data, we can see that the total number of electric buses in 2022 has significantly increased year-on-year for the second year in a row. Furthermore, the number of electric buses on the road has also increased due to an adjustments in timetables and the deployment of more electrified vehicles.

The vehicle kilometres data below show a gradual return to the values recorded in Prague before the COVID-19 pandemic.

	2017	2018	2019	2020	2021	2022
Total number of buses in the fleet Park of DPP (Prague Public Transit Company)	1 170	1 162	1 144	1 166	1 203	1 193
Total number of other buses PID contractors	934	1 022	1 350	1 516	1 889	1 956
Number of km travelled by e-buses	60 755	45 940	116 660	168 930	55 377	410 907
Total number of bus kilometres	72 450 000	75 632 100	75 577 309	70 349 690	70 266 509	73 717 987
Number of vehicle-kilometres of DPP 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
Vehicle kilometres of urban buses non-DPP lines in 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
Number of buses with electric drive	2	2	2	5	23	36

TRAFFIC LIGHTS

Traffic lights (TLs) are one of the most important ways of controlling and influencing traffic 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. The increase in the total number of TLs also reflects their development and therefore the increase in safety in other locations.

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.

Traffic control is also important at intersections that are not controlled by traffic lights. This problem was addressed by the Zavaděči team with the project Řadička within the Prague Innovation Marathon Nakopni Prahu (Kick Up Prague) 2022. With the Prague City Council, the team expanded the possibilities of its competition prototype to facilitate the shifting of tram sets at intersections without light control.

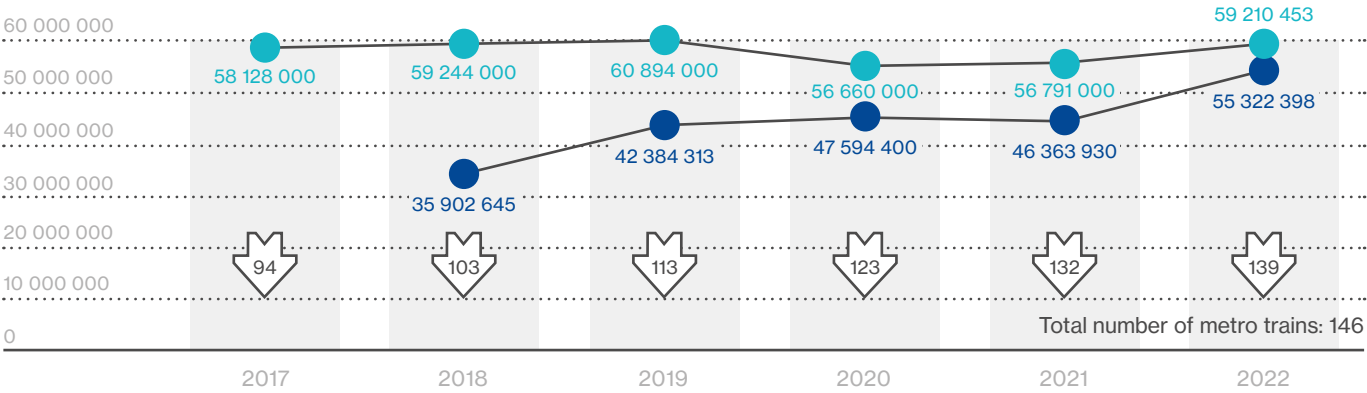|	2017	2018	2019	2020	2021	2022
Number of TLs connected to MTCC	466	478	484	503	528	539
Number of TLs with preference on the tram network	197	206	211	219	223	229
Number of TLs with preference on the bus network	232	238	245	251	260	274
Total number of TLs	660	665	667	668	675	692

AUTONOMOUS CONTROL IN THE METRO

Autonomous vehicles are not only on the roads but are also commonly encountered on the 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 of automation:

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. Furthermore,

the available data shows a gradual return to the subway vehicle-km values of 2019, i.e. before the COVID-19 pandemic.

LEVEL 1	automatic train security in operation with a driver
LEVEL 2	automatic train control in operation with driver
LEVEL 3	automatic train control in operation without drivers but with the presence of a train conductor
LEVEL 4	automatic operation completely without train staff

● Total number of vehicle-kilometres travelled by public transport/DPP vehicles - metro

● Number of vehicle kilometres travelled by public transport in autonomous mode

○ Number of autonomously controlled metro sets by automation level 2

Chart data:
- 58 128 000 (2017), 59 244 000 (2018), 60 894 000 (2019), 56 660 000 (2020), 56 791 000 (2021), 59 210 453 (2022)
- 35 902 645 (2017), 42 384 313 (2018), 47 594 400 (2019), 46 363 930 (2020), 55 322 398 (2022)
- 94 (2017), 103 (2018), 113 (2019), 123 (2020), 132 (2021), 139 (2022)
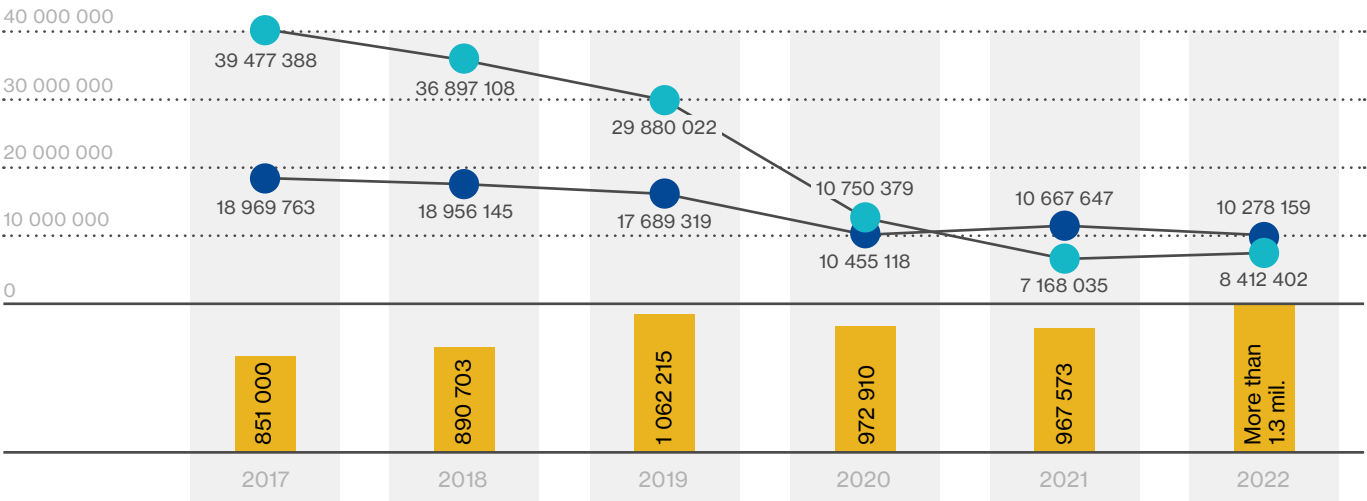
Total number of metro trains: 146

ACCESSIBILITY OF PUBLIC TRANSPORT

The accessibility of public transport in Prague is at a very high level, as proven by international surveys and evaluations. The graph below shows a significant increase in Lítačka users, which has reached over 1 million. The slight increase in paper tickets suggests the implementation of new contactless terminals in public transport vehicles. Nevertheless, people are more likely to purchase coupons, which in many cases are more convenient for them than a single ticket. Tourists, on the other hand, find the new contactless terminals in public transport vehicles to be a pleasant option for purchasing a travel document using a payment card.

● Number of paper tickets sold
● Number of SMS tickets sold
● Number of users of Lítačka (formerly Opencard), (values above 1 million users are automatically rounded)

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

Chart data:
- 39 477 388 (2017), 36 897 108 (2018), 29 880 022 (2019), 10 750 379 (2020), 10 667 647 (2021), 10 278 159 (2022)
- 18 969 763 (2017), 18 956 145 (2018), 17 689 319 (2019), 10 455 118 (2020), 7 168 035 (2021), 8 412 402 (2022)
- 851 000 (2017), 890 703 (2018), 1 062 215 (2019), 972 910 (2020), 967 573 (2021), More than 1,3 mil. (2022)

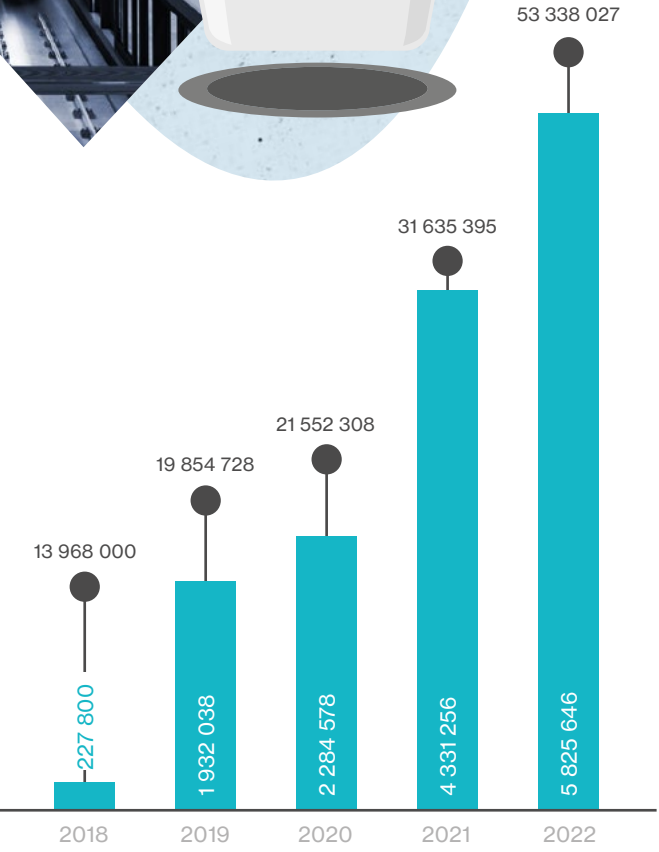"Automation level 4 is planned for metro line D, which is under construction."

USE OF THE CITY APP FOR TRANSPORT AROUND THE CITY

The PID Lítačka urban transport app continues to grow successfully among users. The number of connection searches increased by almost two-thirds in 2022. The popularity among users is thus increasing. 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 close ones. There is a noticeable trend in users moving away from traditional paper tickets towards digital tickets. However, the increase is not as significant as between 2020 and 2021. One of the reasons for this is the data in the infographic, i.e. the increase in the number of users of Lítačka (a travel document in the form of a long term time coupon).

In 2022, the city's PID Lítačka app moved significantly closer to the Mobility as a Service (MaaS) concept. During the year, work was carried out on developing an app to enable parking payments in paid parking zones, and public beta testing of the Intermodal Route Planner, which integrates a route finder and connections across transport modes, was underway. In the future, the MaaS indicator will be monitored, especially in the development of the city app functionalities and their use.

● Number of requests to find a connection
● Number of ticket purchases

Chart data:
- 13 968 000 (2018), 19 854 728 (2019), 21 552 308 (2020), 31 635 395 (2021), 53 338 027 (2022)
- 227 800 (2018), 1 932 038 (2019), 2 284 578 (2020), 4 331 256 (2021), 5 825 646 (2022)

DEVICE PROVIDING REAL-TIME DEPARTURE INFORMATION

The development of digitisation 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 is leading to an increase in the use of these devices at places that are very busy. We can see the highest year-on-year growth to date, with a total of 71 individual devices in 2022.

The number of stops is on the territory of the Prague Capital City is relatively stable and fluctuations occur mainly due to reconstruction.

○ Total number of stops within the PID on the territory of the Prague Capital City

● Number of devices providing real-time departure information located at public transport stops

Chart data:
- 3 331 (2017), 3 401 (2018), 3 354 (2019), 3 362 (2020), 3 470 (2021), 3 469 (2022)
- 125 (2017), 189 (2018), 203 (2019), 218 (2020), 220 (2021), 291 (2022)

PLAST

PAPÍR

In 2022, each resident sorted 20 kg of paper, 13 kg of plastic and 15 kg of glass in the sorted waste bins.
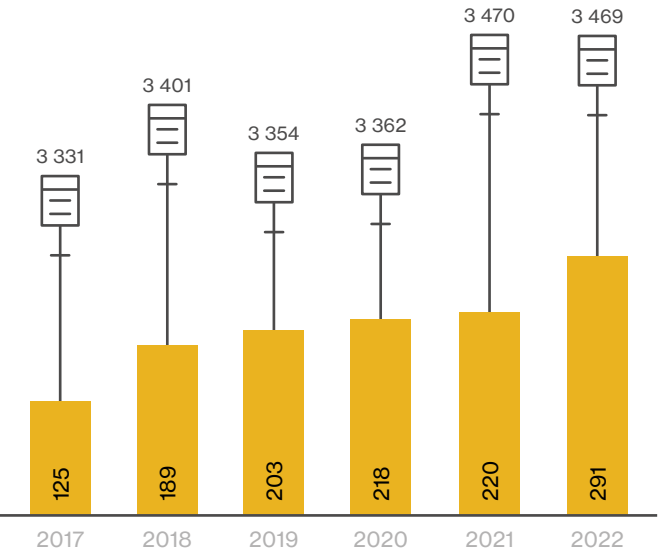
The world is changing and waste is changing with it. The quantity and composition of waste is largely influenced by the evolution of the human population as a whole. Think back to a time when the main component of domestic waste was ash. This is no longer the case today. Another milestone in the changing composition of waste is eating out, or the large amount of disposable packaging both from the grocery sector and when shopping via e-shops. Along with rising living standards, the amount of waste produced by society is increasing, with At the same time, more and more non-renewable resources and valuable raw materials are being consumed.

The primary objective of waste sorting is to reduce the negative impact of industrial production on the environment. It is therefore necessary to sort out the components of municipal waste that can be further used.

Sorting household waste has long been a matter of course for most of us, as evidenced by the fact that, according to surveys, 75% of the Czech Republic's population actively sorts waste on a regular basis. As a result, up to 76% of all packaging placed on the market is recycled. Recycling is one of the ways to prevent waste. If waste cannot be reused or processed for energy recovery, it must be disposed of as a last resort.

Waste sorting is nowadays a crucial activity that determines how much material we lose or put back into circulation through recycling.

SORTING OF MUNICIPAL WASTE

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 waste management system submitted by citizens in 2022 was approximately CZK 1 863 million. Of this, the costs of ensuring the management of waste deposited by citizens at public sorting stations were worth CZK 570.5 million. 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 (55% of the total). Given the size of these costs, it is necessary to coordinate all activities in a common strategy for responsible waste management that ensures efficient collection and material or energy recovery of the waste produced.

The Mixed municipal waste (MMW) indicator shows the production of waste from Prague Capital City citizens from containers placed at public sorted waste sites or from "home" sites. During 2022, there were a total of 6 531 sorted waste sites in the city, including "home sites" - of which approximately 3 475 sites are located directly on the city streets. Household sorted waste sites are located in a total of 3 056 household properties. If the home sites are included, there are 195 inhabitants per sorting point, which meets the target set in the municipality's Waste Management Plan - i.e. to provide one collection point for a maximum of 300 inhabitants.

Each resident of the Prague Capital City sorted a total of 49.9 kg of sorted waste in 2022, while the production of municipal waste in the Prague Capital City was 347.65 kg per inhabitant of Prague. Of the total 443.4 thousand tonnes of waste generated in Prague households, mixed waste (from citizens' bins in household furnishings or in front of the house) is still the most represented, accounting for just under 58%. Compared to 2021, there was a slight decrease in production, which we attribute to the introduction of free collection of bio-waste in bins at homes. The higher weight of bio-waste collected has translated into a lower weight of mixed municipal waste. Collection of edible oils and fats continued in 2022 based on the positive response to this project. By the end of the year, 773 edible oil containers had been delivered to selected public sorting stations.

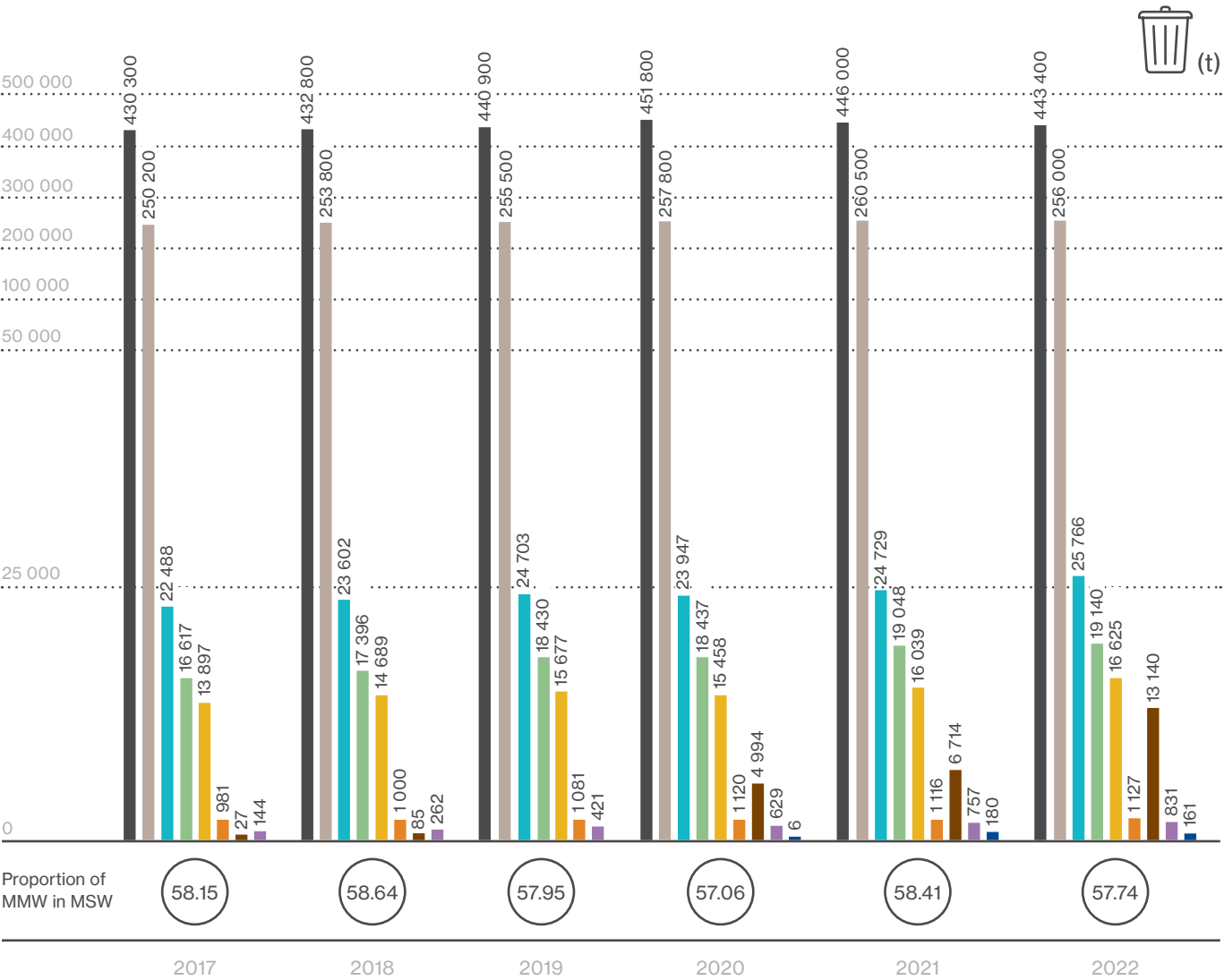- Total waste
- Mixed municipal waste
- Wastepaper
- Glass
- Plastic
- Beverage carton
- Bio-waste
- Metals
- Edible oils
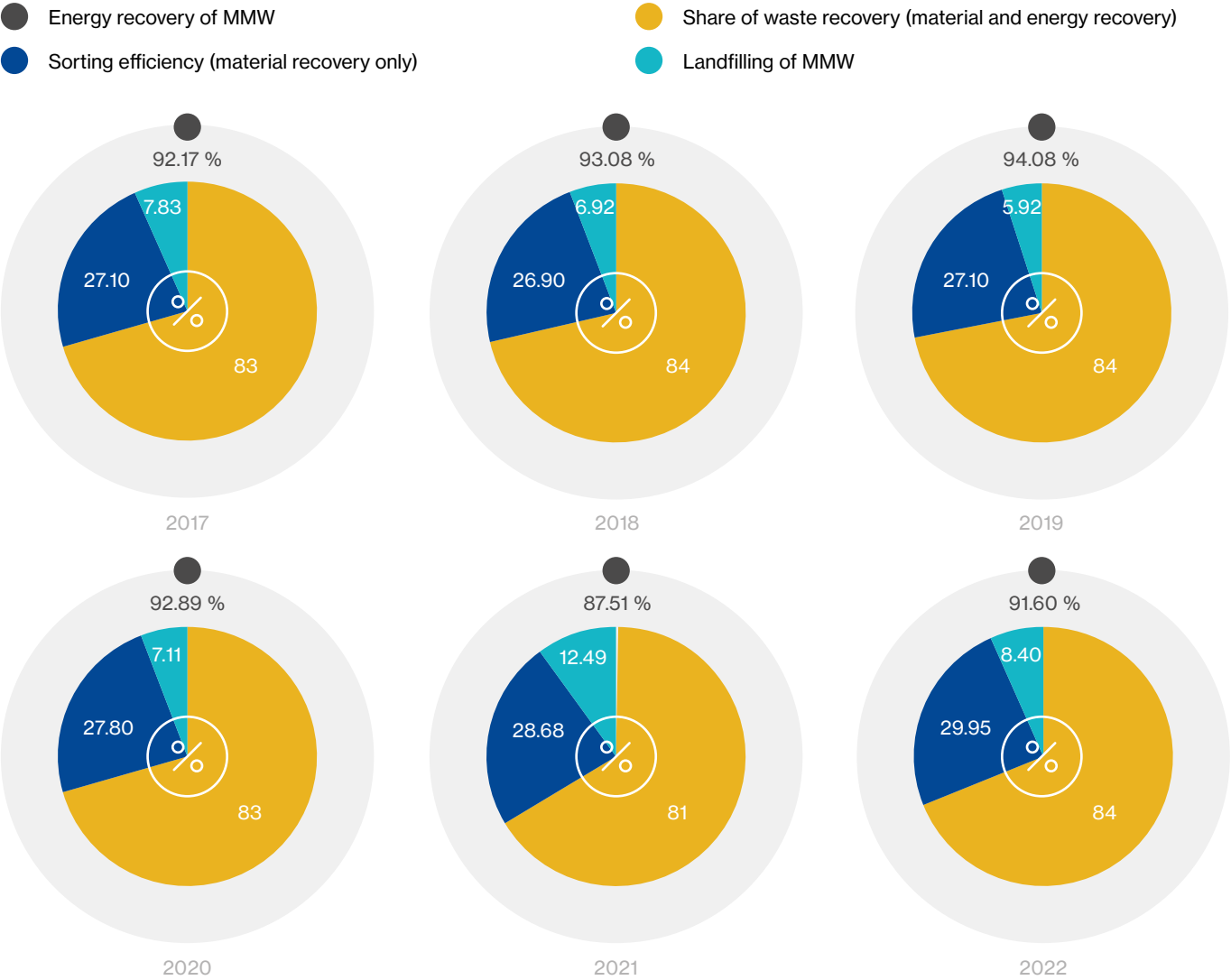

THE USE OF MMW AND ITS COMPONENTS

The City of Prague aims to reduce landfilling as much as possible. For this reason, most of the waste produced is used for energy recovery at the Waste-to-Energy Plant in Malešice ZEVO (WEEE), where the energy released during the process of burning mixed municipal waste is converted into heat and electricity. The maximum proportion of landfilling for the energy recovery of MMW has been set by the capital city. The maximum rate of use of waste-to-energy is 10%.

In 2022, a total of 238.1 tonnes of waste was processed at the Energy Recovery Facility, which is approximately 91.6% of the total amount of mixed municipal waste (see infographic Energy recovery of MMW). In addition, some bulky waste and street rubbish has also been used for energy recovery. Due to a fire at the Waste from Electrical and Electronic Equipment (WEEE) in the second half of 2021, its operation was restricted and part of the mixed municipal waste that would have been used for energy recovery had to be landfilled. This increased the amount of landfilled waste and, conversely, reduced the amount of waste used for energy recovery. The year 2022 saw the resumption of operation of the WEEE, as can be seen in the data below. The amount of energy recovery has increased

again, while the amount of landfilled waste has decreased. In 2022, the material recovery rate of all waste generated by the city was 30%. Its quantity in 2022 increased from 127.9 thousand tonnes to 133.0 thousand tonnes. The increase in the amount of waste materially recovered is due to the collection of bio-waste through containers delivered free of charge to citizens directly to their family or apartment buildings. Thanks to this move by the Prague Capital City, the biodegradable waste in the MMW has been reduced, which has led to a decrease in the total amount of MMW from citizens' household containers (in so-called black bins) for the first time since 2014. The increase in the volume of the biodegradable component sorted from citizens' MMW containers has then led to a reduction in the charge for mixed municipal waste (in black bins) for Prague.

Apart from composting plants, bio-waste is also processed in biogas plants. The resulting product of the process is BioCNG, a biofuel suitable for vehicles moving in urban traffic, or biogas that can be fed into the municipal grid. Heat and electricity are produced from the waste received at the wastewater treatment plants in cogeneration units. Residual stabilised sludge is treated for reuse in agriculture by technological measures.

ENERGY RECOVERY OF MMW

- Energy recovery of MMW
- Sorting efficiency (material recovery only)
- Share of waste recovery (material and energy recovery)
- Landfilling of MMW

WAYS OF DEALING WITH MMW IN PRAGUE

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

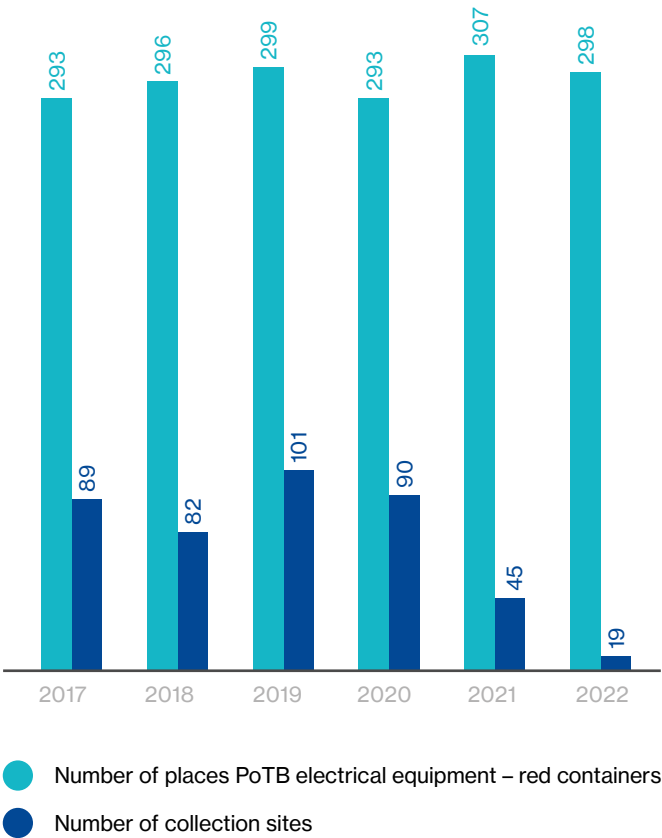|	2017	2018	2019	2020	2021
Material use (%)	27.0	28.0	27.1	27.8	28.7
Incinerated (energy recovery) (%)	56.0	57.0	56.5	55.6	52.0
Landfilled (%)	13.0	14.0	14.5	14.2	19.0

2022
- 30.0
- 53.7
- 14.3
- %
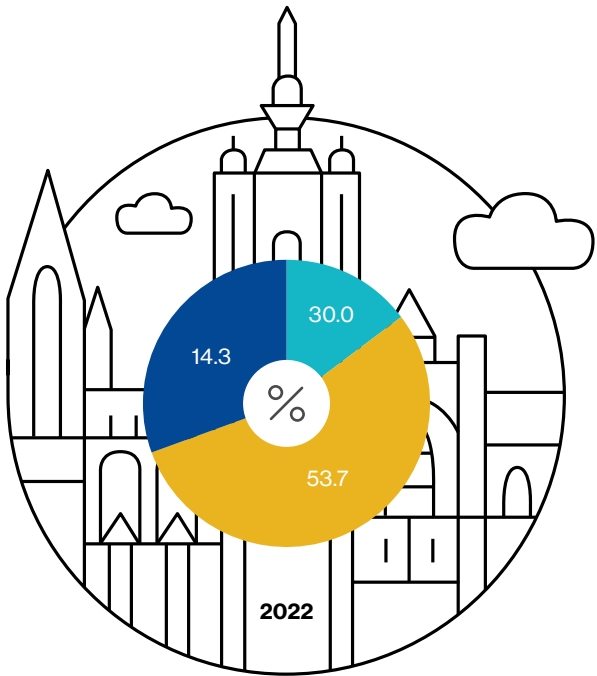
MATERIAL RECOVERY OF WASTE

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.

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.

The number of collection yards includes the 19 permanent collection sites (CSs) of Prague Capital City and the implementation of mobile collection sites (MCSs) in the respective year. Due to the low interest of citizens, the service of organising mobile collection sites was discontinued in June 2021, which is reflected in a decrease in the value for the number of collection sites in 2022.

In 2022, a total of 2 936 large-volume containers (LVCs) were delivered to Prague streets by the Prague Capital City. The total amount of bulky waste collected by collection sites or large-volume containers in 2022 was 37.28 thousand tonnes, which is 29.23 kg per capita. Since June 2021, the recoverable components are separated from bulky waste at collection sites, thus reducing the production of residual bulky waste.

Bar chart values:
Year	Number of places PoTB electrical equipment – red containers	Number of collection sites
2017	293	89
2018	296	82
2019	299	101
2020	293	90
2021	307	45
2022	298	19

- ● Number of places PoTB electrical equipment – red containers
- ● Number of collection sites

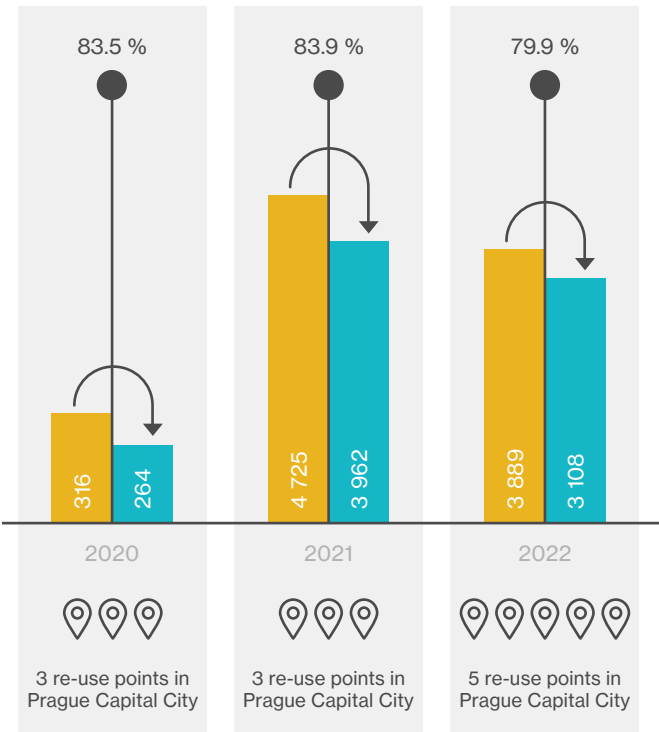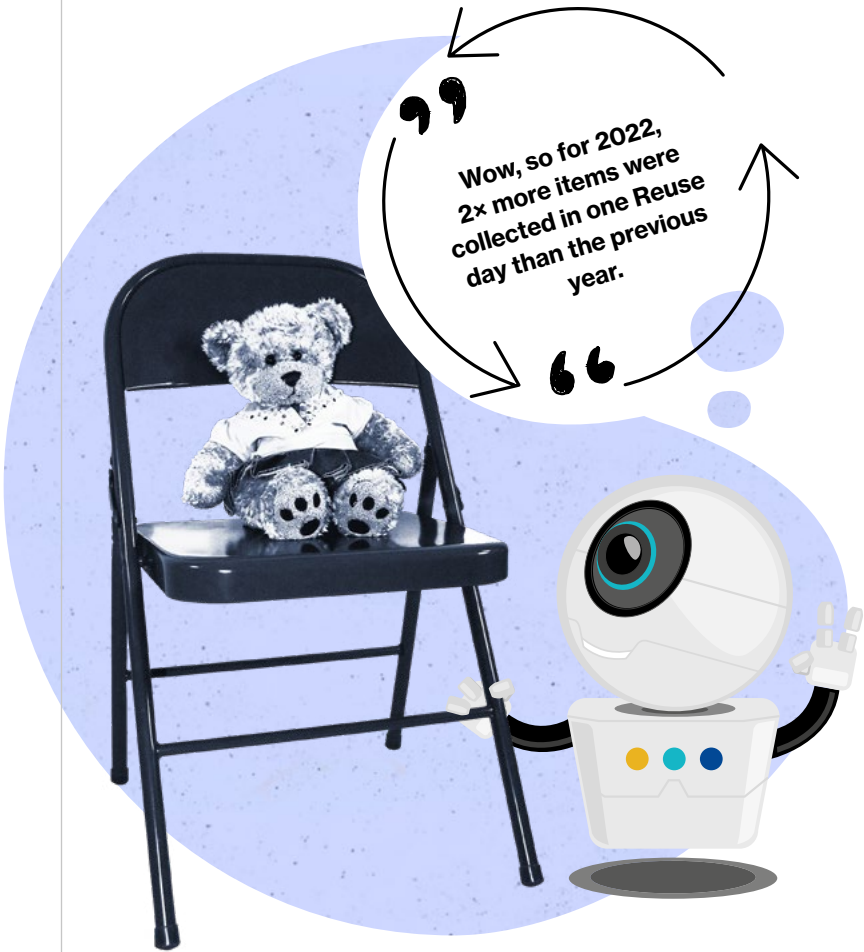|	2017	2018	2019	2020	2021	2022
Attendance at 19 stable collection sites	388 602	391 079	424 411	429 409	419 745	354 857
Quantity of bulky waste from LVC, CS, MCS (t)	30 846	34 205	37 585	40 627	39 805	37 282
Number of inhabitants of Prague Capital City	1 294 513	1 308 632	1 324 277	1 335 084	1 274 562	1 286 120

UTILISATION OF RE-USE POINTS AND TAKE-BACK POINTS

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. Also in 2022, it was possible to drop off various items, such as furniture, books or sports equipment, in the five permanent collection sites - items that could be reused for the residents of Prague in need.

An alternative option for disposing of items that are still in good condition are Reuse Days or SWAP events. In 2022, the City of Prague continued the successful pilot event from 2021 called Reuse Day. Due to high interest among citizens, the metropolis decided to increase the number of Reuse Days to three in 2022, building on the original pilot. Reuse days were also organised by the Prague Capital City in 2022, in the Prague 10 and Prague - Slivenec districts.

During these three events, an impressive 6 800 kg of waste (books, clothes, furniture, dishes, etc.) was collected. 80% of the items were redistributed and the remaining items were given to the participating organisations. The amount of items brought in during the Reuse Days in Prague was higher in 2022 compared to 2021 for several reasons:

- increase the number of events from 1 to 3,
- successful pilot action in 2021,
- extending Reuse days to another municipality,
- sufficient information campaign on the principles of the action,
- the demand from society to hold similar events, with more and-more people adopting a sustainable lifestyle and SWAPs being ahighly desirable and effective alternative to buying new items.

	2020	2021	2022
Resulting value of the indicator	83.5 %	83.9 %	79.9 %
Material obtained (pcs)	316	4 725	3 889
Issued material (pcs)	264	3 962	3 108
	3 re-use points in Prague Capital City	3 re-use points in Prague Capital City	5 re-use points in Prague Capital City

- ● Resulting value of the indicator
- ● Material obtained (pcs)
- ● Issued material (pcs)

In 2022, a total of 38.2 tonnes of old textiles were collected at the collection yards of the capital. 98% of all textiles are used for material aid. The unsuitable material is made into cleaning sheets for humanitarian purposes or used as alternative fuel for cement plants.

In 2022, a total of 3 856 toner cartridges were collected at collection yards, of which 886 toner cartridges were suitable for refurbishment and 2 970 were sent for disposal by incineration as they did not allow the refurbishment process.

"Wow, so for 2022, 2× more items were collected in one Reuse day than the previous year."

Textiles chart (t):
Year	Collected textiles in stable collection sites (t)
2020	68,4
2021	58,7
2022	38,2

- ● Collected textiles in stable collection sites (t)
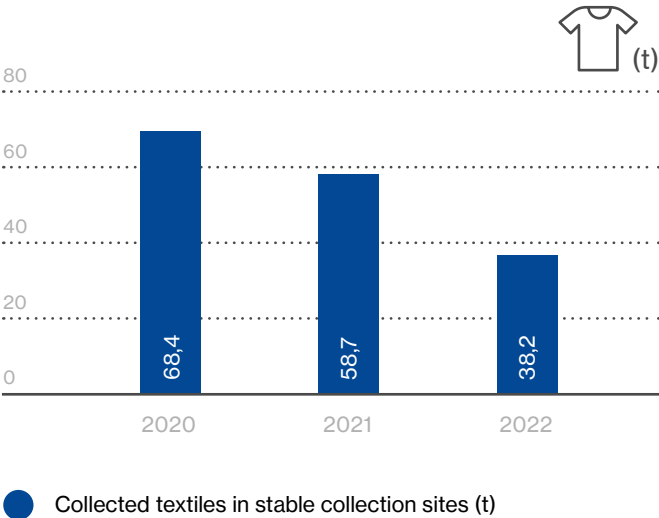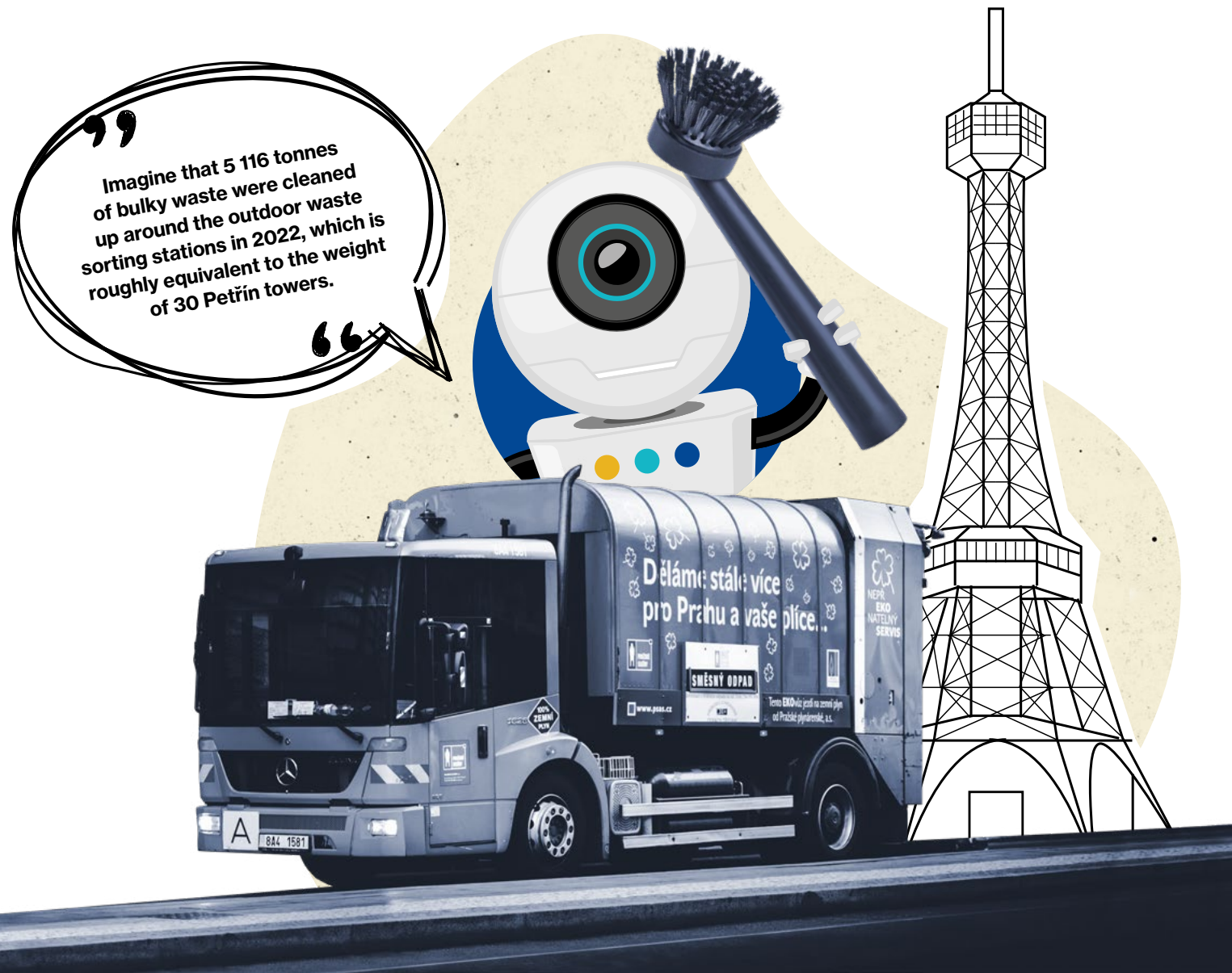
ENVIRONMENTALLY FRIENDLY COLLECTION VEHICLES AND THEIR USE

In 2022, the Prague City Council continued to use data from sensor solutions placed in 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 2022, a total of 1 215 bottom-dumped sorted waste containers (including underground containers) were installed in the streets of Prague. The city uses the measured data from the sensors as one of the important basis 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 bins in the coming years.

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 Council), 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, Plc 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.

The indicator tracking the use of alternative fuel collection vehicles shows their practical use in waste collection. As opposed to the absolute number of alternative fuel vehicles, this indicator focuses on the real level of use of alternative fuel collection vehicles. In 2022, the total number of vehicles in the fleet of waste collection companies was 346 and the indicator level was 15.3%. The aim is to increase the value of the indicator implying a reduction in the use of vehicles using conventional fuels that burden the environment in the city.
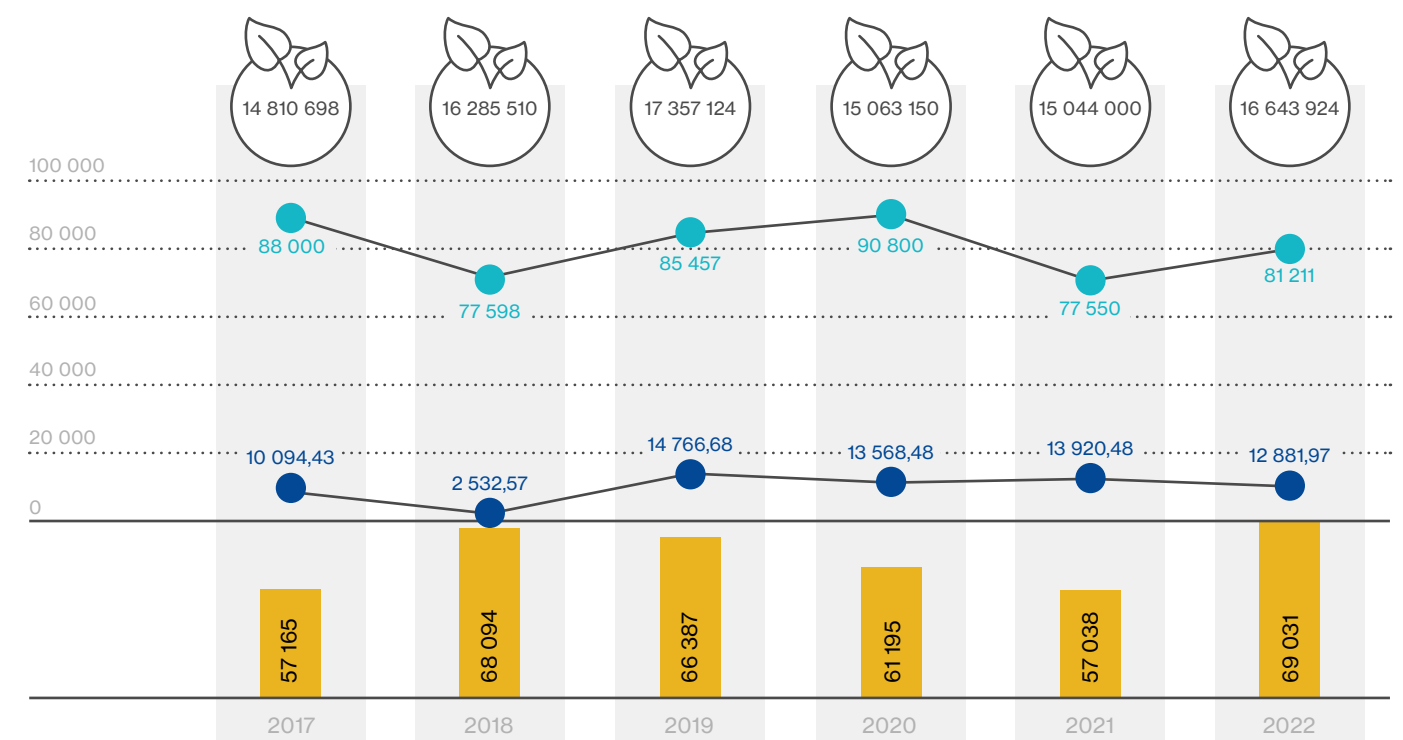
RECOVERY OF SEWAGE SLUDGE

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. Sanitised 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. During 2022, there was a gradual increase in the amount of sanitised dewatered sludge, with the decrease in 2021 mainly due to restrictions associated with the COVID-19 pandemic, such as restrictions on tourism, closure or reduction of hotels, restaurants, shops and service establishments. A large number of employees of companies used home office or childcare, which reduced their commuting to the capital city for work. Increased biogas production corresponded with higher sludge production at the wastewater treatment plant (WWTP) and higher quantities of imported waste entering the digesters.
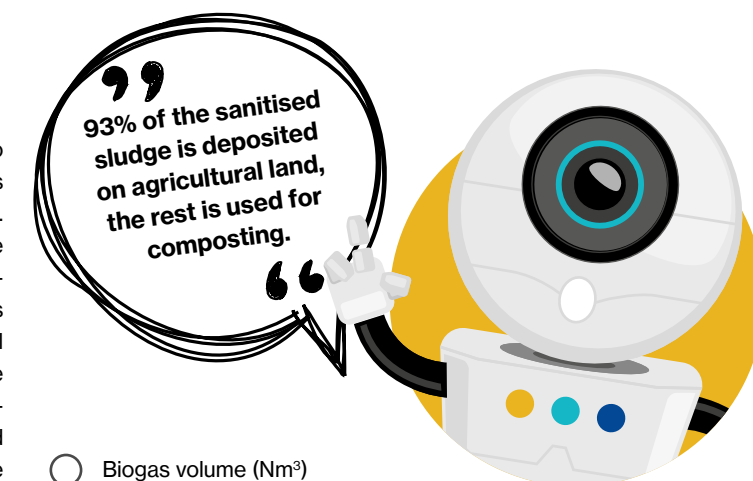
○ Biogas volume (Nm³)

● Sanitised dewatered sludge from wastewater treatment (t)

● Liquid waste received and treated by WWTPs in the territory of Prague Capital City (t)

● Amount of electricity and thermal energy produced within the WWTP (MWh)

Note: For most of 2018, the waste reception at WWTP Prague was closed

	2017	2018	2019	2020	2021	2022
Biogas volume (Nm³)	14 810 698	16 285 510	17 357 124	15 063 150	15 044 000	16 643 924
Sanitised dewatered sludge (t)	88 000	77 598	85 457	90 800	77 550	81 211
Liquid waste received (t)	10 094,43	2 532,57	14 766,68	13 568,48	13 920,48	12 881,97
Electricity and thermal energy (MWh)	57 165	68 094	66 387	61 195	57 038	69 031

In 2022, the company Pražské vodovody a kanalizace, Plc dealt with a total of 3 874 water network accidents, which is 257 fewer cases (6.2%) than in the previous year. The average time of interruption of supply by one accident was 10 hours and 27 minutes. Of the total number of accidents, 40 fell into category 1, which includes accidents in which the supply to more than 1 000 inhabitants is interrupted, or those affecting health facilities or other important buildings.

100% of electricity consumption
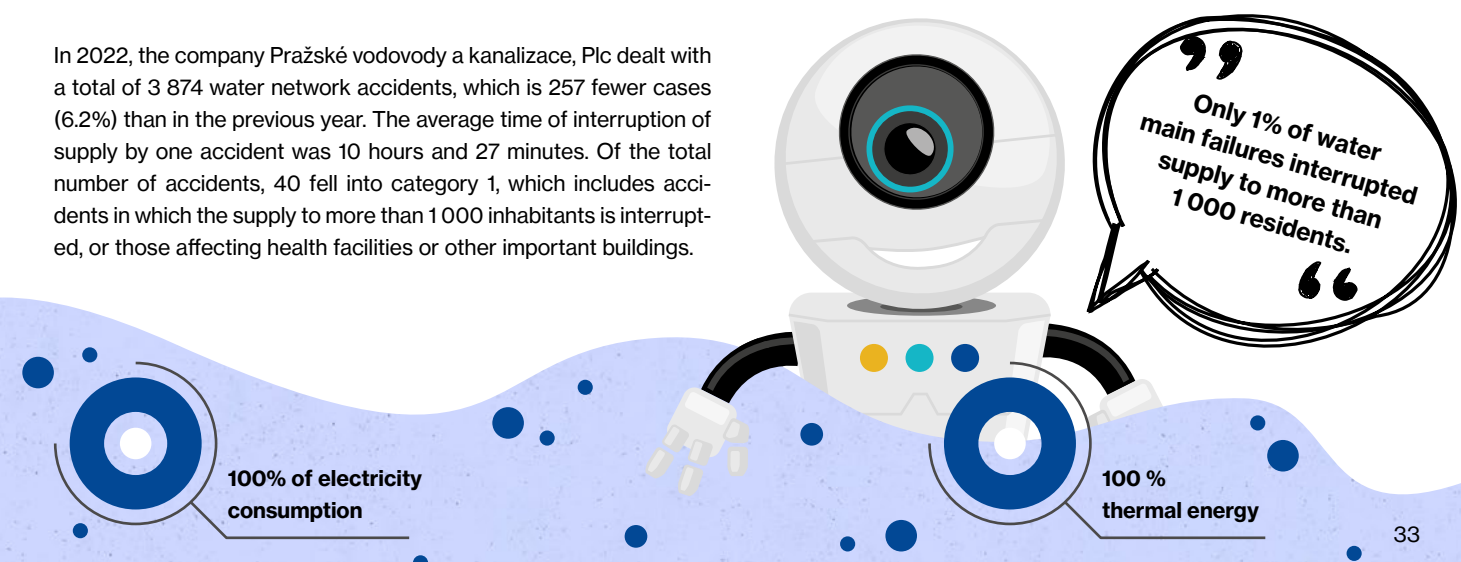
100 % thermal energy

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. The year 2022 and the extreme increase in stock market prices has clearly shown the need for a solution to supply energy locally from renewable sources. The state and cities have to show the way to achieve energy self-sufficiency.

The year 2022 was particularly affected by the impact of the war in Ukraine, which caused extreme concerns about energy supplies and, consequently, the diversion of natural gas and oil supplies from Russia. Electricity prices rose sharply, reaching close to EUR 1 000/MWh on the stock exchange in August. A similar situation occurred for natural gas, with prices exceeding EUR 300/MWh. The end of the year saw a significant calming and reduction in stock market prices, but the impact on consumer prices will be long-term.

For municipalities, and even more so for the capital city of Prague, 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% compared to 2021, or 60.4 TWh in 2022 compared to 62.8 TWh in 2021. Natural gas consumption has fallen by an even more dramatic 20%. The situation is similar for heat supply from the heat supply system (HSS), which shows a 12% drop in consumption.

This development is due not only to the reduction of energy consumption for heating and hot water, but also to the rapid development of local electricity production from photovoltaic power plants (PV plants) and the transition to heat pumps and other local biomass sources. New subsidies have also responded to this trend, supporting the construction of renewable energy sources, the insulation of existing buildings and the construction of passive ones. The legislative process to support the construction of community photovoltaic (PV) plants, where the energy generated can be shared within apartment buildings, has also accelerated.
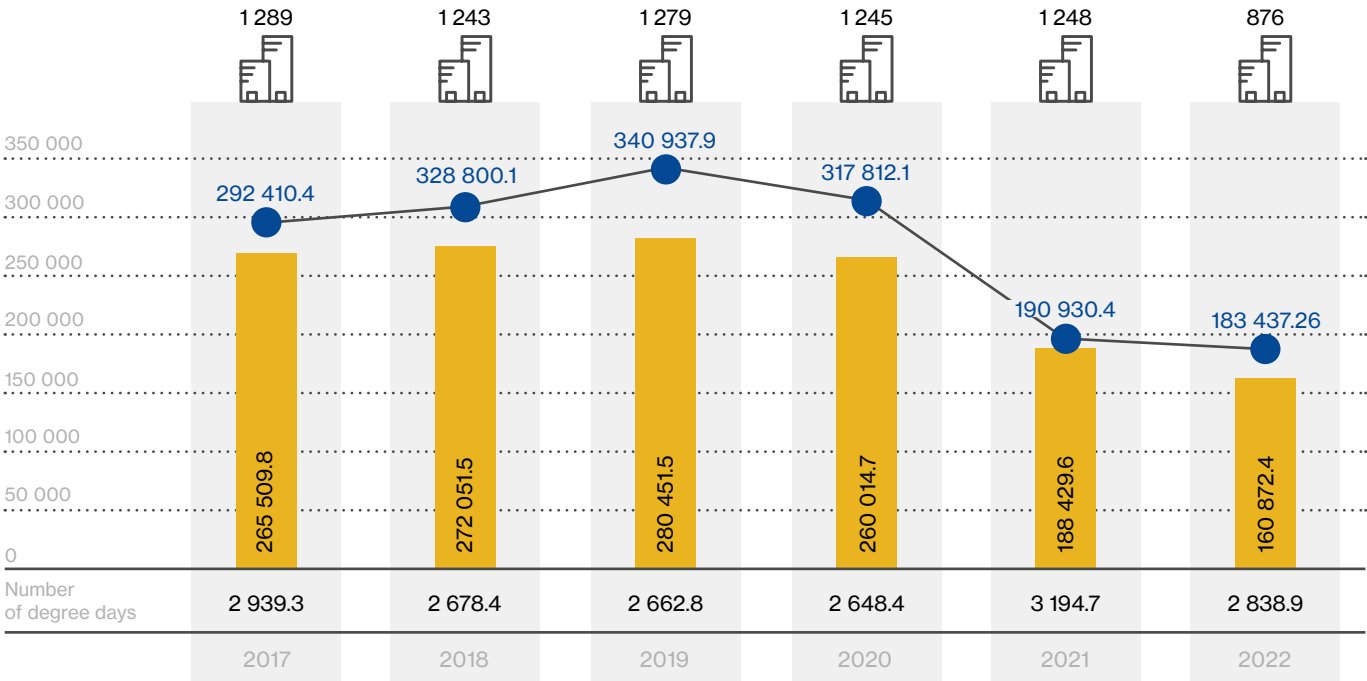
In general, electricity consumption is expected to continue to grow due to new construction, the development of telecommunications networks and electromobility. Based on 2022 developments, much more emphasis will be placed on a stable and secure supply. The Smart Prague 2030 Concept responds accordingly 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 beginning of the year, 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, photovoltaic power plants on the roofs of buildings, etc. Modern systems for monitoring and controlling energy consumption and flows in the building so that energy is consumed are also an integral part of this, and thus the

carbon footprint of the building 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 City of Prague 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 now refers to buildings and consumption points registered for centralised energy purchasing. Compared to previous years, the data structure has been modified. The database contains 876 buildings with a total of 1 871 electricity consumption points and 423 natural gas consumption points. However, the resulting indicator is also affected by the unavailability of thermal energy consumption data for 2022. As in 2021, it is not possible to directly compare the energy consumption of the sample of buildings. 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 therefore to the pursuit of operational energy savings.

The average number of degree days in the long term is 3 237 (Prague - Karlov, 1961-1990). Looking at the data from 2017 onwards, it can be seen that 2022 was the third coldest year overall in the period in question. The basis of the degree day method is the ability to trace the outdoor temperature from meteorological data. The calculation of degree day is used to determine the characteristics of the heating period - the number of day-degrees and the number of heating days. It is one of the procedures used to design, evaluate and compare heat sources and consumers. The calculation is performed over a database of daily average outdoor air temperatures.
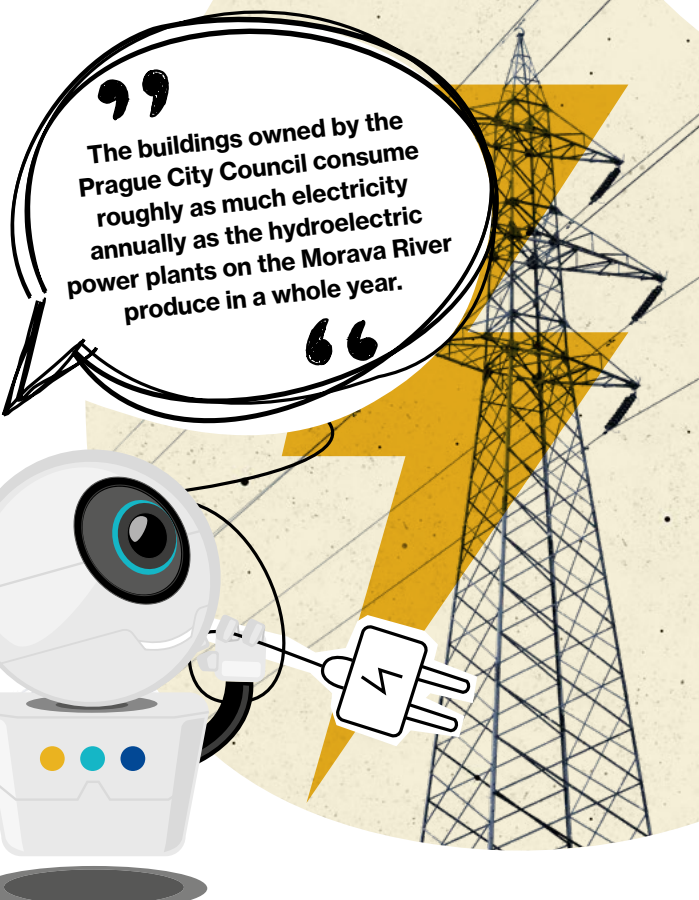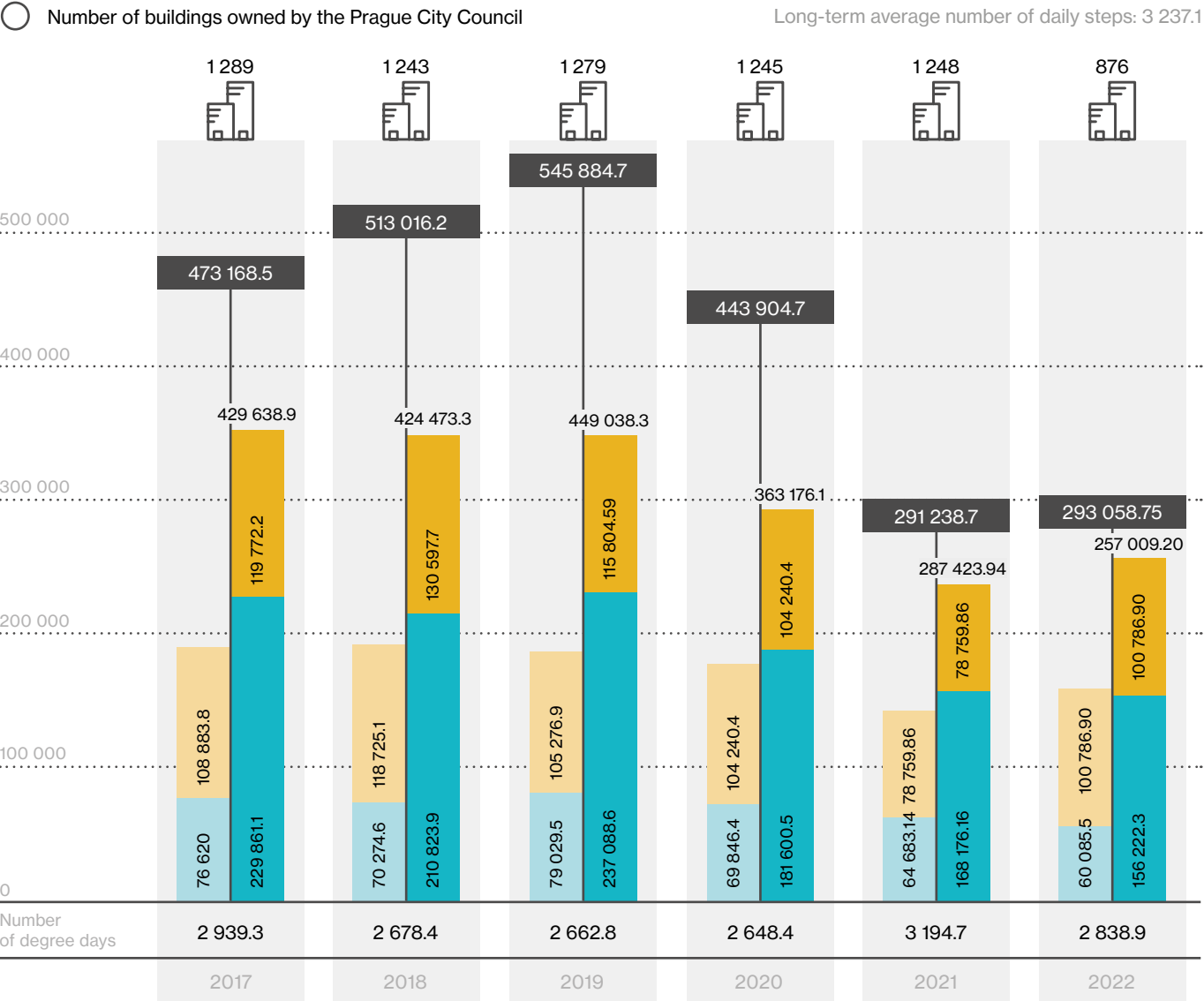
● Annual energy consumption (MWh) in public buildings owned by the Prague City Council

● Resulting indicator value: Converted energy consumption by day-step (MWh)

○ Public buildings owned by Prague Capital City registered in the information system - number of buildings

Long-term average number of degree days: 3 237.1

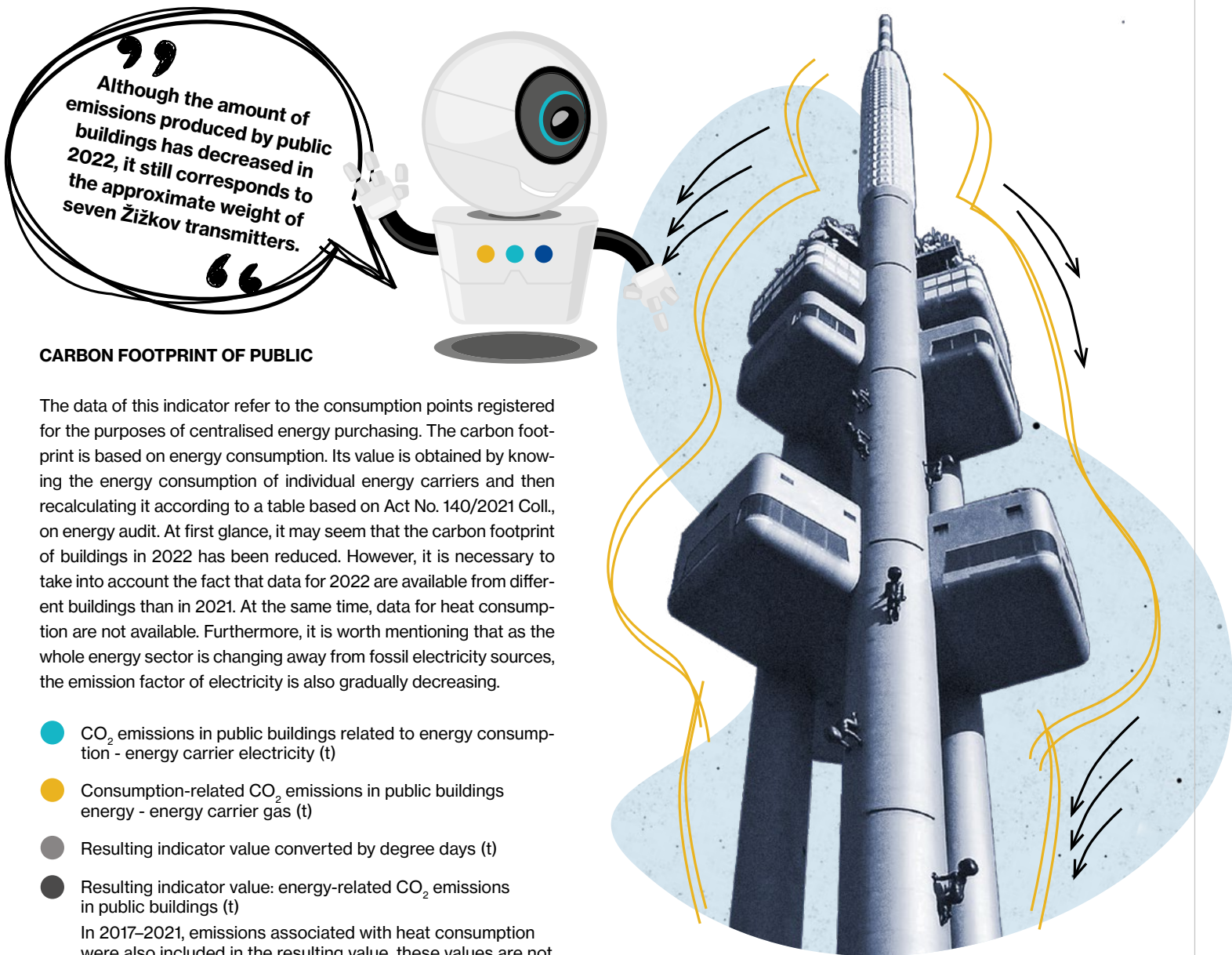|	2017	2018	2019	2020	2021	2022
Buildings	1 289	1 243	1 279	1 245	1 248	876
Converted (MWh)	292 410.4	328 800.1	340 937.9	317 812.1	190 930.4	183 437.26
Annual (MWh)	265 509.8	272 051.5	280 451.5	260 014.7	188 429.6	160 872.4
Number of degree days	2 939.3	2 678.4	2 662.8	2 648.4	3 194.7	2 838.9

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.

No data on thermal energy consumption is available for 2022 and therefore we do not present this data.

● Electricity – Annual energy consumption (MWh) in public buildings

● Electricity – Annual consumption of non-renewable primary energy (MWh) in public buildings

● Gas – Annual energy consumption (MWh) in public buildings

● Gas – Annual consumption of non-renewable primary energy (MWh) in public buildings

● Resulting indicator value: total annual consumption of non-renewable primary energy (MWh) in public buildings, converted by degree days
In 2017–2021, heat consumption was also included in the final value, these values are not available for 2022.

○ Number of buildings owned by the Prague City Council

Long-term average number of daily steps: 3 237.1

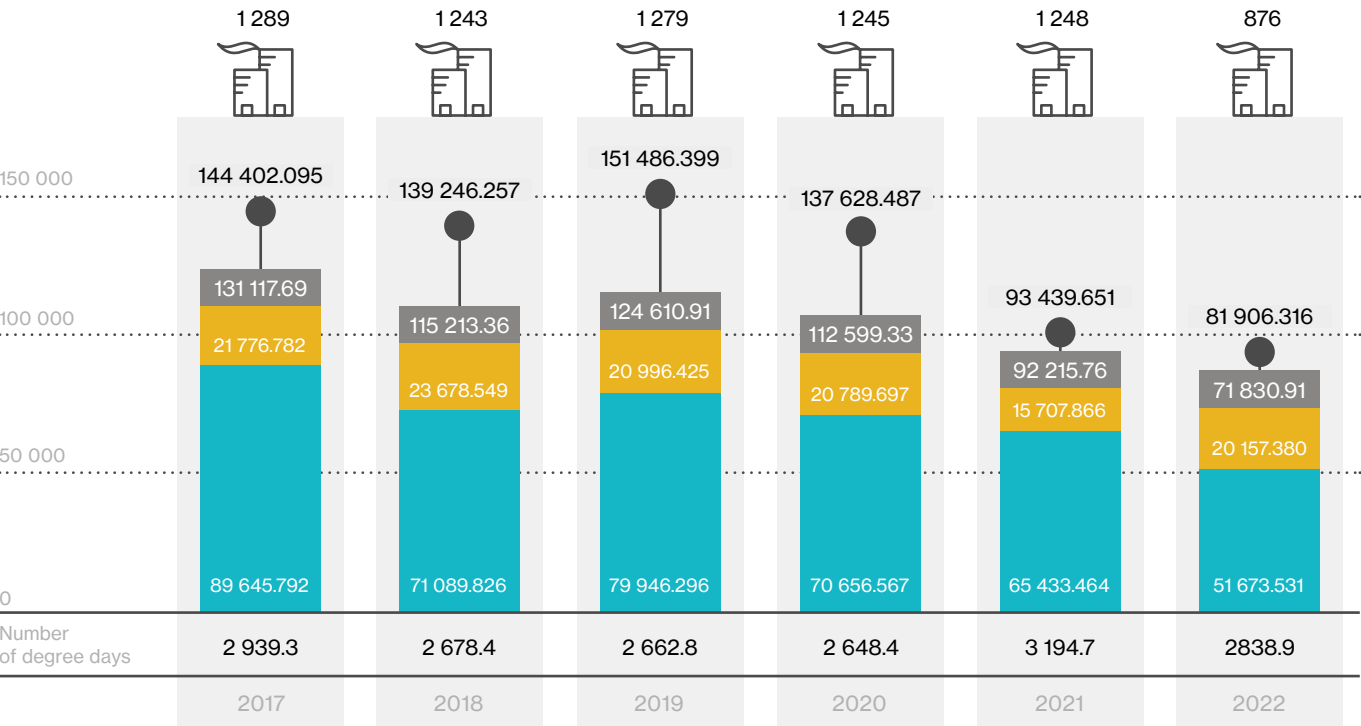|	2017	2018	2019	2020	2021	2022
Buildings	1 289	1 243	1 279	1 245	1 248	876
Resulting indicator	473 168.5	513 016.2	545 884.7	443 904.7	291 238.7	293 058.75
Gas non-renewable	429 638.9	424 473.3	449 038.3	363 176.1	287 423.94	257 009.20
Gas annual	119 772.2	130 597.7	115 804.59	104 240.4	78 759.86	100 786.90
Electricity non-renewable	108 883.8	118 725.1	105 276.9	104 240.4	78 759.86	100 786.90
Electricity annual	229 861.1	210 823.9	237 088.6	181 600.5	168 176.16	156 222.3
	76 620	70 274.6	79 029.5	69 846.4	64 683.14	60 085.5
Number of degree days	2 939.3	2 678.4	2 662.8	2 648.4	3 194.7	2 838.9

CARBON FOOTPRINT OF PUBLIC

The data of this indicator refer to the consumption points registered for the purposes of centralised energy purchasing. 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 Act No. 140/2021 Coll., on energy audit. At first glance, it may seem that the carbon footprint of buildings in 2022 has been reduced. However, it is necessary to take into account the fact that data for 2022 are available from different buildings than in 2021. At the same time, data for heat consumption are not available. Furthermore, it is worth mentioning that as the whole energy sector is changing away from fossil electricity sources, the emission factor of electricity is also gradually decreasing.

- ● CO_2 emissions in public buildings related to energy consumption - energy carrier electricity (t)
- ● Consumption-related CO_2 emissions in public buildings energy - energy carrier gas (t)
- ● Resulting indicator value converted by degree days (t)
- ● Resulting indicator value: energy-related CO_2 emissions in public buildings (t)
  In 2017–2021, emissions associated with heat consumption were also included in the resulting value, these values are not available for 2022.
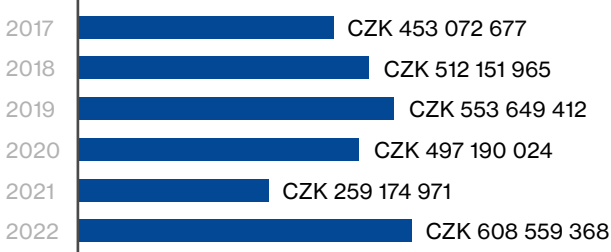- ○ Number of buildings owned by the Prague City Council

Long-term average number of daily steps: 3 237.1

|	2017	2018	2019	2020	2021	2022
Buildings	1 289	1 243	1 279	1 245	1 248	876
Resulting indicator value	144 402.095	139 246.257	151 486.399	137 628.487	93 439.651	81 906.316
Degree days value	131 117.69	115 213.36	124 610.91	112 599.33	92 215.76	71 830.91
Gas	21 776.782	23 678.549	20 996.425	20 789.697	15 707.866	20 157.380
Electricity	89 645.792	71 089.826	79 946.296	70 656.567	65 433.464	51 673.531
Number of degree days	2 939.3	2 678.4	2 662.8	2 648.4	3 194.7	2838.9

ENERGY COSTS

Costs for electricity and gas in 2022 for the consumption sites that were included in the centralised procurement. 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 output is also influenced by the overall increase in the price of the commodities electricity and natural gas.

Year	Cost
2017	CZK 453 072 677
2018	CZK 512 151 965
2019	CZK 553 649 412
2020	CZK 497 190 024
2021	CZK 259 174 971
2022	CZK 608 559 368

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 m^2, the EPCs were processed in 2013, so they will be gradually renewed and we should see larger differences in the coming years. In 2022, EPCs have been prepared for 53 buildings. Not a single assessed building received an A rating, while more than 90% of the newly issued EPCs classified the buildings in class D or worse. This shows that there has been an assessment of mainly older buildings with demanding energy operations.

Class	Count
A	2
B	26
C	125
D	188
E	152
F	54
G	42
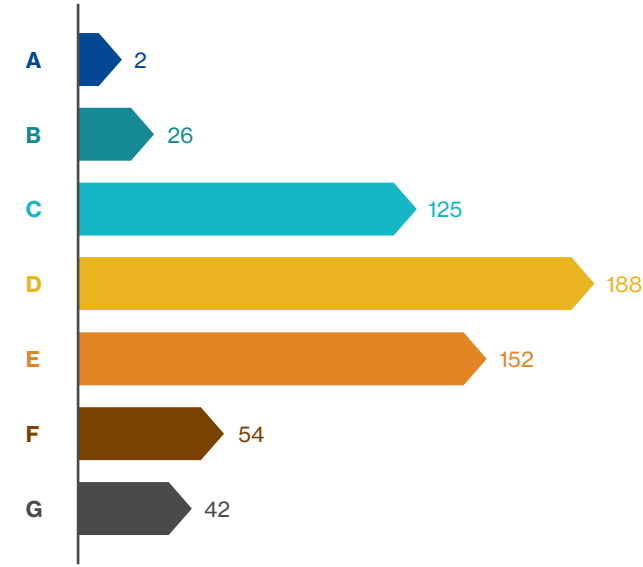
PUBLIC BUILDINGS WITH GREEN BUILDING

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 lifecycle 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.

TOTAL NUMBER OF PUBLIC BUILDINGS WITH ENERGY MONITORING AND INTELLIGENT CONTROL AT A HIGH LEVEL OF AUTOMATION

This indicator tracks the level of monitoring of energy consumption in public buildings.

Currently, there is no unified central register of buildings owned by the Prague Capital City that have energy monitoring in place.

In the future this information will be provided thanks to the energy-oriented pilot projects of Operátor ICT, Plc.

There are no energy-active public buildings in Prague.

2017	2018	2019	2020	2021	2022
6	22	29	56	56	56
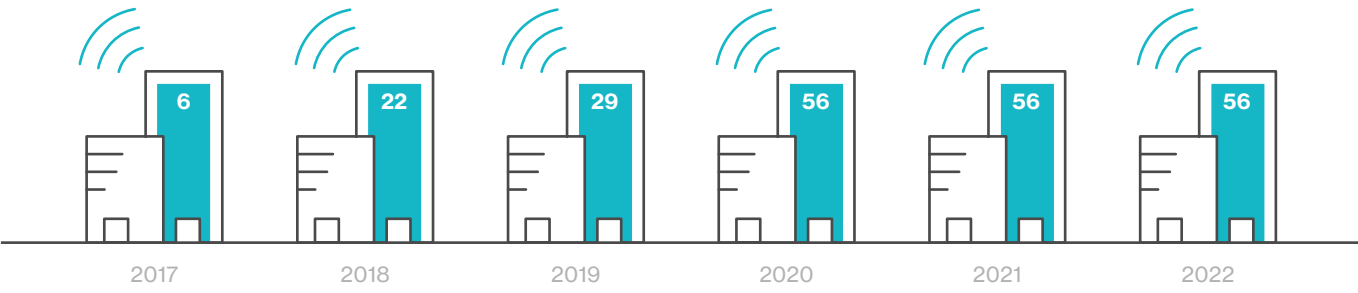
DEGREE OF DIGITISATION OF THE ELECTRICITY

The indicator monitors the degree of readiness of the electricity distribution network of Prague - the distribution network of PRE-distribuce, Plc (PREdi/PREdistribution) - 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.

	2017	2018	2019	2020	2021	2022
Number of smart meters	<1 %	<1 %	<2 %	<2 %	<1 %	<1 %
Total number of all meters within the PREdi distribution	791 000	791 000	810 000	817 000	818 000	828 500

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 2022, the number of smart meters at Pražská plynárenská, Plc saw an increase in the Medium Demand category, but especially in the Small Demand category, where several projects were implemented.

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

The number of smart meters of PREdistribuce, Plc has increased significantly compared to 2021, however, looking at the data we can see that it still has not reached the record year 2020.

The proportion of water meters with remote reading is increasing every year. In 2022, the total number of remotely read water meters was 14 864, which is 17.4% more than in the previous year.

- Number of smart meters PREdistribuce, Plc
- Number of smart meters Pražská plynárenská, Plc
- Number of smart meters PVK, Plc
- Number of smart meters
- Total number of meters PREdistribuce, Plc
- Total number of meters Pražská plynárenská, Plc
- Total number of meters PVK, Plc
- Total number of meters
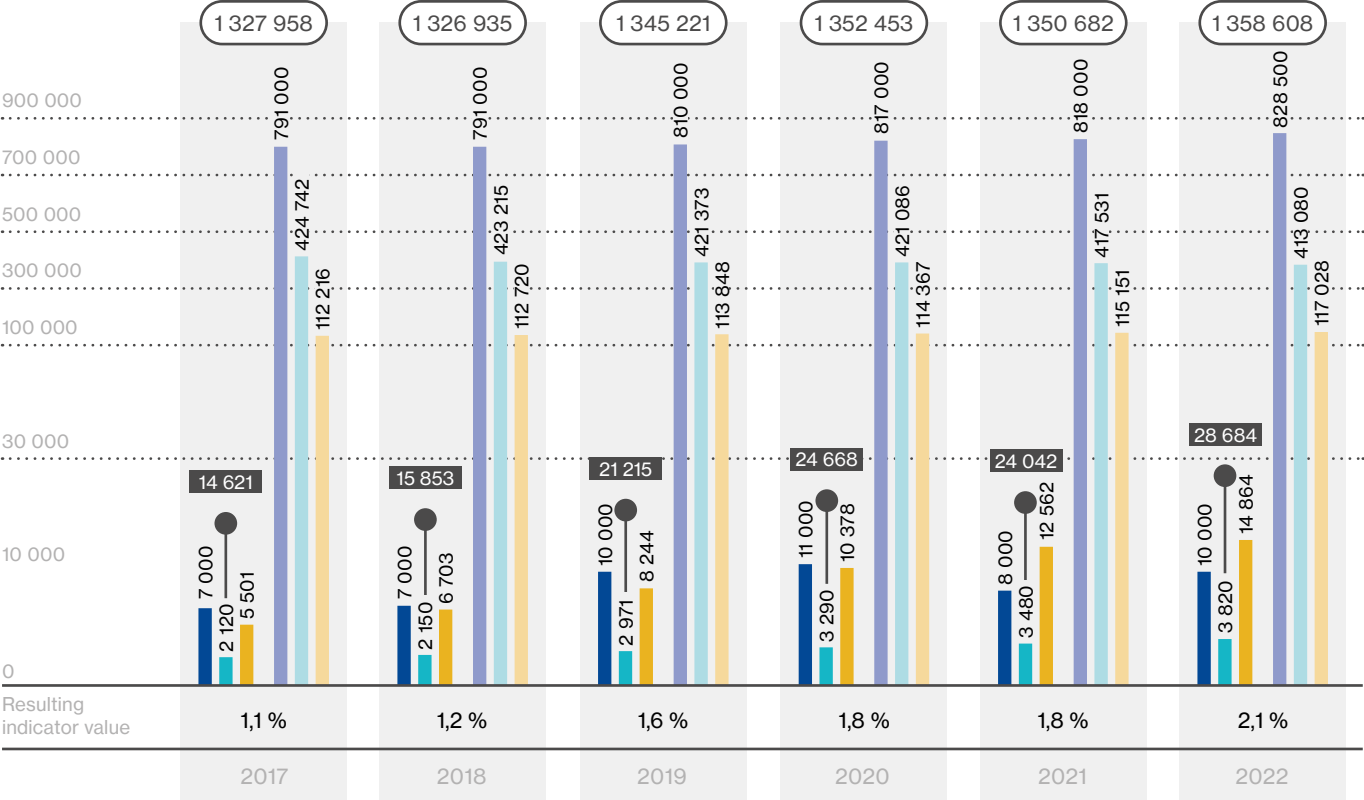
WATER CONSUMPTION

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 2022, Pražské vodovody a kanalizace, Plc (PVK) delivered 92 028 thousand m³ of water to the water supply network, which is comparable to the previous year.

- Population of Prague Capital City
- Quantity of water delivered to the network for implementation in Prague Capital City (m³)
- Resulting value of the indicator: quantity of water delivered to the network for implementation in the territory of Prague Capital City / population of Prague Capital City (m³)
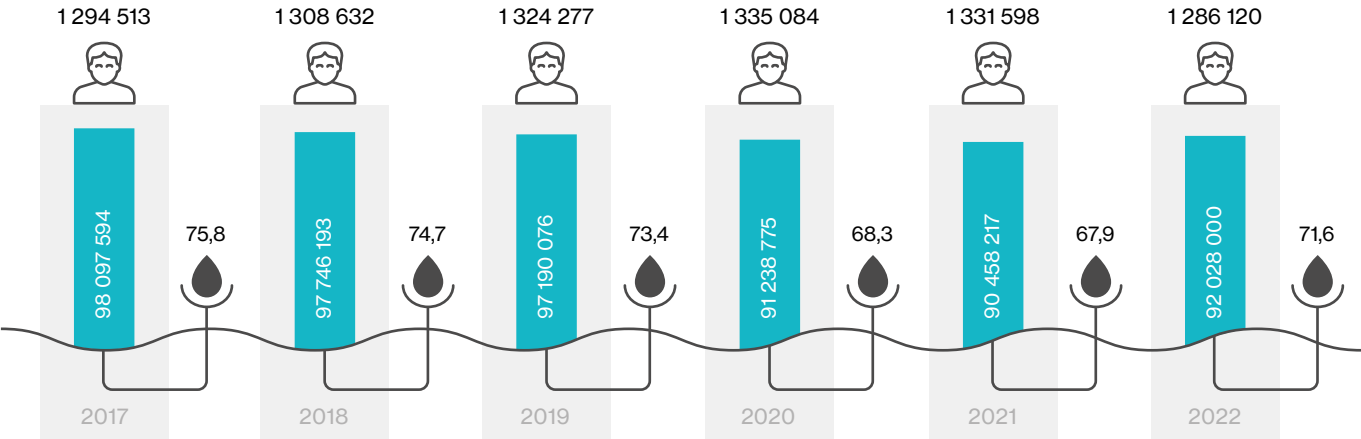
USE OF GREY WATER FOR ENERGY – PUBLIC SECTOR

	2017	2018	2019	2020	2021	2022
Amount of water preheated by grey water energy (m³)	N/A	N/A	N/A	8 712	7 895	5 195
Total water consumption in public sector buildings (domestic hot water and cold water in m³)	1 506 823.82	1 187 699.67	1 385 154.701	1 141 642.5	251 838.780	N/A

UNPLANNED WATER

- Number of accidents on the water
- supply network Length of the water supply network (km)
- Resulting value of the indicator: number of accidents on the water supply network / length of the water supply network (km)
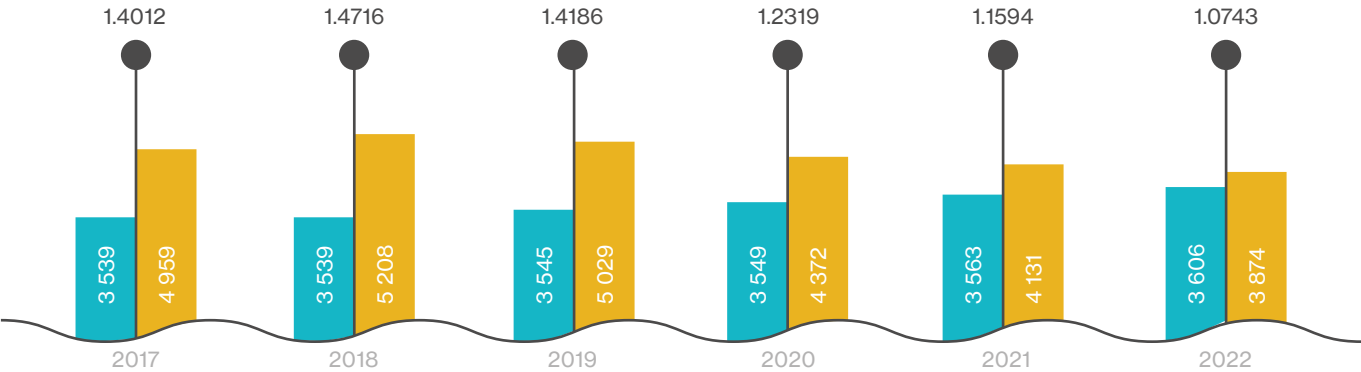
INTELLIGENT LIGHTING

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

Approximately six thousand new smart lamps will be installed in 2022. 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.

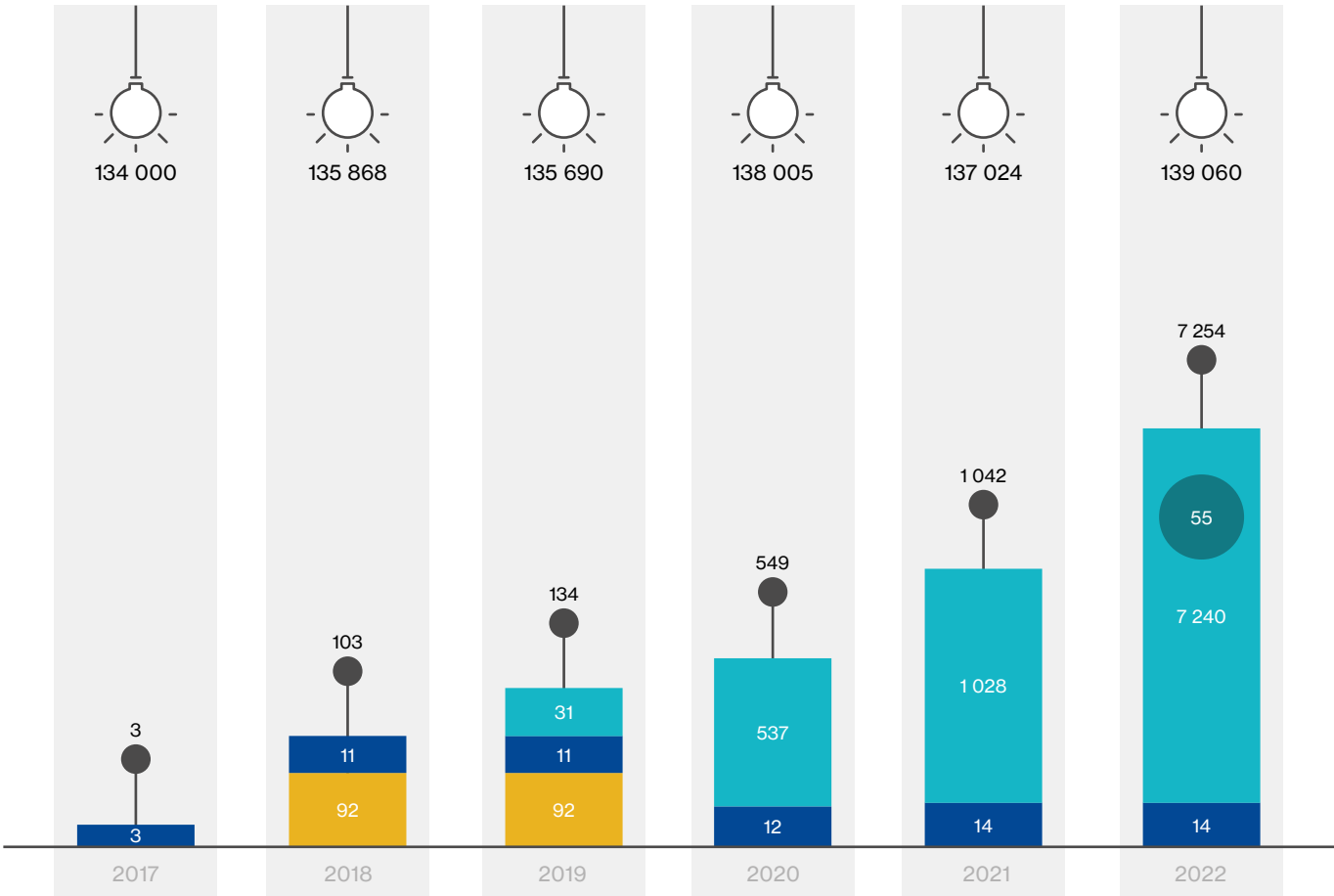Technologie hlavního města Prahy, Plc (THMP), a state-owned company that manages, among others, the PL in the capital, continues the trend of restoring the original poles and implements several pilot projects. Dynamically controlled public lighting is being tested in a number of Prague parks. The original 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.

- 🟡 Number of smart lamps OICT
- 🔵 Number of smart lamps PRE
- 🔵 Number of smart lamps THMP
- 🔵 Number of EV ready lamps THMP
- ⚫ Total number of smart lamps
- ⚪ Total number of all public lighting lamps

2017	2018	2019	2020	2021	2022
134 000	135 868	135 690	138 005	137 024	139 060

2017: 3, 3
2018: 103, 11, 92
2019: 134, 31, 11, 92
2020: 549, 537, 12
2021: 1 042, 1 028, 14
2022: 7 254, 7 240, 55, 14

DECENTRALISED SOLAR ELECTRICITY GENERATION

In 2022, there will be a sharp increase in the number and installed capacity of PV plants. Compared to previous years, when the number of PV installations in Prague Capital City grew by 200-300 units per year, in 2022 almost 1 200 PVs were installed. The installed capacity increased by 10.7 MW.

From the average power figure it is clear that these are micro sources up to 10 kWp of installed power. These microgenerators are supported by the New Green Savings subsidy programme.

(MW)

	2017	2018	2019	2020	2021	2022
Number of electricity sources installed on the territory of Prague Capital City	1 223	1 242	1 481	1 724	2 052	3 205
Diameter of installed solar power	0.019	0.018	0.015	0.014	0.013	0.011
Total power and number of others micro power devices	NA	23.040	23.129	23.129	17.479	23.129
		32 sources	12 sources	12 sources	10 sources	12 sources
Landfill gas	x	5.552	5.650	5.650	5.402	5.650
		7 sources	2 sources	2 sources	1 source	2 sources
Sludge gas	x	5.402	5.402	5.402	5.402	5.402
		5 source	1 source	1 source	1 source	1 source
Water energy	x	12.084	12.075	12.075	12.075	12.075
		19 sources	8 sources	8 sources	8 sources	8 sources
Wind energy	x	0.002	0.002	0.002	0.002	0.002
		1 source	1 source	1 source	1 source	1 source

Resulting indicator value:
Amount of installed capacity of solar power plants in Prague Capital City (MW)

22.927 — 22.823 — 22.388 — 23.39 — 25.872 — 36.465
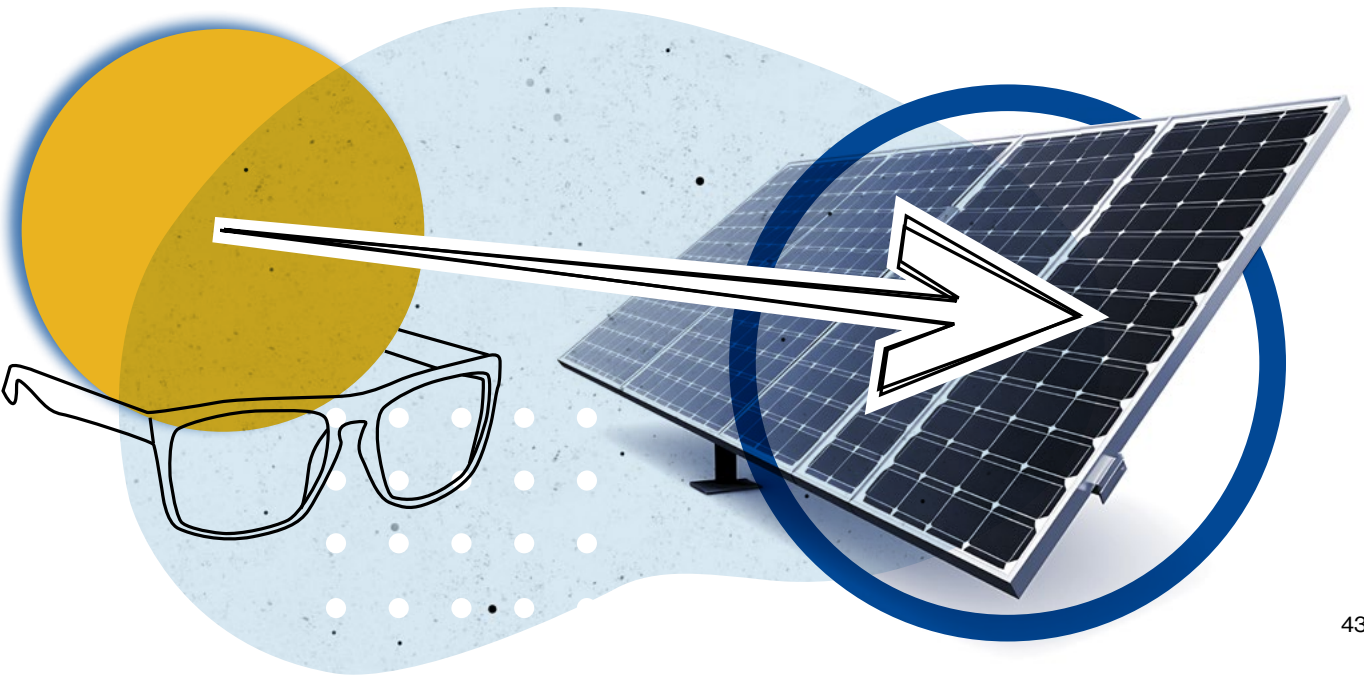
The City of Prague is successfully innovating its services and discovering new opportunities in the field of tourism. Creative variations on classic events and completely progressive entertainment concepts are appearing on the city's agenda.

Street festivals, public music and cultural performances, and international celebrations of important holidays are held throughout the year. All this enriches the offer of countless interesting Prague sights. In general, Prague is a place of culture, meeting and celebration all year round.

Especially during the summer, the offer is expanded by the renewed concept of summer cinemas, themed celebrations on Prague's embankments and other public outdoor events. These events perfectly complement the quiet corners of the city centre, where you can enjoy the charm of Prague undisturbed.

With innovations in the field of tourism, the city shows its interest in its tourists and residents who like to spend time in Prague and like to come back. Recent innovations include video mapping, geocaching, augmented reality tours and assistance by robotic guides.

The biggest novelty among the additional services is the Prague Visitor Pass (PVP), a new multi-purpose Prague tourist card under which the capital city offers comprehensive services on its territory.

The year 2022 was characterized by a large influx of tourists as a consequence of loosening the international tourism in connection with the end of the COVID-19 pandemic. After a few years, tourist numbers and related statistics have begun to return to normal, as can be seen in the following tables and graphs.
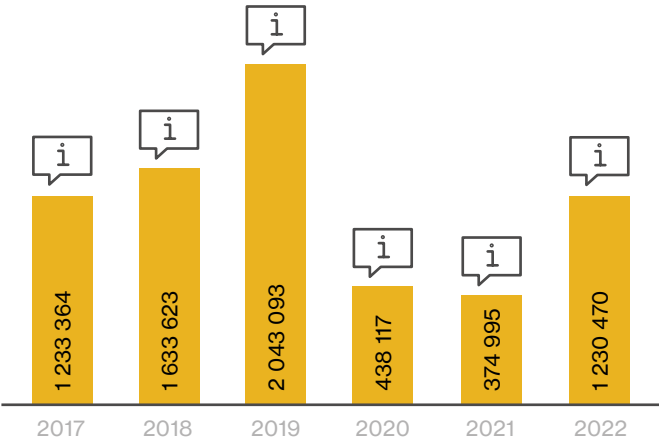
USE OF BIG DATA IN TOURISM

Tourism development can be targeted to relevant users through the collection and analysis of related data. Analysis of anonymised information obtained from mobile operators 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., helps better target and improve services for visitors and map the tourism situation in individual Prague locations. This leads to an overall increase in the level of tourism.

In order to promote tourism, Prague signed a memorandum with Mastercard at the beginning of 2022 and joined the City Possible platform, which is already used by more than 300 cities. The capital thus has access to payment data reflecting the behaviour of cardholders, which is used to target marketing campaigns for visitors to the city, for example by the city's company Prague City Tourism, Plc (PCT).

FEEDBACK FROM TOURISTS

Tourist feedback is key to improving services in the city. PCT monitors feedback from visitors to Prague and evaluates interactions within Prague's information centres, from social media posts and from email communications. The graph shows the number of interactions with visitors to the capital through the information centres. At first glance, it can be seen that tourists have been sending feedback most frequently via social networks and e-mail in recent years.

🟡 Number of interactions in information centres

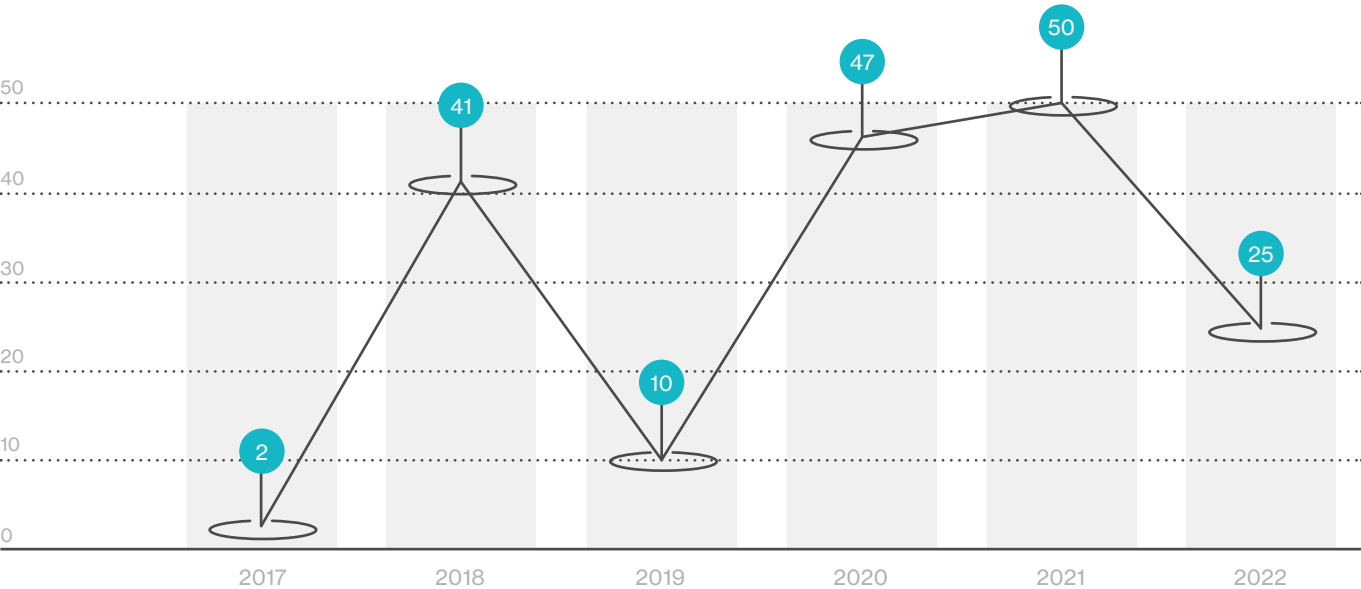| Year	Interactions
2017	1 233 364
2018	1 633 623
2019	2 043 093
2020	438 117
2021	374 995
2022	1 230 470

GEOLOCATION GAMES

Geolocation games are a fun, knowledge-based activity where people follow GPS and designated waypoints to get to a destination. These games can be put to good use in tourism, e.g. as themed route planning. The stories have different focuses and plots.

In Prague, the Geo-Fun geolocation game with twenty one routes, the Hidden Stories game with two routes and Play Prague! with two routes a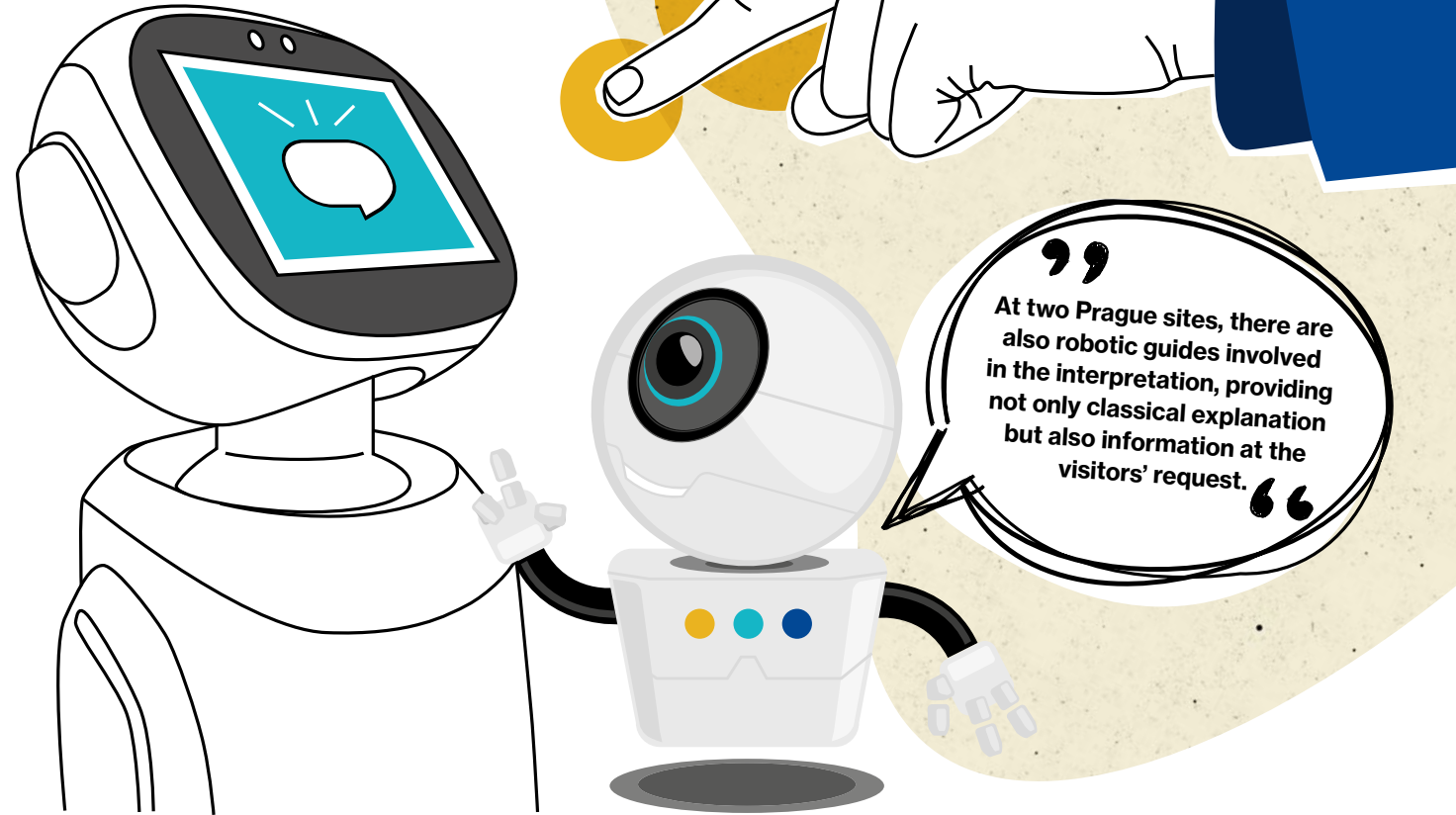re currently available for free. The companies also offer private or corporate games with individual settings. The principle consists not only in finding individual goals but also in performing the tasks that await the player after reaching these places.

🔵 Number of available geolocation games

Year	Games
2017	2
2018	41
2019	10
2020	47
2021	50
2022	25

GUIDE – ROBOT

At two Prague sites, there are also robotic guides involved in the interpretation, providing not only classical explanation but also information at the visitors' request.

SENSOR-BASED VISITOR COUNTING

Sensor-based people counters can use various technologies to detect the presence of a person, making it possible to monitor the movement of people in a specific location.

In the second half of 2021, the Pedestrian Traffic Intensity project, aimed at monitoring pedestrians, especially taking into account 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 the existing cameras of the city camera system (CCTV system). After the successful pilot operation, the following locations were included in the operation: the Rašínovo náplavka (embankment), the Charles Bridge, the intersection of Na Můstku and Rytířská Streets, Stromovka and U Výstaviště Street – under the railway viaduct. In 2022, the number of monitored sites remained unchanged.

	2017–2019	2020	2021	2022
Resulting indicator value	0	5	5	5
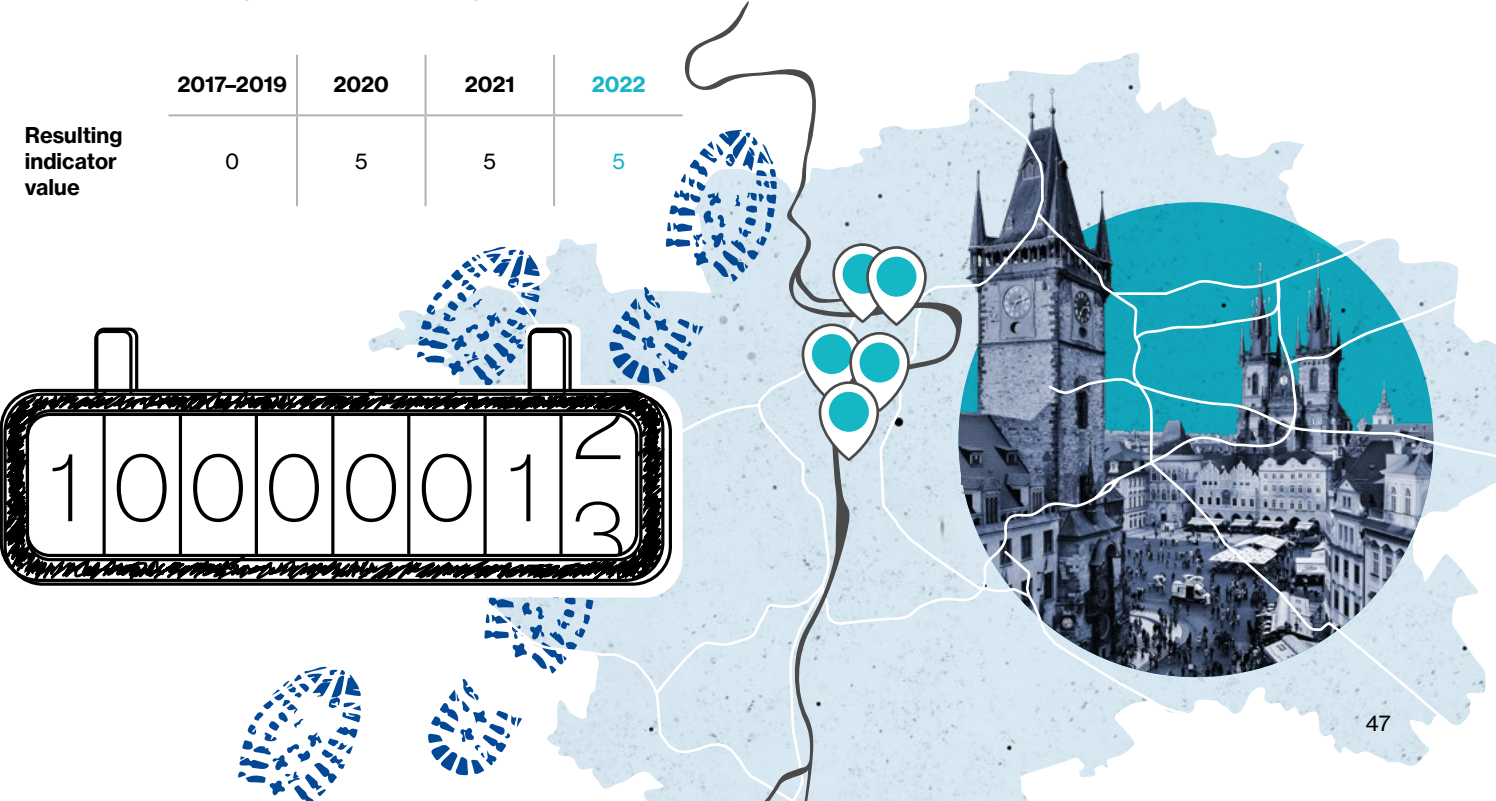
TOURISM PRODUCTIVITY

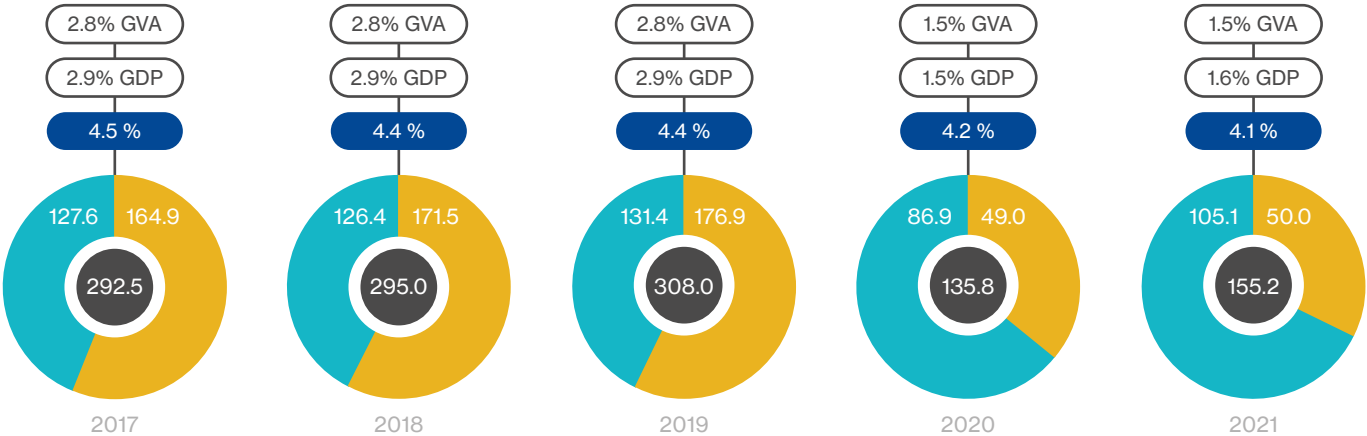Prague is not only visited by tourists from foreign countries but also from all parts of the Czech Republic. Their ratio is then shown in the next indicator. It aims to approximate the productivity of tourism and uses indicators related to tourism expenditure, with a breakdown between expenditure by 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 to the overall result.

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

* The data are published with a one-year delay, and the 2022 values will be published in SPI 2023, which will allow to assess the situation towards the end of the COVID-19 pandemic.

- ● Expenditure of domestic visitors (billion CZK)
- ● Expenditure of foreign visitors (billion CZK)
- ● Total visitor expenditure on tourism (billion CZK)
- ○ Tourism shares
- ● Share of tourism in employment

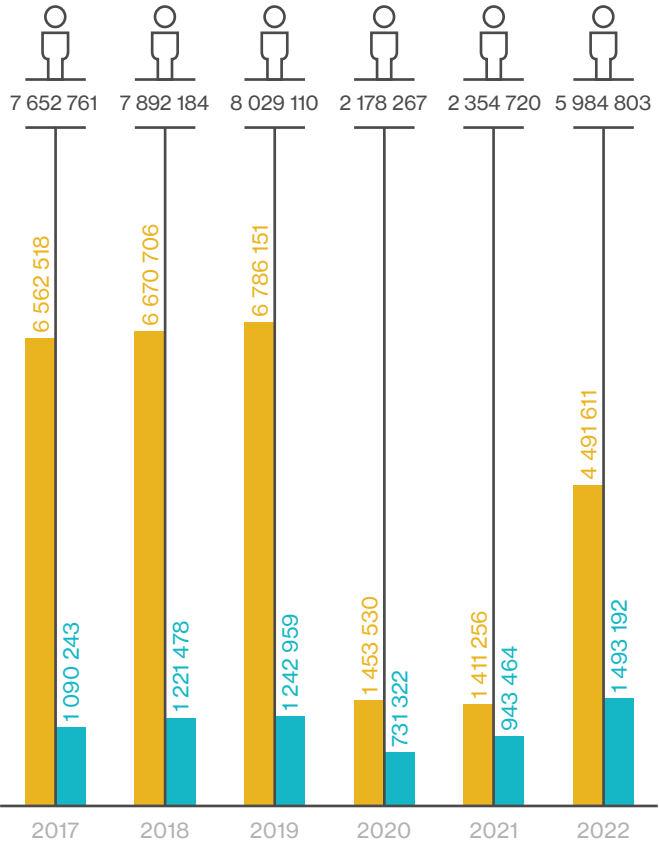|	2017	2018	2019	2020	2021
GVA	2.8% GVA	2.8% GVA	2.8% GVA	1.5% GVA	1.5% GVA
GDP	2.9% GDP	2.9% GDP	2.9% GDP	1.5% GDP	1.6% GDP
Share	4.5 %	4.4 %	4.4 %	4.2 %	4.1 %
Domestic	127.6	126.4	131.4	86.9	105.1
Foreign	164.9	171.5	176.9	49.0	50.0
Total	292.5	295.0	308.0	135.8	155.2

NUMBER OF VISITORS

The capacity of the capital city is continuously monitored, both in terms of the total number of visitors and their overnight stays in accommodation facilities.

The number of visitors to the city each year is a very important indicator, reflecting not only the overall situation in tourism but also the capital's efforts to increase its attractiveness among European cities. In 2022, the number of visitors to the capital rose by 154%. The capital is also increasingly popular with domestic visitors.
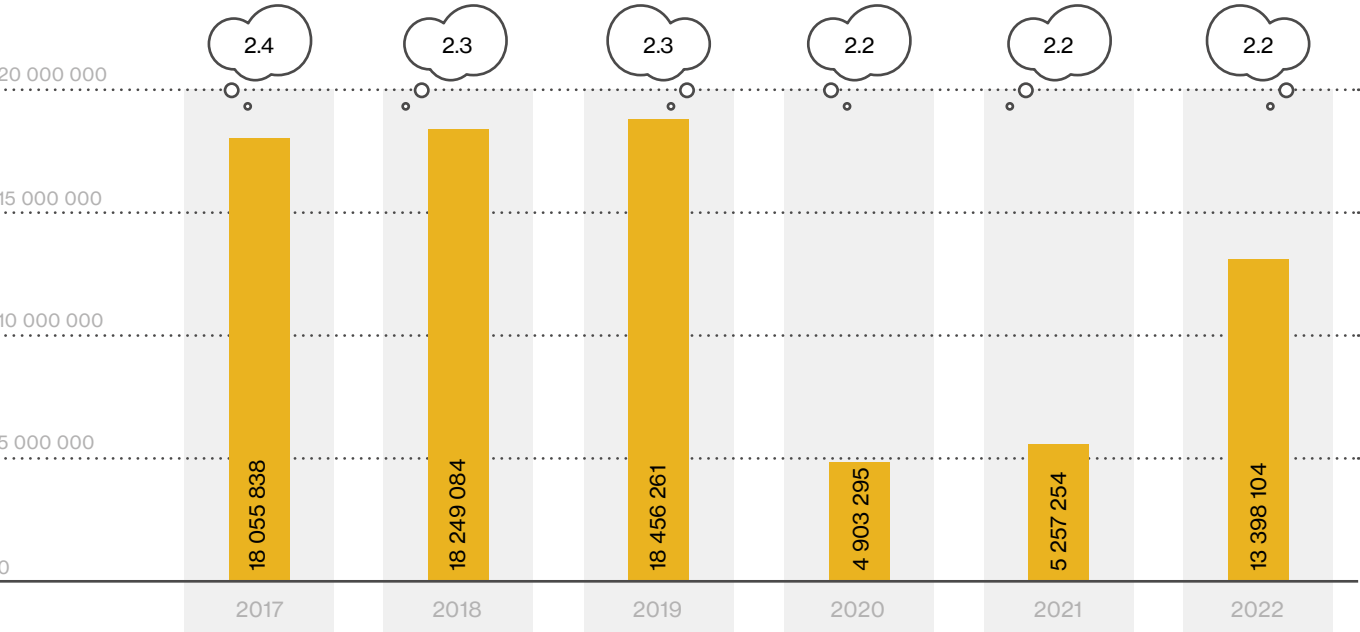
Most of the foreign visitors came from Germany, Slovakia, the USA, Poland and the UK. According to data from the Czech Statistical Office, tourists spend on average 2 to 3 nights in Prague.

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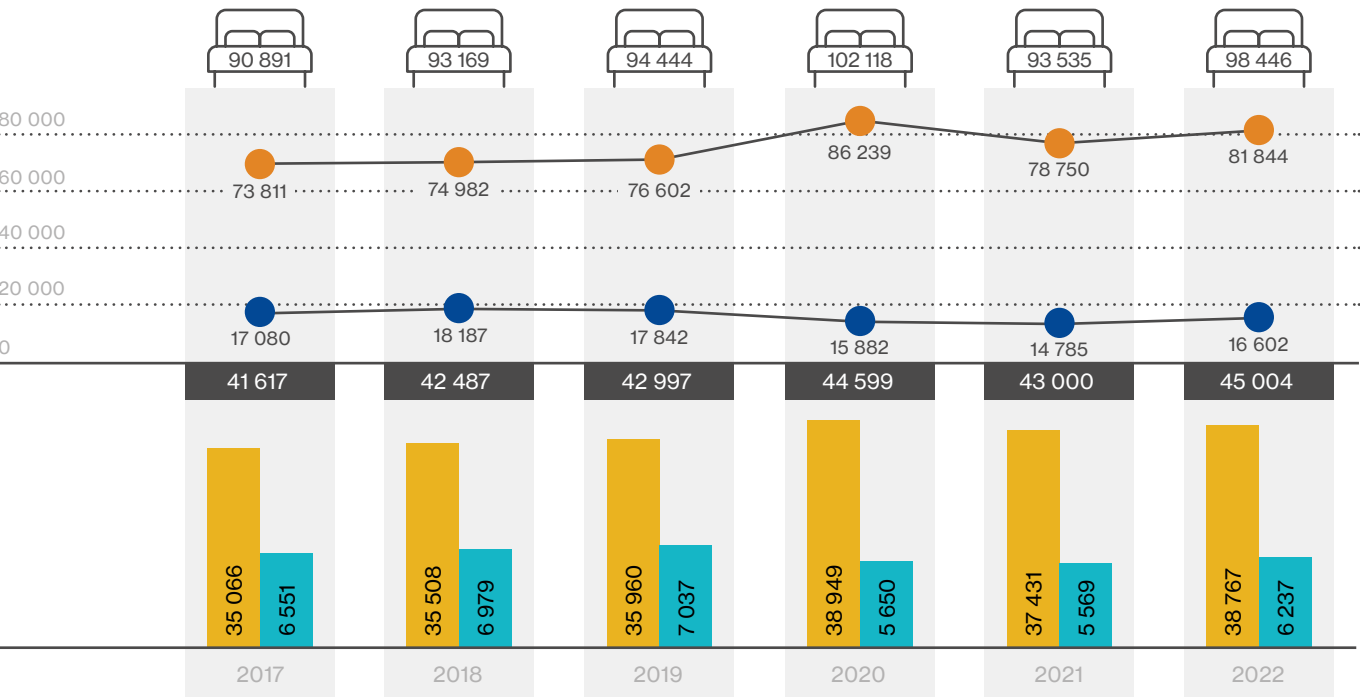- ● Number of domestic visitors
- ○ Total number of visitors

	2017	2018	2019	2020	2021	2022
Total	7 652 761	7 892 184	8 029 110	2 178 267	2 354 720	5 984 803
Foreign	6 562 518	6 670 706	6 786 151	1 453 530	1 411 256	4 491 611
Domestic	1 090 243	1 221 478	1 242 959	731 322	943 464	1 493 192

NUMBER OF NIGHTS

- ● Total number of overnight stays
- ○ Average length of stay (number of nights)

	2017	2018	2019	2020	2021	2022
Average length of stay	2.4	2.3	2.3	2.2	2.2	2.2
Total number of overnight stays	18 055 838	18 249 084	18 456 261	4 903 295	5 257 254	13 398 104

NUMBER OF ROOMS AND BEDS

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

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

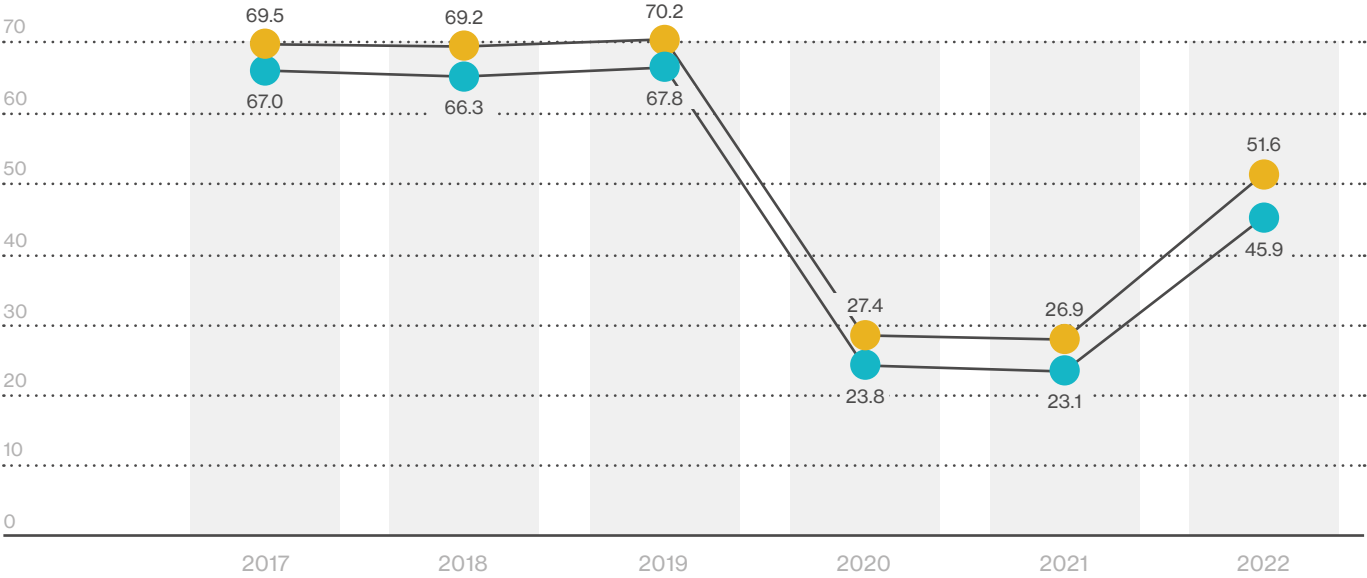|	2017	2018	2019	2020	2021	2022
Total number of beds	90 891	93 169	94 444	102 118	93 535	98 446
Number of beds in hotels	73 811	74 982	76 602	86 239	78 750	81 844
Number of beds in other accommodation facilities	17 080	18 187	17 842	15 882	14 785	16 602
Total number of rooms	41 617	42 487	42 997	44 599	43 000	45 004
Number of hotel type rooms	35 066	35 508	35 960	38 949	37 431	38 767
Number of non-hotel type rooms	6 551	6 979	7 037	5 650	5 569	6 237

ROOM OCCUPANCY

The indicator describes the use of beds in mass accommodation facilities. Net bed occupancy is calculated as the ratio of the number of overnight stays and the product of the average number of available beds and the number of operating days. Room occupancy is the product of the number of 'room-days' (i.e. the number of occupied rooms on each day of the period under review) and the product of the average number of available rooms and the number of operating days.

Room and bed occupancy in 2022 registers an enormous increase, responding like other indicators to the overall strengthening of tourism in 2022 after the post-COVID-19 pandemic loosening.

- ● Net bed occupancy (%)
- ● Net room occupancy (%)

Year	Net room occupancy	Net bed occupancy
2017	69.5	67.0
2018	69.2	66.3
2019	70.2	67.8
2020	27.4	23.8
2021	26.9	23.1
2022	51.6	45.9

PRAGUE VISITOR PASS

In June 2022, the City of Prague, together with Prague City Tourism, Plc and Operátor ICT, Plc, launched a new city tourist card Prague Visitor Pass (PVP). It is a comprehensive system including complete information, sales and check-in functionalities. In addition, a web and mobile application with an e-shop and a check-in system at the participating monuments and attractions were also created. The PVP is available both in the physical form of a card and as a modern e-pass in a mobile app. It is available in several categories (child, student, adult) and in three variants of validity (48,72 or 120 hours).

The card makes visiting Prague much easier, especially for foreign tourists. In addition to free entry to more than 60 major tourist attractions, the card offers free use of public transport and bus transport to the airport (Airport Express). It also includes a number of other benefits, including cultural and sporting events or guided tours of Prague. The Prague Visitor Pass has a wide range of activities outside the long-congested Prague city centre, reflecting a new sustainable approach to tourism.

GUIDED TOURS · FREE ENTRIES · FREE PUBLIC TRANSPORT · ▢RAL EVENTS · SPORT EV▢ · AIRPORT TR▢
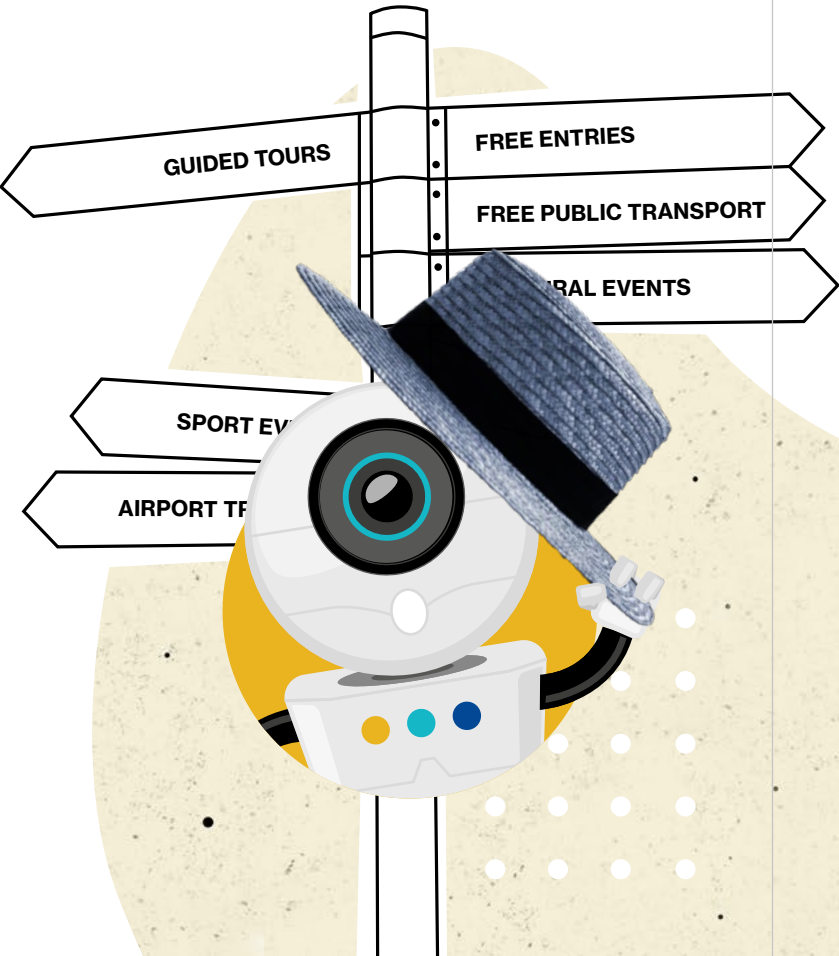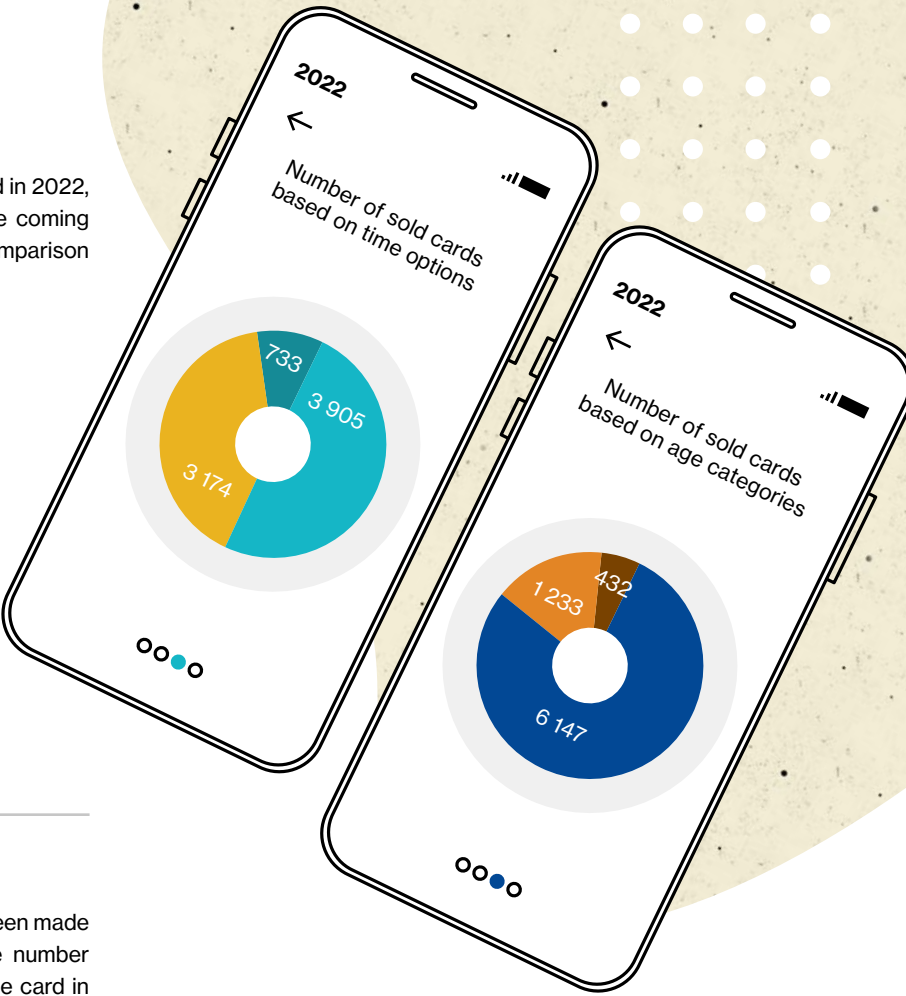
Prague Visitor Pass Sales
The indicator shows the total number of tourist cards sold in 2022, with a breakdown of sales by category and type. In the coming years, it will also be possible to provide a year-on-year comparison of interest in this tourist card.

- ● PVP cards – 48 hours
- ● PVP cards – 72 hours
- ● PVP Cards – 120 hours
- ● PVP cards adult
- ● PVP cards child
- ● PVP student cards

Resulting indicator value:
Total number of tourist cards sold/year: **7 812**

2022
Number of sold cards based on time options

733 · 3 905 · 3 174

2022
Number of sold cards based on age categories

1 233 · 432 · 6 147

### Attendance at participating attractions
The indicator shows the total number of visits that have been made via the tourist card to all participating attractions. The number has increased from 55 to 62 since the introduction of the card in June 2022.

51 782
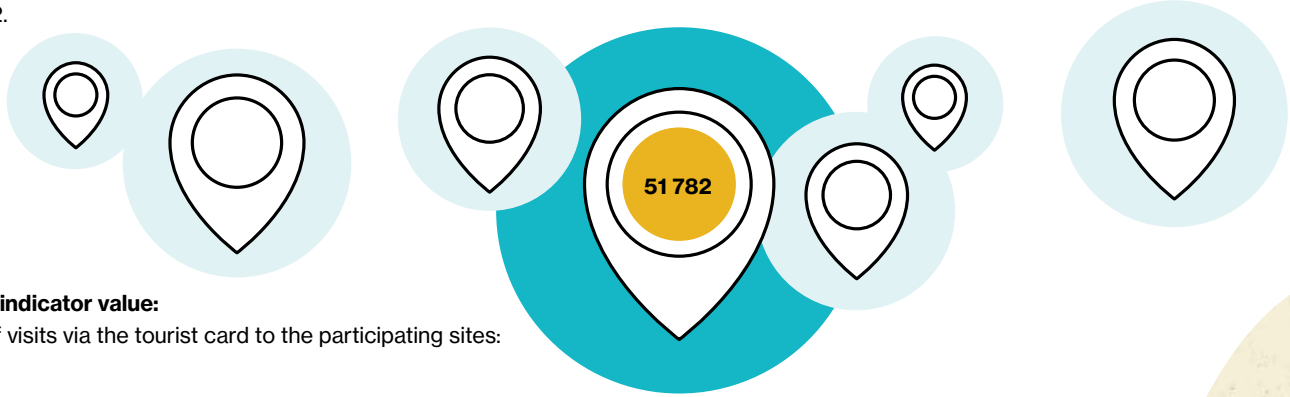
Resulting indicator value:
Number of visits via the tourist card to the participating sites:

Usage by media
The Prague Visitor Pass can be used via two types of media. It is either a physical 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.

2022
MOBILE APPLICATION (E-PASS)

1 982

PHYSICAL CARD (PASS)

5 830
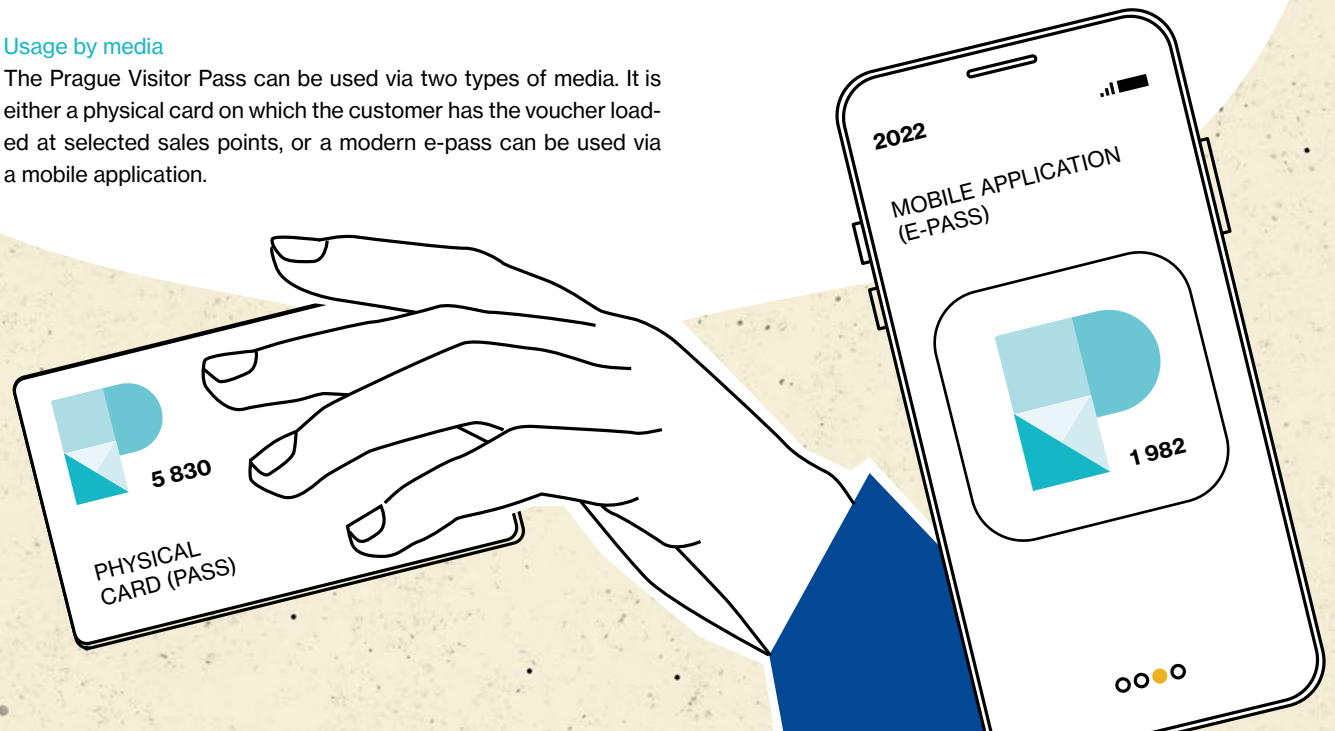
PEOPLE AND URBAN ENVIRONMENT

Creating a smart city around people, not buildings, is the way to create a truly smart and sustainable place for the quality of life of its inhabitants and users.

During 2022, the residents of Prague[3] and its users were returning to normal life and use of the city after the state of emergency caused by the COVID-19 pandemic. The people who are the essence of the city and help to shape it returned to public spaces, offices, schools, and shops, resulting in a "revival" of Prague. The return to the normal functioning of the capital represented a significant change in the past year. The opportunity to meet with others and to break free from isolation was beneficial not only for the city as such, but also for the quality of life of its inhabitants. Communication with the citizens of Prague, safety, health and community and social life continued to be supported.

Communication and interaction with residents are developed through mobile applications with functions that meet the current needs of life and movement in the city. The safety of citizens in public space will be increasingly enhanced by automated detection and prediction of risk phenomena using intelligent camera systems and a sensor network. In cities, demands will increase not only for the promotion of active life and access to sport, but also for care using the latest technologies to improve the quality of life of its inhabitants. An equally important aspect is the promotion of green planting and urban agriculture, which contribute to the improvement of the environment and food self-sufficiency of Prague. Innovative technologies also bring unconventional ways of using public spaces and their equipment. Urban furnishings can offer citizens and visitors to Prague accessibility by combining traditional utility features of furnishings with added functions, such as sensors to fill bins or smart lamps. By promoting digitisation and public participation in the development of the city, the creative potential of the inhabitants is harnessed, trust is built and projects that are lacking in the urban environment are realised. Modern technologies enable the city to use appropriate methods of public participation and improve the quality of life of its citizens.

---

[3] 1.28 million as of the last day of 2022 (source: CZSO)

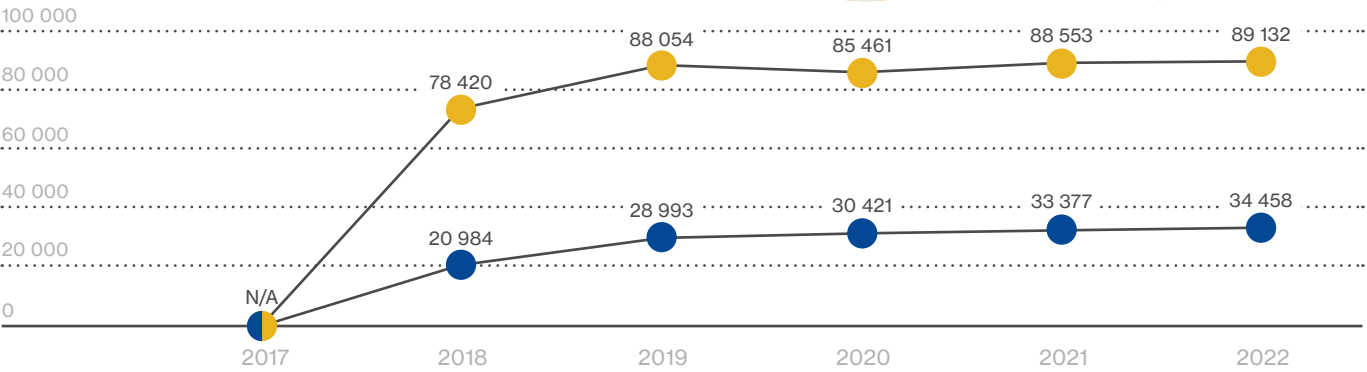In 2022, three new vertical gardens were added in Prague.

CITY MOBILE APP

MOJE PRAHA (MY PRAGUE)

Mobile apps help to connect cities with people and further use data collected from people in the urban environment. In 2022, there was a further increase in the number of users of the Moje Praha (My Prague) app. The app is being developed to offer as much relevant and up-to-date information as possible to make life in Prague as easy as possible for users. Therefore, the app makes available essential information from the public space about parking zones and the possibility of paying for parking, traffic information, cultural news, but of course also contacts and opening times at offices and other practical data.

> Moje Praha mobile app is already used by almost 7% of Prague's residents, even though it doesn't support the PID Lítačka yet.

- 🟡 Number of Moje Praha users
- 🔵 Number of users Změňte.to

|	2017	2018	2019	2020	2021	2022
Moje Praha users	N/A	78 420	88 054	85 461	88 553	89 132
Změňte.to users	N/A	20 984	28 993	30 421	33 377	34 458

ZMĚŇTE.TO (CHANGE.IT)

The Změňte.to (Change.it) mobile app was taken over by the OICT in July 2019. The app is a one-stop shop that offers users the opportunity to send suggestions and suggestions to the municipality's staff and its subordinate organisations, or to rate the authorities. The application's usage is growing every year, with a 3% increase in the number of users in 2022, as well as an 8.6% increase in the number of suggestions submitted to 13 194. Thus, like Moje Praha, the app is proving to be beneficial and well accepted by the residents.

> Although you can't register your robot yet, you can register your dog from the comfort of your home thanks to the Portál Pražana in some of the city districts.

> Zzzzz...

PORTÁL PRAŽANA (PRAGUE CITIZEN PORTAL)

The Portál Pražana (Prague Citizen Portal) is gradually digitizing the city's agendas and making it possible to process them online. Since January 2022, the possibility of processing the dog fee, for example, has been gradually expanded, and the function of payment for municipal waste has been similarly developed. The number of agendas has gradually increased since 2020, when the five-year operation started, which has also led to an increase in the number of users and processed applications. The same trend is expected to continue as additional functionalities are expected to be implemented. In a year-on-year comparison, the number of processed requests is increasing as expected.

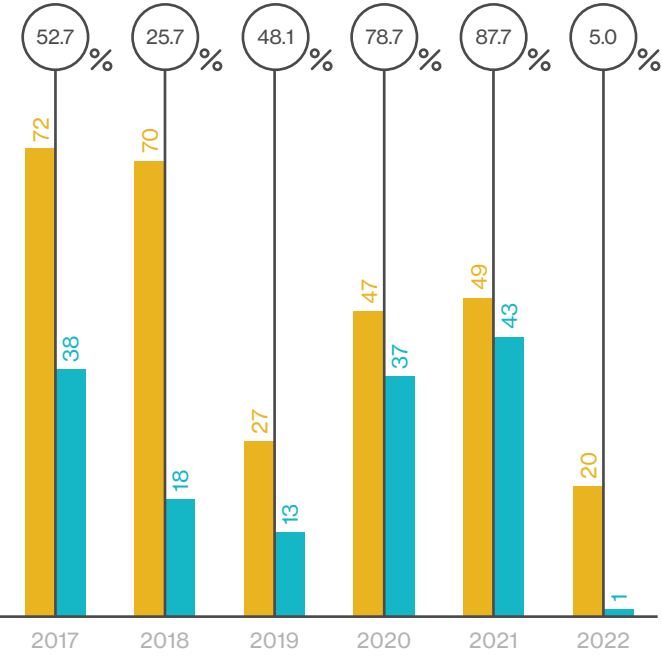|	2017	2018	2019	2020	2021	2022
Number of digitised agendas	–	–	–	4	15	16
Number of users of digitised services	–	–	–	2 000	35 000	29 000 +
Number of applications processed	–	–	–	12	1 876	3 569
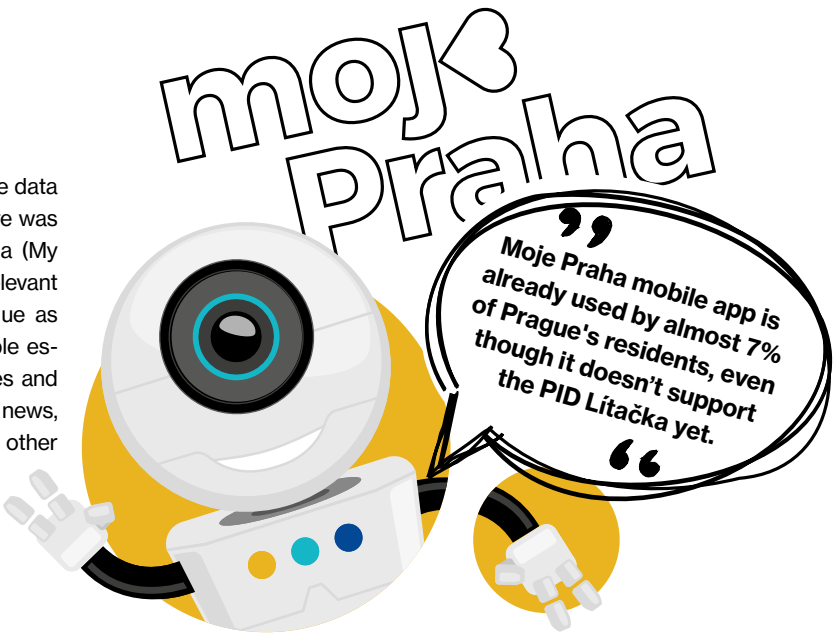
CITY WEBSITE MÁM NÁPAD (I HAVE AN IDEA)

Mám nápad (I have an idea) is a web portal through which the OICT collects ideas for new projects from citizens, visitors to Prague or anyone interested in innovating the capital. OICT's goal is to achieve the highest possible success rate for relevant projects, i.e. to have as many ideas as possible approved with a vision of subsequent implementation. However, there has been a nearly 60% year-on-year decline in project proposals submitted in 2022. Only 1 of the proposals was approved. This proposal was placed in the Future Mobility area.

The decline in the number of accepted ideas may be related to the growing reputation of the competition Nakopni Prahu Prague Innovation Marathon, where people can submit their ideas for the implementation of innovative projects. This is also related to the prioritization of media support, which was focused on promoting the innovation marathon.

- 🟡 Number of all ideas received
- 🔵 Number of ideas approved
- ⚪ Percentage of success of relevant projects

	2017	2018	2019	2020	2021	2022
Percentage of success	52.7%	25.7%	48.1%	78.7%	87.7%	5.0%
Number of all ideas received	72	70	27	47	49	20
Number of ideas approved	38	18	13	37	43	1

PRAGUE INNOVATION MARATHON NAKOPNI PRAHU (KICK UP PRAGUE)

NAKOPNI PRAHU (KICK UP PRAGUE) is a roughly five-month-long competition (like a hackathon) whose primary goal is to generate new projects ready for rapid pilot implementation, aimed at improving the lives of the capital's residents. The competition takes place under several thematic areas, such as the city for people, environment and energy management, data and digitalisation, and future mobility. The competition is open to teams of two to four members, with no requirement to live or be based in Prague.

By 2022, three editions of the competition had been held, with public interest in participating increasing year on year. Three winning innovative projects emerge from each year, which the Smart Prague project office then assists methodically with their implementation.

In 2022, the third edition of Nakopni Prahu (Kick Up Prague) resulted in the winning projects Řadička, reKáva and Gamifit. The Zavaděči team with their project Řadička aims to improve the fluidity of tram transport in Prague and their system can already be tested by the Transport Company in real operation. The reKáva project, on the other hand, collects coffee grounds from cafés, companies and other participating institutions to provide them for the needs of oyster mushroom cultivation. The Gamifit project is a gamified fitness app and tool for primary school students, which aims to connect students with the teacher and motivate them to move through fun gamified elements.

> Thanks to the reKáva project, you can grow oyster mushrooms at home using coffee grounds.

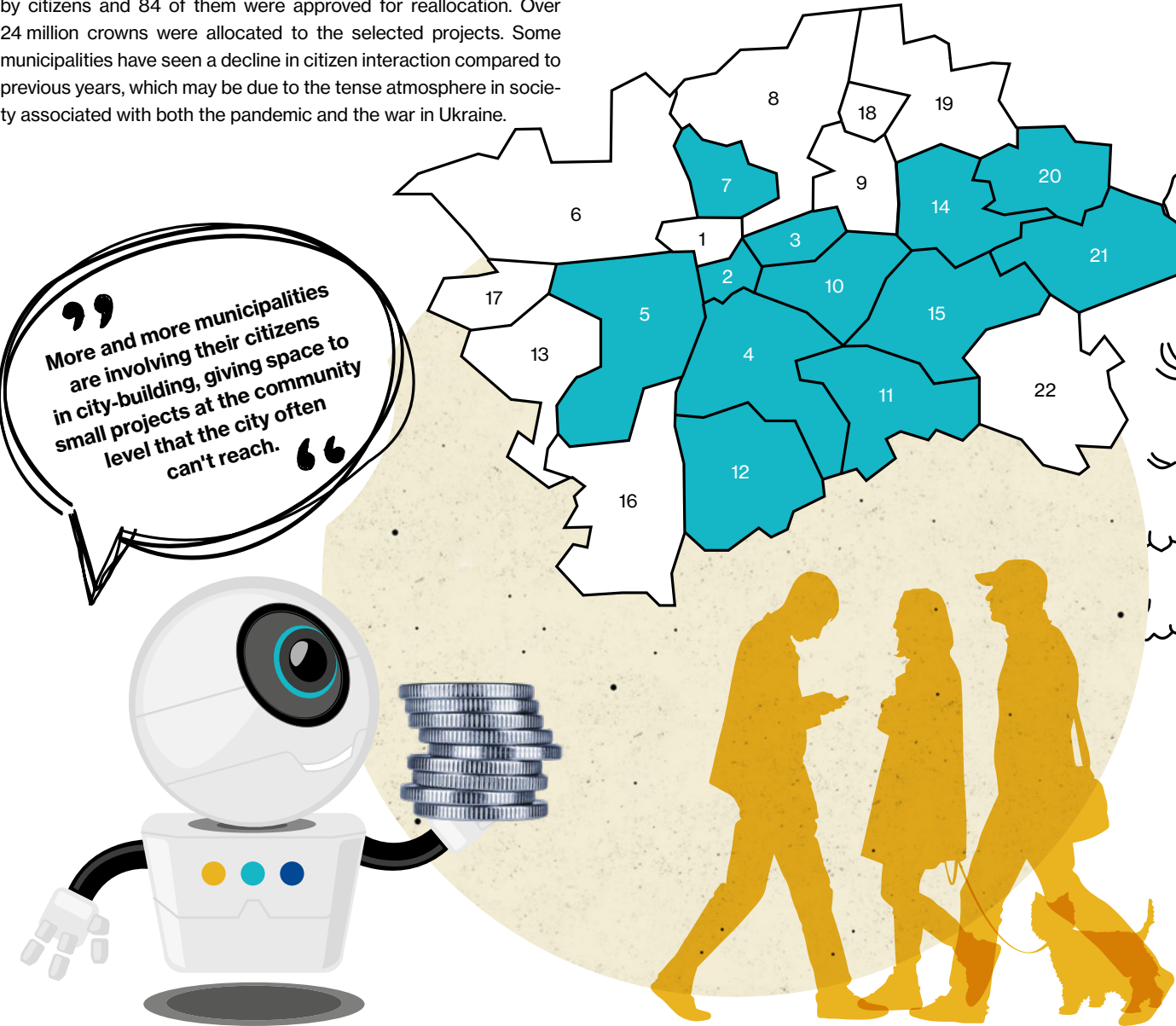|	2020	2021	2022
Number of registered teams	29	39	43

The next edition of the Prague Innovation Marathon Nakopni Prahu (Kick Up Prague) will take place in spring 2023.
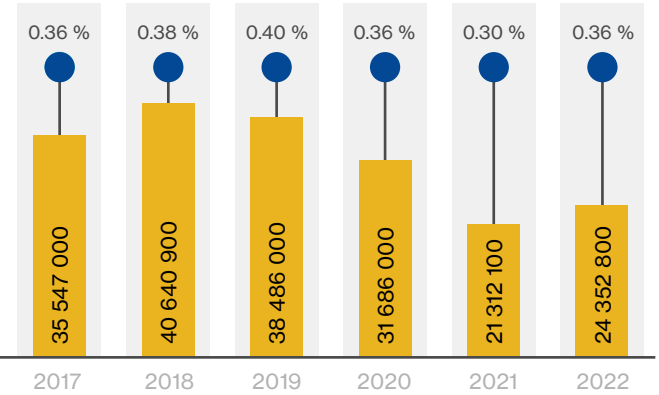
PARTICIPATORY BUDGET OF THE MUNICIPALITY

The tool of participatory budgeting allows city residents to actively participate in the development of their urban district. In 2022, 1 new municipality with a participatory budget was added, 35% of all municipalities in Prague, thus enabling the inhabitants of their area to co-create a place to live. In total, 274 proposals were submitted by citizens and 84 of them were approved for reallocation. Over 24 million crowns were allocated to the selected projects. Some municipalities have seen a decline in citizen interaction compared to previous years, which may be due to the tense atmosphere in society associated with both the pandemic and the war in Ukraine.

● Municipalities with a participatory budget (20):
2, 3, 4, 5, 7, 10, 11, 12, 14, 15, 20, 21, Čakovice, Dolní Měcholupy, Ďáblice, Kolovraty, Libuš, Počernice, Suchdol, Troja.

○ Municipalities without participatory budget

> More and more municipalities are involving their citizens in city-building, giving space to small projects at the community level that the city often can't reach.
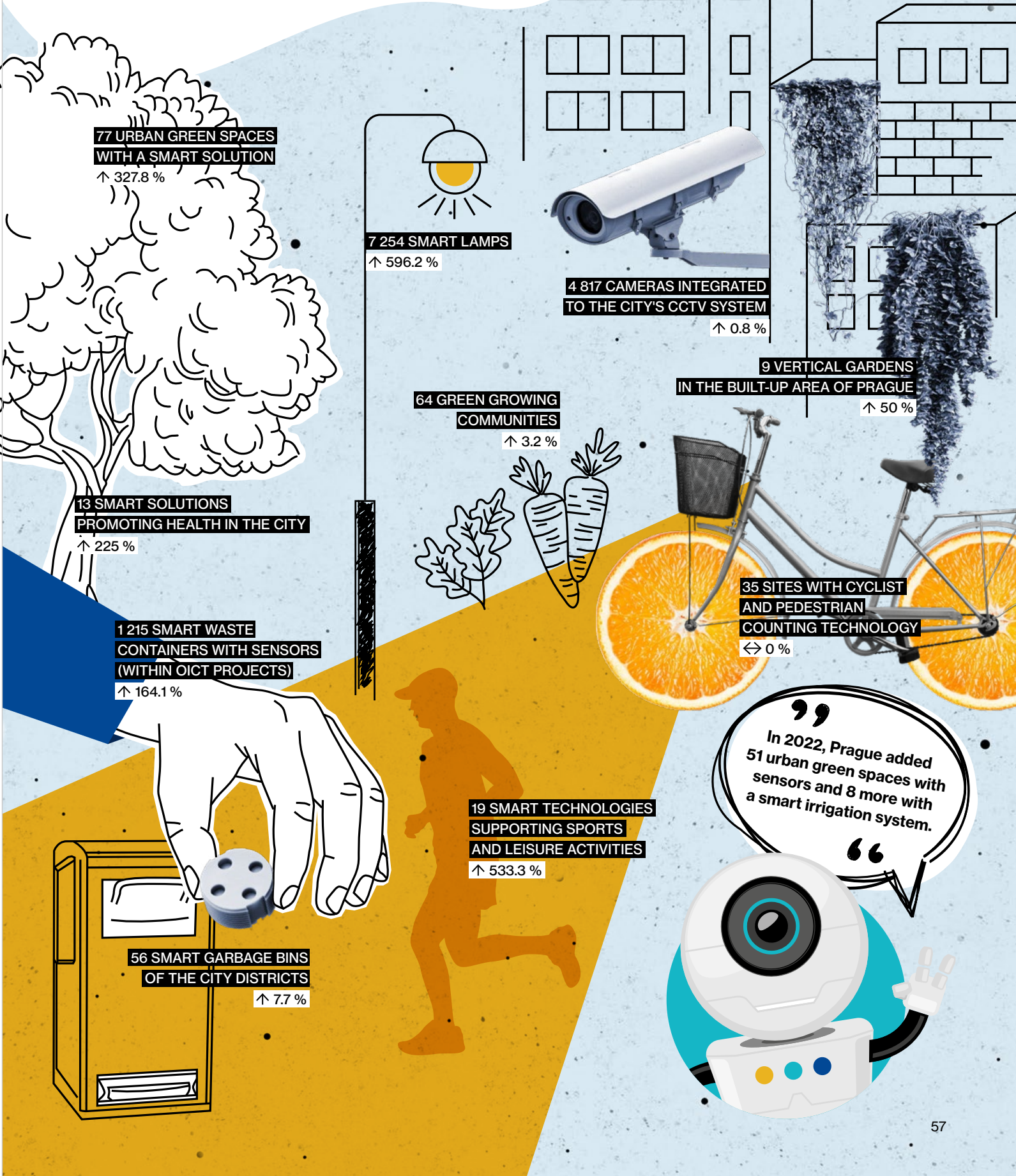
FINANCIAL MEANS OF PARTICIPATION

● Municipal funds allocated to the participatory budget (CZK)

● Percentage of the municipal budget allocated to participation in the total budget of the municipality

	2017	2018	2019	2020	2021	2022
%	0.36 %	0.38 %	0.40 %	0.36 %	0.30 %	0.36 %
CZK	35 547 000	40 640 900	38 486 000	31 686 000	21 312 100	24 352 800

THE SMART CITY

One of the components of building a smart city is the implementation of so-called smart elements in the space (e.g. sensor systems or "improved" existing elements). These components then help people within the urban environment to improved safety, comfort, information or new data, which then informs further development and effective city management.

161 SENSORS OR MEASURING THE STATE OF ENVIRONMENT IN PUBLIC SPACE ↑ 159.7 %

77 URBAN GREEN SPACES WITH A SMART SOLUTION ↑ 327.8 %

7 254 SMART LAMPS ↑ 596.2 %

4 817 CAMERAS INTEGRATED TO THE CITY'S CCTV SYSTEM ↑ 0.8 %

9 VERTICAL GARDENS IN THE BUILT-UP AREA OF PRAGUE ↑ 50 %

64 GREEN GROWING COMMUNITIES ↑ 3.2 %

13 SMART SOLUTIONS PROMOTING HEALTH IN THE CITY ↑ 225 %

35 SITES WITH CYCLIST AND PEDESTRIAN COUNTING TECHNOLOGY ↔ 0 %

1 215 SMART WASTE CONTAINERS WITH SENSORS (WITHIN OICT PROJECTS) ↑ 164.1 %

19 SMART TECHNOLOGIES SUPPORTING SPORTS AND LEISURE ACTIVITIES ↑ 533.3 %

56 SMART GARBAGE BINS OF THE CITY DISTRICTS ↑ 7.7 %

> In 2022, Prague added 51 urban green spaces with sensors and 8 more with a smart irrigation system.

We know that data helps 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 City of Prague - Golemio - is a service provided by OICT mainly to the Prague City Council, as well as to Prague companie, 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 users within the City of 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 via the **Golemio.cz** website. A team of experienced experts through the Golemio Data Platform also provides technical consultation in all relevant areas, is able to 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 a solid part of the 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 broader. 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, trains or, most recently, the metro. 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. At the same time, it also serves as a source of data for information boards about departures in Prague (primarily bus stops and train stations) and the Central Bohemian Region, which significantly reduces the cost of expanding the network of information boards.

An important innovation in 2022 was the launch of a new catalogue of open data (LKOD - Local Catalogue of Open Data), which is closely linked to the national catalogue of open data and enables the publication of open data in accordance with legislative requirements. The LKOD, like the entire Golemio Data Platform project, is published as open source, so other cities and local authorities can use this solution for free. Other interesting projects this year were the processing of traffic flow data from the WAZE mobile navigation system, which saw intensive use of the data for traffic analysis in connection with the first phase of the Barrandov Bridge reconstruction, the completion of preparations for a significant expansion of the Smart Waste Collection project, including the start of testing of additional technology for collection detection (RFID), the launch of a pilot project aimed at monitoring microclimatic parameters, and many others.

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 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.
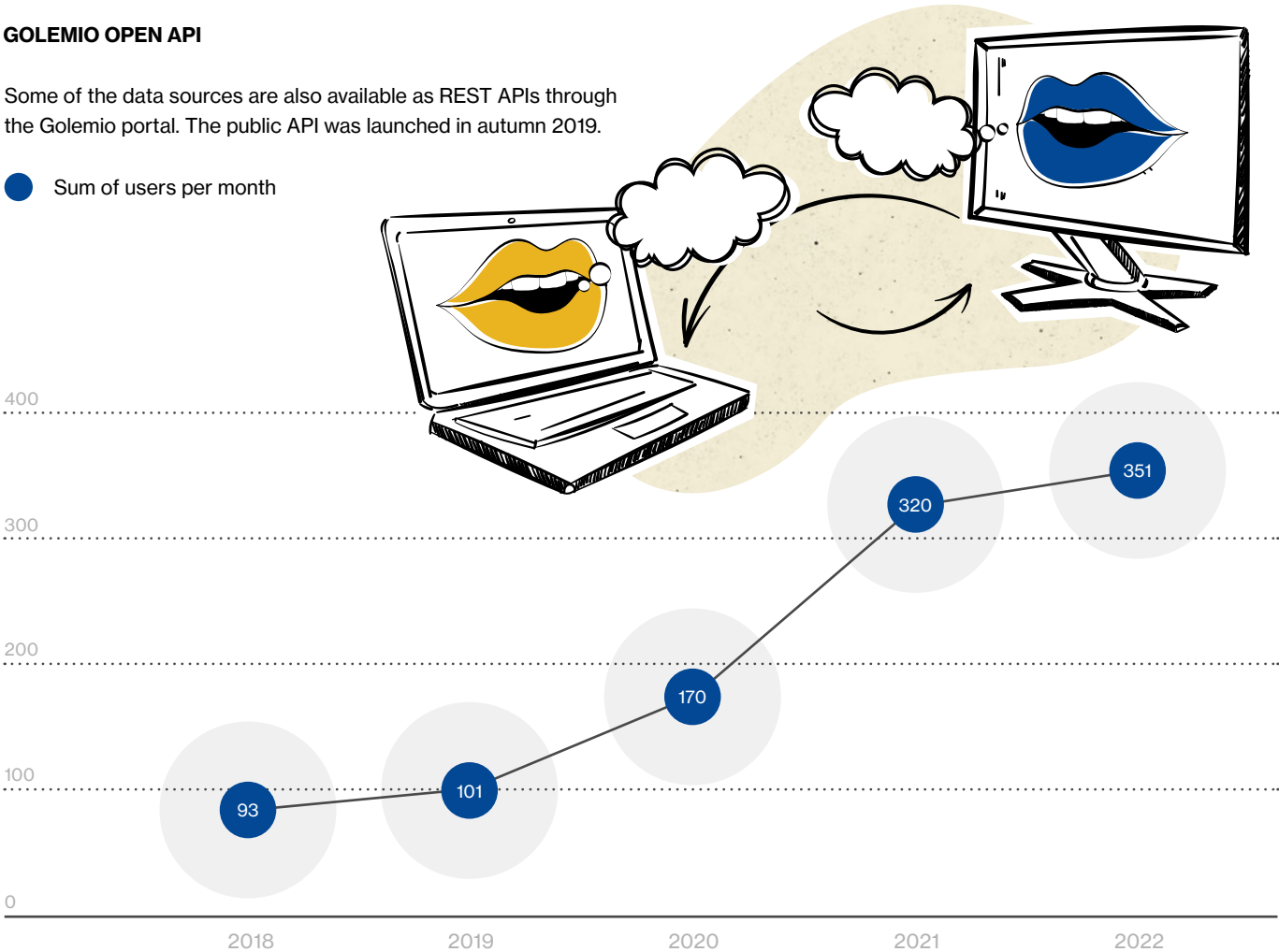
- Number of available dashboards and other outputs
- Sum of users per month

	2019	2020	2021	2022
Sum of users per month	68	768	952	1 008
Dashboards	60	110	128	145
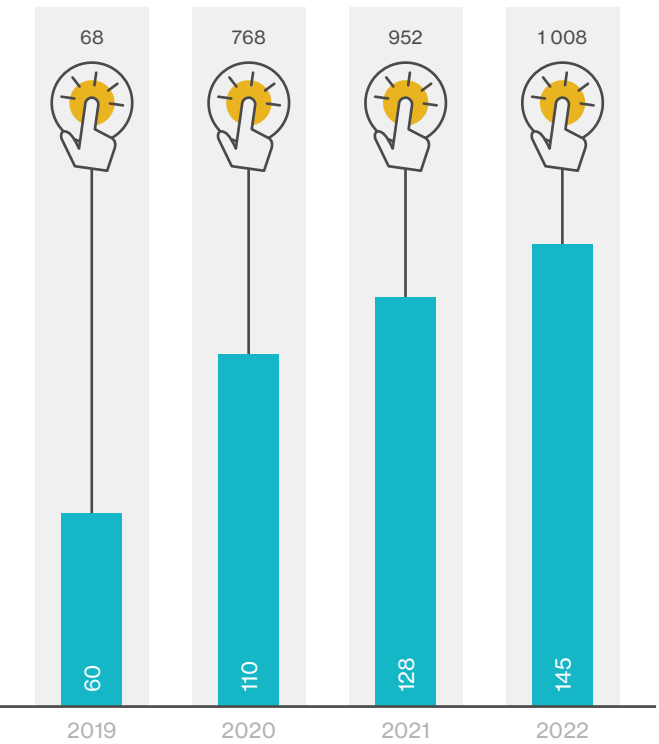
GOLEMIO OPEN API

Some of the data sources are also available as REST APIs through the Golemio portal. The public API was launched in autumn 2019.

- Sum of users per month

| 2018	2019	2020	2021	2022
93	101	170	320	351

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 2022, a total of ten new datasets from six areas were published on the Open Data Portal of the City of Prague:

BUDGET AND INVOICES
TRAFFIC OFFENCES
MUNICIPAL WASTE
CONTRIBUTORY ORGANISATIONS
OFFICIAL BOARD
REMUNERATION OF REPRESENTATIVES

In 2022, the Council of the Capital City of Prague approved the following. The Open Data Strategy of the Prague City Council in 2022. Prague City Council adopted the Open Data Strategy for the period 2021-2025, in the preparation of which the Golemio Data Platform participated. As of September 1, 2022, Act No. 106/1999 Coll., on free access to information, was adopted, which in certain areas also affects local government units. The obligations arising from the Act are gradually being implemented in the processes of the Prague City Hall.

- Number of newly published data sets

| 2019	2020	2021	2022
	63	11	10
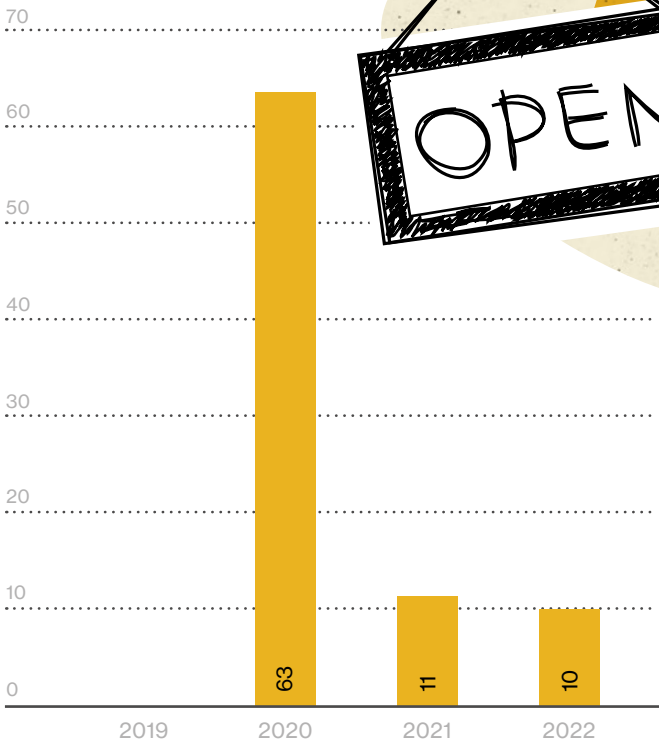
PRAGUE CITY DATA CONGRESS

Prague City Data Congress 2022 focused on projects in the areas of mobility, public space and climate change.

The event featured twenty speakers from eight countries, including Germany, the USA, the UK, the Netherlands, Italy, Japan and others. Representatives from the Massachusetts Institute of Technology (MIT) - Fabio Duarte and Eunsu Kim - gave keynote presentations as part of a special evening program organized in collaboration with the Institute of Planning and Development. This time the event had a relatively high, almost half Czech speakers and workshop leaders (9).

Over 500 registrations were recorded on the official conference website and GoOut.cz. In addition to the main programme, the event this time brought a diversified schedule that included practical workshops, walks and rides through the city for congress visitors.

- Number of registered visitors
- Number of speakers

	2018	2019	2020	2021	2022
Speakers	21	33	17	21	20
Registered visitors	130	280	620	420	590
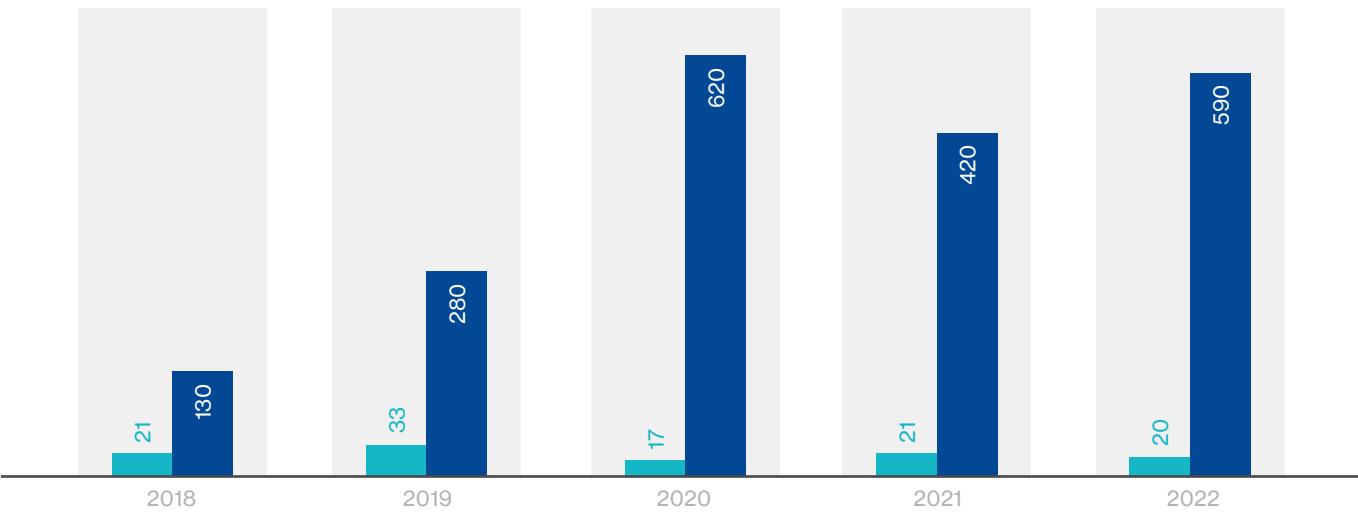
ABOUT THE SMART
PRAGUE OICT TEAM

The Smart Prague team is made up of people who are motivated by the future of the capital city. It includes internal and external specialists and experts, especially in the areas of project management, data analysis and innovation in the city. Smart Prague projects help respond appropriately to the various challenges of the capital city of Prague, which are related, for example, to climate change, new mobility trends, the quality of life in the metropolis or the economy and operation of city buildings.

In the seven years of the Smart Prague project office's existence, 47 project plans have been approved by the Prague City Council's Commission for the Development of the Smart Cities Concept in the Prague Capital City and nearly thirty projects are currently in various stages of implementation. In mid-2022, the office expanded to include the New European Bauhaus (NEB) Innovation Team, which is dedicated to engaging Prague in international calls and projects. Since its inception, the office has been monitoring the implementation of the Smart Prague 2030 Concept and the annual evaluation of the Smart Prague Index indicators shows how it is succeeding. In addition, the team has organised a large number of working groups and various meetings with representatives of city organisations, cities and municipalities both in the Czech Republic and abroad in 2022. The Smart Prague team regularly participates in many domestic and international conferences and trade fairs to gather inspiration and ideas for further projects in the capital.

One of the leading international trade fairs that Smart Prague attended in 2022 was the Smart City Expo World Congress in Barcelona. Here, both the Golemio Data Platform and last year's edition of the Smart Prague Index (SPI 2021) received significant recognition. The NEB Innovation Team was introduced at the conference as well. International trade fairs, such as this one in Barcelona, are a great opportunity for the team to not only learn more about the latest developments in innovative technologies from representatives of smart city teams from around the world but also to present the progress of Prague's Smart Cities Concept.

The sixth edition of the annual Smart Prague Index shows not only how the city is gradually returning to normal with the end of the COVID-19 pandemic, but also how it is resisting the new challenges caused by the war in Ukraine and the related energy crisis. Tourists are gradually returning to Prague, made possible by the development of the Prague Visitor Pass app as well. Meanwhile, the city is addressing the need to move towards local renewable energy sources. The development of this problem and the way Prague is facing it will probably be observed in the years to come. However, 2022 has also seen changes in other areas, such as the Future Mobility, where we see an increasing trend towards alternative drives and the use of modern technologies, both in the availability of devices at bus stops providing information about departures in real time and in the purchase of travel documents via the PID Lítačka mobile app. The next year will hopefully bring a similarly impressive shift thanks to projects that are moving Prague among the increasingly "smarter" cities.
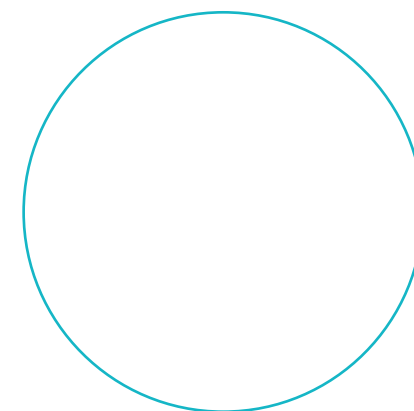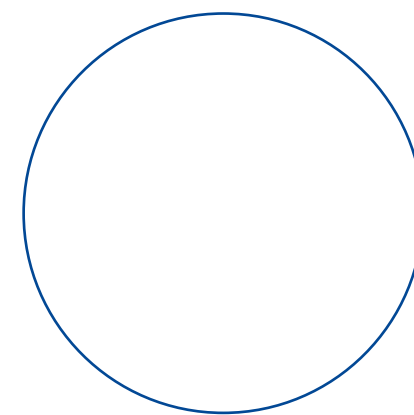
List of abbreviations used and all indicators monitored can be found at
www.smartprague.eu

oict.
smart prague

www.smartprague.eu

2022