

# ANNUAL REPORT 2021

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## 01 OUTLOOK FOR 2022

The start of the year will continue to be complicated by the various constraints and safeguards imposed in response to the COVID-19 pandemic.

As the year progresses, life is expected to return to normal; tourism is forecast to resume and this will perhaps be reflected in the amount of water consumed in the capital.

### SIGNIFICANT EVENTS

#### AND PROJECTS AWAITING PVK IN 2022:

In January, Pražské vodovody a kanalizace, a.s. (PVK) assumed full operation of the Prague Central Wastewater Treatment Plant's New Water Line. PVK will contribute to project preparations for the reconstruction of the Old Water Line, which is slated to begin in 2023.

PVK will introduce an artificial intelligence system across the water supply network to assess its pressure zones. In the spring, PVK will again arrange for satellite imaging of the water supply network, as this helps to detect hidden drinking water leaks and consequently reduce the network's water losses.

The location, structural condition and remaining life of water supply and sewerage systems will be ascertained by means of smart technologies such as SmartBall and PipeDiver.

The Company will continue implementing grant projects aimed primarily at the removal of micropollutants and pesticides from drinking water and wastewater (sludge). It will also deploy PCR methods for wastewater with a focus on detecting the presence of the SARS-CoV-2 virus.

PVK will continue to work on joint projects with Pražská vodohospodářská společnost, a.s. (PVS) with a view to unifying and developing their IT systems and GIS, TIS and BIM databases. PVK and PVS will also collaborate on a number of investment projects.

PVK will roll out new smart technologies and digitalisation in areas such as customer services and processes (electronic assembly sheet – E-procurement, the Moje voda portal, electronic records of investigations, etc.).

In its customer service, the Company is concentrating on perfecting contactless electronic, or perhaps digital, communication, gradually completing the integrated reporting system, implementing a new system for calculating water and sewerage charges, and launching a multitude of projects to improve efficiency.

The traditional telephone survey of customer satisfaction with PVK services will take place in September. The certification of the Company's integrated management system will be re-audited in November.

## **02 SNAPSHOT**

Pražské vodovody a kanalizace, a public company limited by shares (PVK), is the legal successor of the state-owned enterprises Pražské vodárny and Pražská kanalizace a vodní toky to the extent specified in the privatisation proposal.

1 April 1998

INCORPORATED

Ke Kablu 971/1, 102 00 Praha 10 – Hostivař

REGISTERED OFFICE

CZK 483,288,000

SHARE CAPITAL

Public limited company (*akciová společnost*)

LEGAL FORM

25656635

COMPANY NUMBER

SHAREHOLDERS

51% Veolia Central & Eastern Europe S.A.

49% Pražská vodohospodářská společnost a.s.

The Company has no branches outside the Czech Republic.

The Company holds no treasury shares.

### **03 SIGNIFICANT EVENTS IN 2021**

We learnt how to function in a pandemic. Sadly, 2021 is another year that will go down in history as a year of covid.

The pandemic spilled over uninterruptedly from the previous year and made life miserable for people all over the world – including the Czech Republic – from January to December.

The situation surrounding the epidemic and the resulting government regulations were in constant flux, but this was not permitted to have any impact on the drinking water supply or wastewater treatment. The situation may have been harsh, but PVK succeeded in keeping operations running smoothly.

Even so, the restrictions did have an adverse effect on the operation of the Customer Service Centre, which was closed to the public from January to April 2021 in order to safeguard the health of customers and employees. Instead, customers were offered full replacement communication via telephone, email and their online customer account. Many customers also welcomed the opportunity to use the PVK and PVS joint opinion portal, enabling them to submit requests and applications and process design documentation electronically from the comfort of their home or office. In May, visitors wishing to come to the Customer Service Centre could do so by booking a time slot in advance. Then, from June to November, the Centre was fully operational, before switching back to appointments only in December after the epidemic began to get worse again.

Naturally, the epidemic also took its toll on employees working in strategic positions and operational units. They continued to work in several disconnected groups, as they had been used to in 2020, to ensure that there would be substitutes competent to replace them if they fell ill or had to quarantine.

It goes without saying that strict hygiene rules remained in place for employees and visitors at the Company's offices and operating facilities. Hand sanitiser dispensers were a common sight at the entrances to all buildings, and the wearing of respirators became a normal part of everyday life.

Vaccination proved to be an effective defence against severe cases of COVID-19. Starting in April 2021, PVK and Česká voda – Czech water (CVCW) worked with Thomayer University Hospital to offer their employees the vaccine. In time, this service was taken over by the SALUBRA clinic in Hostivař. By the end of the year, the overall vaccination coverage of PVK and CVCW employees was an above-average 82%.

Faced with the challenges thrown up by the pandemic, PVK rose to the occasion in 2021 by taking an active role in the fight against COVID-19 through its activities and innovations.

#### **PODOLÍ WATERWORKS RETURNED TO FULL SERVICE**

Podolí Waterworks, a treasure among Prague's water supply facilities, has been back in full operation since 2021. It had been shut down ever since the 2002 floods, remaining only as a back-up source subject to test runs four times a year to verify that the technology was still working.

Podolí Waterworks was put back into permanent operation to secure a greater supply of drinking water for Prague and other towns and villages in the Central Bohemian Region. Before the facility could be reopened, however, its technology had to be upgraded and supplemented so that the water supplied to the network would meet the latest requirements of the Drinking Water Decree.

This upgrade took two years. In that time, a third processing stage was added to the technology: granular activated carbon (GAC) filtration, which is able to extract a large proportion of pesticides, their metabolites and other hazardous substances from water. The sanitary conditions of the water produced were also improved by means of both UV radiation and chlorine gas dosing.

Podolí Waterworks has the capacity to supply up to 1,200 l/s. The water is pumped to the Karlov, Flora, Zelená liška, Laurová and Bruska water reservoirs, where it is mixed with water from Želivka or Káraný.

#### THE REFURBISHMENT OF DĚVÍN WATER TOWER AND PUMPING STATION WAS COMPLETED

The refurbishment of Děvín water tower and its adjacent pumping station was completed in 2021 after two years' work. The equipment from the 1980s had become outdated and was in constant need of minor repairs. The most logical step was therefore a complete overhaul.

The refurbishment cost more than CZK 100 million. All three of the tower's tubes and the connecting staircase were restored and repainted, and the tower's damaged cladding was replaced. The refurbishment of the pumping station included the complete renovation of the structural part and of the mechanical and electrical equipment. The newly installed pumps increased the pumping efficiency. The substation was also upgraded. The running of the pumping station is now fully automated, with operating data transmitted online to the PVK Central Control Room, where staff can also control the equipment remotely.

This comprehensive rehabilitation has made it possible for one of Prague's landmarks, designed by the renowned architect Karel Hubáček, to continue serving the people of Prague.

#### WASTEWATER MONITORING RELIABLY DETECTS COVID-19 INFECTION

The fact that COVID-19 severely disrupted and crippled the entire country is beyond question. PVK is seeking to make an active contribution to the containment of the pandemic. In partnership with a team of scientists from the University of Chemistry and Technology (VŠCHT), it is monitoring wastewater from selected primary and nursery schools, retirement homes, the airport at Ruzyně, selected shopping centres, and other facilities.

The results of the pilot project proved that wastewater monitoring was an excellent indicator of the extent of the epidemic and how it was unfolding at individual schools and other facilities. It also revealed that blanket PCR testing is much more effective at controlling the spread of the epidemic than antigen testing.

Wastewater is sampled on a regular basis to determine the presence of the SARS-CoV-2 virus RNA. The analysis of data from schools (and other facilities) has yielded several important findings:

› The method for detecting SARS-CoV-2 RNA in wastewater is sensitive enough to detect whether even a few individuals present in the facility are positive.

Wastewater monitoring indicated that COVID-19 was already spreading in schools during October 2021, at a time when there was no widespread testing and positive cases detected from individual testing were relatively low. Subsequent blanket testing from early November corroborated this trend.

Analysis of viral RNA in wastewater indicates that schools conducting regular blanket PCR testing were able to trace and isolate infected persons very efficiently in November and December 2021. As long as infected pupils and their contacts were systematically and rapidly quarantined, wastewater

was not positive on the second day after blanket testing. Even where there were delays in tracing and quarantining at-risk contacts, the Thursday samples usually tested negative. By contrast, blanket antigen testing was found to be minimally effective in this regard.

## **04 CORPORATE GOVERNANCE**

GOVERNING BODIES OF THE COMPANY AS AT 31 DECEMBER 2021

### **PVK Board of Directors**

Ing. Philippe Guitard - Chairman  
Ing. Petr Mrkos - Vice-Chairman  
Ing. Martin Bernard, MBA  
Ing. Miluše Poláková  
Mgr. Eva Kučerová  
Ing. Pavel Válek, MBA  
Mgr. Mark Rieder

### **PVK Supervisory Board**

Mgr. Martin Velík - Chairman  
Ing. Petr Kratochvíl - Vice-Chairman  
PhDr. Ing. arch. Lenka Burgerová, Ph.D.  
RNDr. Marcela Dvořáková  
Ing. Rostislav Čáp  
Marek Dřevo  
Alena Březinová  
Jaroslav Dostál  
Ing. Miloš Šimon

### **Company management**

Ing. Petr Mrkos - CEO  
Ing. Petr Slezák - Deputy CEO, Chief Personnel Officer  
Ing. Pavel Novotný - CFO and Sales Director  
Ing. Petr Kocourek - Chief Operating Officer  
Ing. Petr Sýkora - Chief Technical Officer  
RNDr. Marcela Dvořáková - Chief Communications and Marketing Officer

## **05 HIGHLIGHTS**

PROFIT AFTER TAX:

CZK 569.6 million

NUMBER OF EMPLOYEES:

1,141

TOTAL WASTEWATER TREATED:

118,979,000 m<sup>3</sup>

LENGTH OF THE SEWERAGE NETWORK OPERATED:

4,760 km

NUMBER OF CONTRACT CUSTOMERS:

93,521

COMPANY TURNOVER:

CZK 8.64 billion

WATER SUPPLIED TO THE WATER SUPPLY NETWORK:

90,458,000 m<sup>3</sup>

LENGTH OF THE WATER SUPPLY NETWORK OPERATED:

4,444 km

WATER LOSSES:

14.9%

## **06 EDITORIAL BY THE CHAIRMAN OF THE BOARD OF DIRECTORS**

Ladies and Gentlemen,

I am writing this piece for the 2021 Annual Report at a time when a conflict that has no place in the civilised world is unfolding. A conflict that we had hoped our advanced civilisation would never experience. A conflict that, in its essence, concerns every one of us, but some of our co-workers much more. I deeply appreciate the solidarity shown by our employees towards their colleagues from Ukraine, and the selfless help and strong ethos of our teams during the crisis. I would like to thank all our employees for their moral standing and resilience in this difficult and trying time.

The crisis in Ukraine illustrates once again how important it is to be prepared for events that we would rather not experience, but cannot avoid. PVK, as an entity responsible for the Czech Republic's critical infrastructure, is constantly planning for various crisis scenarios. We demonstrated how highly prepared we were during the COVID-19 epidemic, and we can do so now as well. We are aware of heightened security risks and, particularly when it comes to cybersecurity, we are dealing with an extraordinary number of challenges that put the robustness of our security systems to the test. I wish to reassure all our customers, employees and business partners that we monitor and analyse all security risks meticulously and, thanks to our many years of work, we are fully prepared to counter them. We will make every effort to ensure that our customers always receive a completely safe and first-class service.

Our minority shareholder, Pražská vodohospodářská společnost, is once again proving what an invaluable role it plays in fraught situations. The excellent relationship between the two shareholders makes for close security cooperation with the City of Prague. Public-private cooperation has shown that it can be very effective and efficient even in dealing with security risks, because these are common to both the private and public sector.

Indeed, this type of collaboration had already proved its worth in the response to the COVID-19 pandemic in 2021. PVK teamed up with the City of Prague and several selected boroughs in the capital to launch a project monitoring the presence of the virus in wastewater. This effective method made it possible to react in good time to changes in the pandemic situation in the city, and to optimise the anti-epidemiological measures applied at selected facilities such as schools and nursing homes.

In the midst of acute risks and threats to society, all too often longer-term problems are neglected and solutions to them are put on hold. I am concerned that precisely such a situation may now emerge in the protection of our planet and climate. For all the immediate problems we are facing, the fight against climate change remains a priority for our company, as evidenced by the bioCNG transition project we launched in 2020, which will reduce our carbon footprint considerably. This project has steadily made progress towards the certification of our ISO 14064 system, which will comprehensively address greenhouse gases and set clear targets and rules for the reduction of these emissions at PVK.

In the same vein, occupational safety remains an absolute priority for us. Our company is doing its utmost to offer employees conditions safeguarding its status as an attractive and stable employer.

I would like to thank all PVK employees for their fine work and all our partners for embracing the values and ideals embodied by our company. PVK remains a rock in today's fractious world.

Philippe Guitard, Chairman of the Board of Directors

**07 ORGANISATIONAL STRUCTURE**



**08 OUR SERVICES**

Pražské vodovody a kanalizace, a.s. (PVK) provides comprehensive water management services, an uninterrupted supply of high-quality drinking water, sewage disposal, and wastewater treatment for the City of Prague and Radonice. In addition to this core business, the Company offers a range of other related services to the public, housing cooperatives, municipalities and industrial enterprises. These include laboratory analysis, network diagnostics, water meter replacement and smart metering, network surveys, and network measurements, to name just a few.

For the most part, the water networks and water facilities operated by PVK are owned by the City of Prague. These assets are managed by the city-owned Pražská vodohospodářská společnost a.s. (PVS), which is responsible for investment. Since 20 September 2018, PVS has been a 49% shareholder in PVK. Pražské vodovody a kanalizace operates the water infrastructure and pays rent to the city to use it. PVK has paid the city more **than CZK 37 billion** in rent since 2002, when Veolia bought into the Company. The other 51% of PVK's shares are held by Veolia, a company that supplies water, heat and electricity and is active in waste processing and recovery in the Czech Republic and elsewhere around the world. It provides its subsidiaries with know-how in the design, roll-out and operation of water infrastructure that it has accumulated in more than 150 years' experience.

## **CERTIFICATION**

In autumn 2021, the company successfully underwent the first surveillance audit of its anti-bribery management system under ISO 37001 by Bureau Veritas and a recertification audit of its integrated management system under ISO 9001 (quality management system), ISO 14001 (environmental management system), ISO 50001 (energy management system), and ISO 45001 (occupational health and safety management system), which has been in place at the company since 2006. PVK's integrated management system is diamond-certified by Certified Quality Systems (CQS).

Both audits by certification authorities affirmed that PVK is an industry leader. No non-conformities were found and in both cases the auditors acknowledged the high standard of the system in place.

## **DRINKING WATER SUPPLY AND DISTRIBUTION**

Despite the adverse epidemiological situation in 2021, PVK continued to ensure that there was a constant supply of high-quality drinking water from the Káraný and Podolí water treatment plants (WTPs), which it operates, and from the Želivka and Sojovice WTPs, from which it purchases water ("imported water").

In 2021, Podolí Waterworks started supplying drinking water to the Prague water supply network again. In June, it launched permanent operation for the first time since 2002, when flooding had damaged the water treatment plant in Podolí and reduced it, in the meantime, to a backup source. The decision to put the water treatment plant in Podolí back into permanent operation was taken to secure a greater supply of drinking water to the water supply system serving Prague and other towns and villages in the Central Bohemian Region.

In order for the water treatment plant in Podolí to be put into permanent operation and for drinking water to be supplied from here to the water supply network, some of the technology had to be upgraded and supplemented so that the drinking water supplied would meet the stringent quality requirements under the Decree of the Ministry of Health No 252/2004 laying down requirements for drinking and hot water and the scope and frequency of drinking water checks.

Podolí Waterworks was extensively upgraded between 2019 and 2021. A third technological stage was added – granular activated carbon (GAC) filtration, which removes pesticides, their metabolites and other substances from the water. This technology was already in use at the Želivka water treatment plant. Consequently, the quality of the water supplied from Podolí is the same as that from Želivka and satisfies the strict limits established by the decree.



The PVK Central Control Room is responsible for round-the-clock control of water distribution from the various water treatment plants. These days, the supply of drinking water also relies on automated processes and information systems that oversee everything from the production of drinking water in water treatment plants to the filling of reservoirs and subsequent distribution to consumers.

TABLE – WATER SUPPLIED TO THE WATER SUPPLY NETWORK IN 2021

	Indicator	Quantity (m <sup>3</sup> )
Drinking water	Drinking water produced by PVK	23,996,755
	Water imported from the Želivka and Sojovice WTPs	81,653,237
	Total drinking water	105,649,992
	Exported water (drinking water supplied into a public water supply network managed by another entity)	16,094,690
Industrial water	Water produced – industrial water mains	902,915
Drinking + industrial	Drinking water and industrial water produced by PVK	24,899,670
	Water for sale supplied to the network (water produced + water imported - water exported)	90,458,217

In 2021, PVK supplied 90,458,000 m<sup>3</sup> of water to the water supply network, 0.9% less than in the previous year. Average per capita water consumption was 113 litres per day in 2021. Factors reducing the water supplied included restrictions on tourism and the shuttering or limited operation of hotels, restaurants, shops and service-industry establishments. Besides schools, decisions were taken to close museums, exhibitions, accommodation facilities, university halls of residence, and other facilities. Many workers ended up working from home, either because their employers had closed their offices or because they needed to take care of their children after schools were shut. As a result, there was a fall in the number of people commuting to Prague. A trend is emerging in which numerous businesses, where the nature of the job allows, are transitioning to a hybrid model that permanently combines office- and home-based work. This made a difference to the amount of drinking water consumed in Prague last year and will continue to do so in the future.

CHART – DRINKING WATER PRODUCTION BY WATER TREATMENT PLANT (m<sup>3</sup>)

Želivka, imported water	70,005,071
Káraný, internally produced water	17,088,316
Sojovice, imported water	11,648,166
Podolí, internally produced water	6,908,439

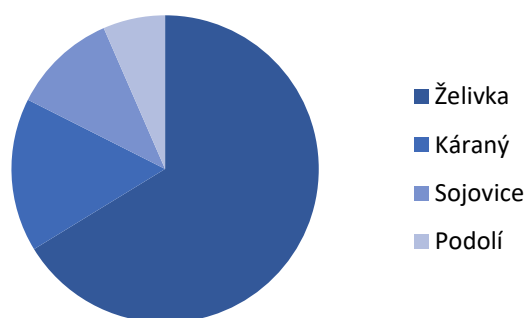


CHART – INTERNALLY PRODUCED WATER, IMPORTED WATER, AND INDUSTRIAL WATER IN 2021 (%)

Internally produced drinking water	23,996,755	23%
Industrial water supply	902,915	1%
Imported water	81,653,237	77%

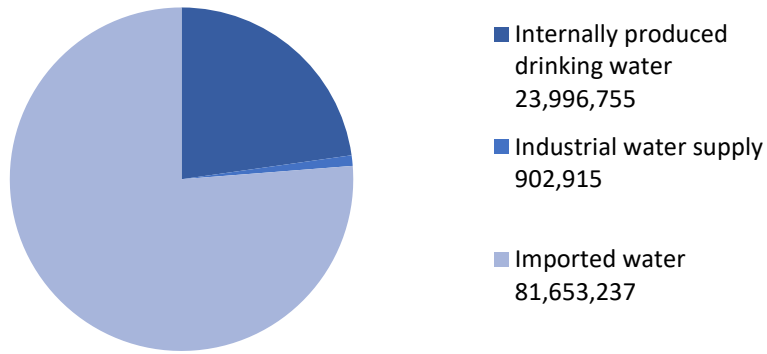


CHART – WATER REVENUE AND NON-REVENUE WATER BETWEEN 2017 AND 2021 (thousands of m<sup>3</sup>)

	Revenue water	Non-revenue water
2017	82,058	16,039
2018	83,294	14,452
2019	83,579	13,611
2020	78,335	12,904
2021	76,359	14,099

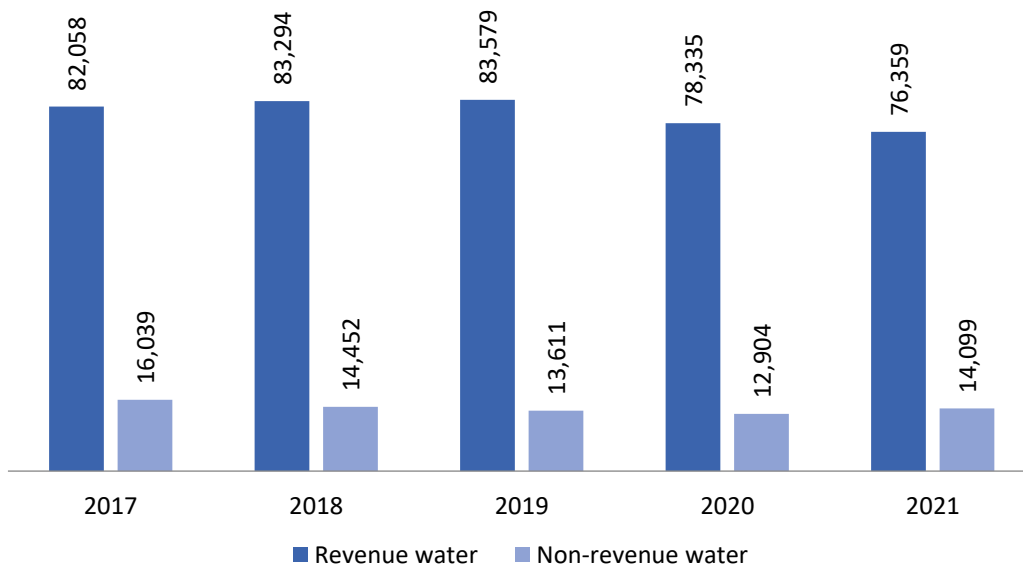
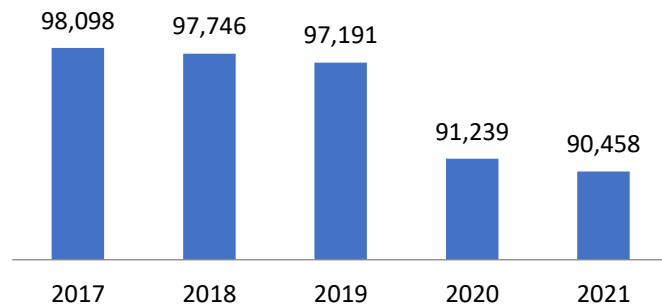


CHART – WATER SUPPLIED TO THE WATER SUPPLY NETWORK BETWEEN 2017 AND 2021 (thousands of m<sup>3</sup>)

2017	98,098
2018	97,746
2019	97,191
2020	91,239
2021	90,458



## WATER LOSSES

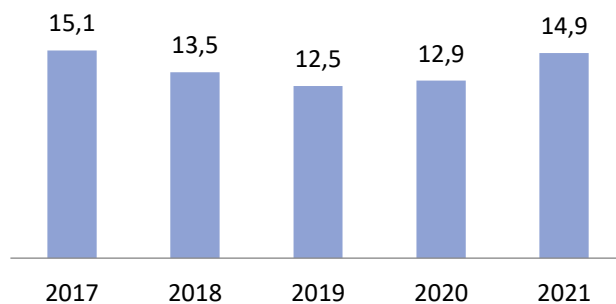
Water losses in Prague’s water supply network, which have long been below the national average, came to 14.9% last year, equivalent to a total volume of 13,152,000 m<sup>3</sup>. It was not that long ago, in 2000, that more than a third of water was being lost. Just a few years previous to that, in 1996, losses were more than 43%. PVK’s regular monitoring of the water supply network includes the continuous assessment of water losses in supply zones and regular water supply network diagnostics. This is one of the chief factors behind the good water loss statistics. In 2021, 2,893 km of the water network were inspected and 317 hidden leaks were discovered. For the second year running, PVK’s efforts to combat water loss drew on satellite remote sensing, a unique technology that identified 50 hidden leaks.

TABLE

Length of water supply network	3,563 km
Length of supply pipes	881 km
Number of supply pipes	117,170
Number of water meters	115,151
Number of reservoirs	67
Volume of reservoirs	753,494 m <sup>3</sup>
Number of pumping stations	51

CHART – DRINKING WATER LOSSES BETWEEN 2017 AND 2021 (%)

	%
2017	15.1
2018	13.5
2019	12.5
2020	12.9
2021	14.9



## WATER METERS

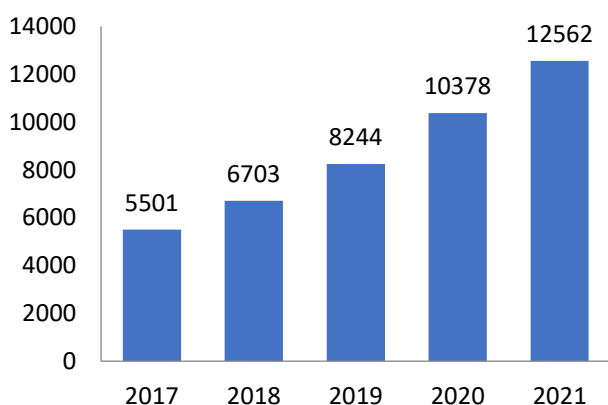
At the end of 2021, there were 115,151 water meters – used to measure the consumption of the drinking water supplied – in the PVK network in Prague and Radonice. 19,732 meters were replaced because their certification had expired. In addition to these water meters, 228 remote-reading sub-meters for individual billing, known as dedicated irrigation water meters, were installed. In response to customer requests, we officially tested 684 meters, with 49 official tests carried out on the spot. Repairs and checks of 10,338 meters were outsourced.

The proportion of remote-reading meters is rising every year. In 2021, there was a 21% year-on-year increase in these water meters to 12,562. Meter readings are transmitted by radio to a “concentrator”. All data is then transmitted via the internet directly to the end user. Readings are taken online. The data is stored on a server and immediately presented online at [veolia.unimonitor.eu](http://veolia.unimonitor.eu) or in the Veolia CEM mobile app.

Remote radio-transmitted readings offer greater user convenience and lower reading costs. In addition, they can be used to monitor water consumption online and promptly detect any malfunctioning meters. They are also a guarantee of precision. PVK works with Pražská teplotárenská a.s., Pražská plynárenská, a.s. and PREměření, a.s. to take remote readings.

GRAF – NUMBER OF REMOTE-READING WATER METERS BETWEEN 2017 AND 2021

2017	2018	2019	2020	2021
5501	6703	8244	10378	12562



#### WATER SUPPLY INCIDENTS

In 2021, PVK dealt with 4,131 water supply incidents, down 241 (5.5%) on the preceding year. The average water supply interruption time per incident was 10 hours and 31 minutes.

Of the total number of incidents, 71 (i.e. only 1.7%) were category 1 incidents, where more than 1,000 inhabitants are left without water or where the supply to healthcare or other important facilities is affected. There were 122 category 2 incidents (3% of the total number), and 3,938 category 3 incidents (95.3%).

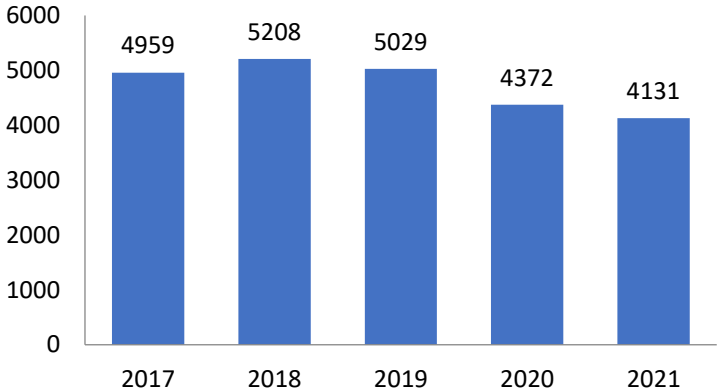
The leading cause of the incidents was corrosion (69.4%), followed by land movement (23.7%) triggered, for example, by frost. These two causes were responsible for more than 93.1% of cases. The remaining less than 6.9% of incidents were the result of third-party intervention, material defects, frozen pipes, and other miscellaneous causes.

It is PVK’s policy to provide maximum information on each incident while minimising the impact on the consumer. Incidents are reported online at [www.pvk.cz](http://www.pvk.cz). This information clarifies whether

drinking water supplies are affected at a particular site, where water wagons have been deployed, whether water (including packaged water in bags) has been distributed for emergency supply, and the estimated time it will take to complete the repair and restore normal water supply. All this information is also available via Google Maps. Prague residents who have registered with the SMS INFO text message service also receive news about outages and incidents on their mobile devices.

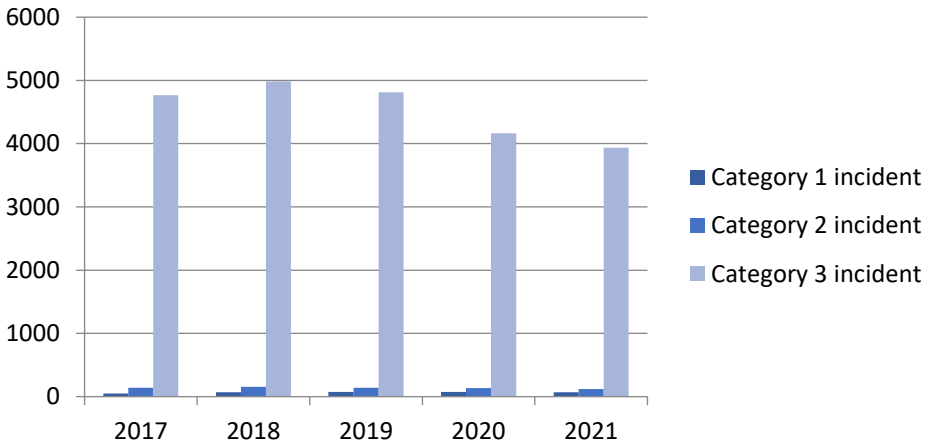
CHART – NUMBER OF WATER SUPPLY INCIDENTS REPAIRED BETWEEN 2017 AND 2021

2017	2018	2019	2020	2021
4,959	5,208	5,029	4,372	4,131



GRAPH – CATEGORY 1, 2 AND 3 INCIDENTS BETWEEN 2017 AND 2021

	Category 1 incident	Category 2 incident	Category 3 incident
2017	48	142	4,769
2018	67	158	4,983
2019	74	142	4,813
2020	73	133	4,166
2021	71	122	3,938



There was a fall in the number of water supply network incidents. This was due to the state of emergency and the reduction in operations caused by the anti-epidemic measures and their impact on various fields of activity. In particular, water consumption was down, there was less traffic, and construction work was downsized. All this had a direct or indirect impact on the occurrence of incidents.

### WASTEWATER COLLECTION AND TREATMENT

In 2021, 1.3 million inhabitants were connected to the sewerage system in Prague. The sewerage system in place in the central part of Prague is a combined system, i.e. it drains sewage together with rainfall to the existing Central Wastewater Treatment Plant (CWWTP) and, since 19 September 2018, also to the New Water Line (NWL). The outskirts of Prague are served by separate sewer networks that drain sewage and rainwater separately.

In 2021, in addition to the CWWTP, PVK operated a further 20 branch wastewater treatment plants (BWWTPs): Březiněves, Horní Počernice – Čertousy, Dolní Chabry, Holyně, Kbely, Koloděje, Kolovraty, Klánovice, Královice, Lochkov, Miškovice, Nebušice, Nedvězí, Sobín, Svěpravice, Uhřetěves – Dubeč, Újezd nad Lesy, Újezd u Průhonic, Vinoř, and Zbraslav.

In 2021, 118,979,000 m<sup>3</sup> of wastewater was treated at the existing CWWTP, the NWL and BWWTPs. This is 7.4% more than in the previous year. Of the total wastewater treated, 54% was treated by the NWL, 38% by the CWWTP's old water line, and 8% by branch wastewater treatment plants.

TABLE

Total length of the sewerage network	3,742 km
Length of drainage pipes	1,018 km
Number of drainage pipes	125,819
Number of pumping stations	335
Number of wastewater treatment facilities	Central WWTP + 20 branch WWTPs

CHART – QUANTITY OF WASTEWATER TREATED IN 2021 (m<sup>3</sup>)

CWWTP – existing water line	44,989,000	38%
NWL	64,601,400	54%
TOTAL CWWTP	109,590,400	92%
BWWTPs	9,388,256	8%
TOTAL	118,978,656	

■ CWWTP – existing water line 44,989,000  
 ■ NWL 64,601,400  
 ■ BWWTPs 9,388,256

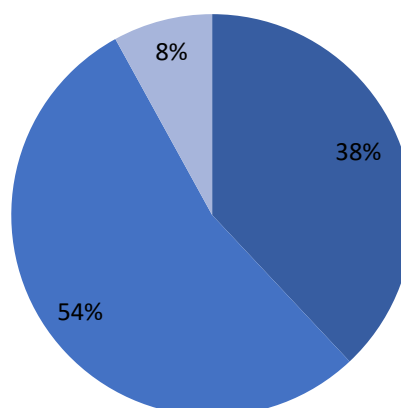
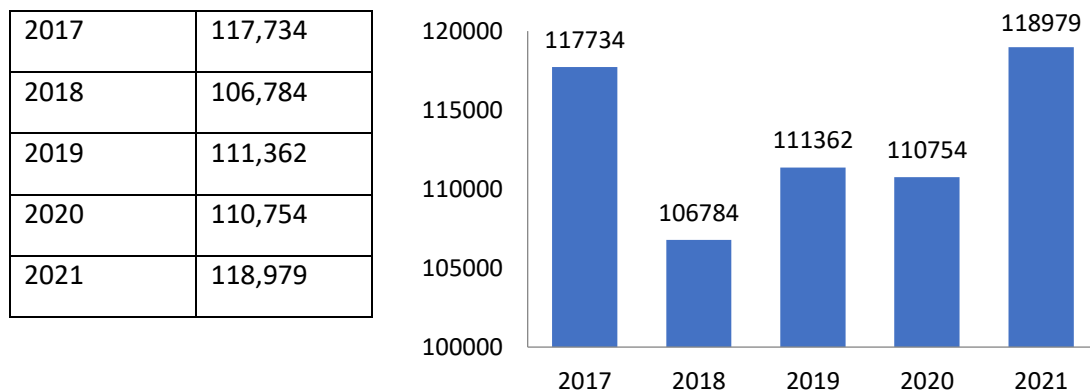


CHART – TOTAL QUANTITY OF WASTEWATER TREATED BETWEEN 2017 AND 2021 (thousands of m<sup>3</sup>)



The treatment of Prague’s wastewater at the CWWTP and the NWL resulted in the separation of 3,086 tonnes of grit (sand and gravel) and 2,707 tonnes of screenings. The total annual production of dewatered stabilised sludge was 77,550 tonnes, of which 93% was used in agriculture and 7% was composted.

The **old CWWTP line** produced 15,044,000 Nm<sup>3</sup> of biogas in the sludge stabilisation process. The Company’s cogeneration units produced 32,772 MWh of electricity. The Company’s operation of the existing water line consumed 28,871 MWh, while 4,819 MWh of surplus “green” energy was distributed to the Prague grid.

Following three years of successful trial operation, the main pumping station at the CWWTP was approved in September 2021. This is a core facility at the complex as it transports influent wastewater to the CWWTP’s existing water line and New Water Line for treatment.

The extended trial operation of the CWWTP’s now-approved NWL was completed and PVK took over its operation as at 31 December 2021. The final approval and handover of the NWL for permanent operation brought to a close a historically, structurally and technologically crucial stage of framework capital project 6963, i.e. the complete reconstruction and expansion of the CWWTP at the Císařský ostrov site. Between 2015, i.e. the start of the NWL construction, and the launch of trial operation in September 2018, PVK provided the contractor with the assistance required during construction. Up to the end of 2019, PVK was responsible for the contractual trial operation of the NWL on behalf of the contractor. Subsequently, after winning a tender, PVK provided PVS with operation and maintenance services, as well as the services of engineers, laboratories, and electricity and water supply, during the extended trial operation of the NWL.

## INCIDENTS IN THE SEWERAGE NETWORK

In 2021, PVK employees dealt with 2,805 sewerage network incidents, including manhole-related incidents and blockages. This was 22 (0.8%) fewer incidents than in the preceding year. The highest proportion of incidents involved drainage pipes (43.4%), while 36.1% of cases concerned sewers.

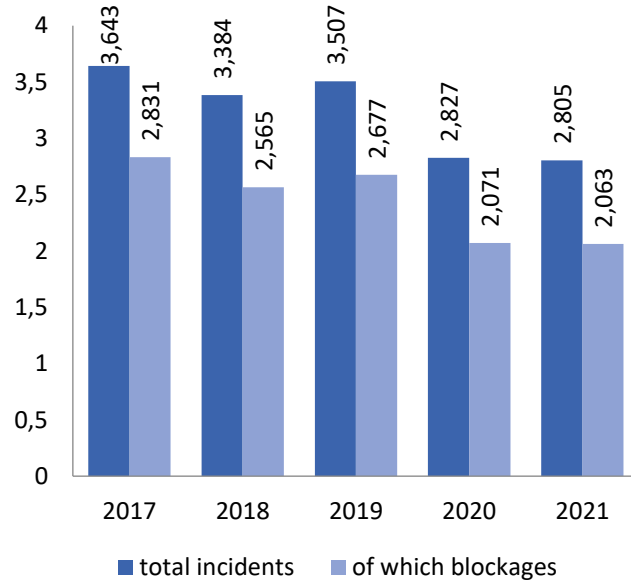
The most common sewerage network incidents, in terms of the type of damage, involved blockages and sediment, accounting for 73.6%, or 2,063, of incidents. Other causes of incidents included missing or broken manhole covers, damaged rehabilitation lining, destruction, deformation, damaged masonry, etc.

TABLE – NUMBER OF SEWERAGE NETWORK INCIDENTS BY TYPE OF FACILITY IN 2021

Type of facility	Number of incidents	%
Sewers	1,012	36.1
Drainage pipes	1,216	43.3
Shafts, chambers, reservoirs, spillways	431	15.4
Other	146	5.2
Total	2,805	100

CHART – SEWERAGE NETWORK INCIDENTS BETWEEN 2017 AND 2021, SHOWING THE SHARE OF BLOCKAGES

	total incidents	of which blockages
2017	3,643	2,831
2018	3,384	2,565
2019	3,507	2,677
2020	2,827	2,071
2021	2,805	2,063

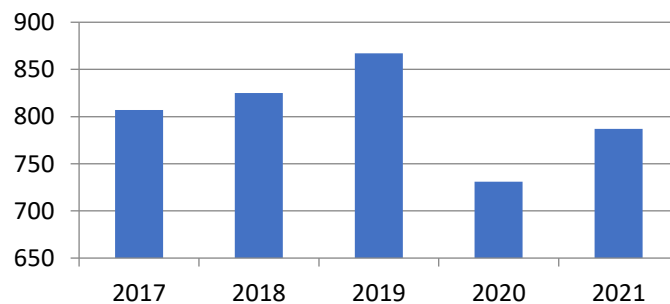


### EQUIPMENT BREAKDOWNS

In 2021, PVK handled 787 equipment breakdowns, i.e. 56 (7.7%) more than in the year before.

CHART – NUMBER OF EQUIPMENT BREAKDOWNS BETWEEN 2017 AND 2021

2017	807
2018	825
2019	867
2020	731
2021	787





There was a fall in the number of sewerage network incidents and equipment breakdowns. This was due to the state of emergency and the reduction in operations caused by the anti-epidemic measures and their impact on various fields of activity. In particular, water consumption was down, there was less traffic, and construction work was downsized. All this had a direct or indirect impact on the occurrence of incidents.

## **SEWERAGE NETWORK SURVEYS**

Systematic preventive surveys of the sewer network are carried out under an operating contract between PVK and PVS. Camera inspection systems are used for sewers that cannot be entered physically and visual inspections are conducted on foot in tunnels. PVK also inspects sewers exposed to high-velocity water discharge and coordinates repairs of tramlines, road surfaces and other utilities.

In 2021, the sewerage network unit surveyed 135 km of sewers and inspected 2,658 access shafts and sewerage network installations. These inspections revealed 23 sewerage network faults. Drawing on their evaluations of sewerage network inspections, employees came up with 83 proposals to fix defects. These were subsequently submitted for inclusion in repair and investment plans.

We smoke-tested 19 km of sanitary sewers. Smoke testing is mainly used to detect separate sewer system misconnections or to verify the route of a sewer. In 2021, using this method employees detected 34 misconnections where surface water was being discharged into the sanitary sewer system. Removing these connections reduces the strain on pumping stations and branch treatment plants.

In cooperation with Lesy hlavního města Prahy, the Czech Environmental Inspectorate and Prague City Hall, the Company's employees found 13 misconnections where wastewater was being discharged into surface water sewers. Their subsequent disconnection improved the quality of surface water in Prague. Since 2020, PVK has also been seeking out sewers used for the drainage of rainwater where it is unclear who owns and operates them. In 2021, these inspections continued and were upscaled.

## **WATER QUALITY**

PVK's accredited laboratories carry out regular checks on drinking water and wastewater quality. The accreditation under ČSN EN ISO/IEC 17025:2018 covers the entire range of the laboratories' activities: sampling and analysis of drinking, hot, packaged, surface, raw, ground and waste water, water from intermediary process stages and sludge, and bathing water, including waste sampling and analyses of process chemicals used in water treatment and purification.

### **Drinking water**

Drinking water throughout Prague is safe. Its physical, chemical, microbiological and biological properties comply fully with Czech and European standards. The quality is systematically checked throughout the production and distribution of drinking water, all the way to the consumer's tap.

Drinking water quality is regularly monitored in accordance with Decree No 252/2004 laying down requirements for drinking and hot water and the scope and frequency of drinking water checks, as amended, which conforms to EU drinking water requirements. Water quality is also checked after

incidents, repairs and any other interventions in the water supply network. Drinking water quality monitoring is based on the requirements of Decree No 252/2004 and on risk factors affecting the drinking water treatment process, from the source to the end point of the water supply network. Screening analyses of other risky contaminants are also conducted regularly to confirm that drinking water is free of other extraneous matter.

In 2021, as in previous years, the water supply network was inspected for drinking water quality control purposes at the points of delivery to the distribution system, along the distribution route, in each of the water reservoirs, and directly at consumers. One problematic indicator in the distribution of drinking water is its iron content and the associated water colour and turbidity. Depending on the drinking water quality control results, the water supply network is flushed and documentation on its periodic renovation is submitted.

Now that drinking water from the treatment plant in Podolí has started to be regularly fed into the water supply network, a new operational laboratory has been built at that plant to run the operational analyses necessary for the management of the technology there. The laboratory conducts basic chemical, microbiological and biological analyses.

Nearly 7,000 samples of drinking water supplied to the Prague water supply network were taken in cooperation with individual water treatment plants in 2021. The entire drinking water treatment process is also monitored. In addition, samples are regularly taken at individual water treatment plants to control the water treatment technology, including analyses of the raw water used for water treatment. This amounts to almost 17,000 additional samples that help to monitor water quality from the source to the consumer's tap. Close attention is also paid to sampling drinking water after water supply network incidents and repairs to ensure that consumers have a safe supply of drinking water. 770 samples were taken for water quality control after incidents and scheduled repairs. In those samples, 18,973 parameters were analysed, 98% of which complied with the Decree's drinking water requirements.

In the practices followed by the laboratory, the application of alternative microbiological methods to detect whether drinking water is contaminated following interventions in the water supply network has proven useful when putting the water supply back into service. In addition, new modern means of determining water contamination that provide information on water quality more quickly than the conventional culture-based methods used in routine drinking water quality control cases are being investigated. These new approaches, mainly polymerase chain reaction (PCR) methods, are important for dealing with remedial measures when water mains are put back into operation after an incident.

## **Wastewater**

The PVK laboratory regularly monitors wastewater quality throughout the wastewater collection and treatment process. Wastewater samples taken directly from specific points in the sewer network, from industrial wastewater producers, and from each wastewater treatment plant are analysed. A large section of samples (including of sludge gas and sludge) comes from the Prague CWWTP and its installations so that the efficiency of the treatment process can be evaluated. Liquid waste delivered to selected WWTPs by outside entities is also checked. The scope and frequency of monitoring complies with all applicable wastewater legislation. The main reason for wastewater quality control is to ensure compliance with the limits prescribed for effluent discharge, with a view to preventing the discharge of contaminated wastewater and damage to the environment.

To cope with the high number of wastewater samples, automated analysers are used in the wastewater laboratory. These are able to process large numbers of samples, thus speeding up the water quality control process.

In 2021, 25,027 samples were processed in the PVK wastewater laboratory.

Since 2021, water quality control has also included the monitoring of the presence of the SARS-Co-V-2 virus in wastewater. The results of these laboratory analyses are instrumental in tracking the course of the epidemic in Prague. In 2021, this was a pilot monitoring exercise, and it will now be further expanded by PVK.

## **OTHER SERVICES**

### **Cooperation with ČEZ, Elektrárna Počerady and Energotrans**

PVK, working with its partners Martia, a.s. and Česká voda - Czech Water, a.s., successfully completed another year in the maintenance and repair of water and sludge management facilities at conventional power plants. This partnership enables us to cover most activities with our own capacities and to react promptly to operating needs and requirements.

In 2021, servicing was provided at Mělník (Energotrans, a.s.), Počerady (combined cycle – ČEZ, a.s., coal cycle – Vršanská uhelná a.s., Sev.en Energy Group), Tušimice, Prunéřov, and Ledvice. All these activities were carried out without compromising operations and to the satisfaction of the clients – ČEZ, a.s., Elektrárna Počerady, a.s., and Energotrans, a.s.

In 2021, PVK's maintenance work generated turnover of CZK 49.8 million at all these sites combined. Together with other assignments beyond the scope of routine maintenance, total turnover amounted to CZK 57.1 million. Major contracts included the repair of the internal surface of sumps at Ohře Pumping Station (the Počerady combined cycle, worth CZK 4.9 million) and the repair of a horizontal sand filter (the Počerady steam gas cycle, worth CZK 2.4 million).

### **Provision of remote readings**

In 2021, PVK continued to implement previously launched projects. These included remote readings of revenue-water meters for Vodohospodářská společnost Rokycany, s.r.o., CHEVAK Cheb, a.s., Královéhradecká provozní, a.s., Středočeské vodárny, a.s., and Frýdlantská vodárenská společnost, a.s. In addition, a contract was entered into with Vodárna Sokolovsko s.r.o., as the successor of VOSS, a.s.

The Company continued to work with Pražská energetika on remote readings of revenue-water meters. Out of a total of 450 metering points, 362 meters with on-line remote readings were installed. This project was conceived on the basis of PVK's experience of remote readings of secondary meters at its operating facilities.

### **Drinking water supplied in substitute packaging**

Although the epidemic persisted in 2021, year-on-year production of bagged water was higher than in the previous year. In total, PVK produced 285 cases of packaged water. As a result, drinking water in substitute packaging aided the supply of drinking water during 77 incidents and planned drinking water supply shutdowns. Cases that did not end up being used directly at incidents or shutdowns were distributed at social and charity events.

Some of this project targets the needs of registered disabled persons when the drinking water supply is reduced or interrupted. In this respect, we registered five new applicants from existing boroughs. In all, 385 disabled persons are registered for the delivery of bagged drinking water. No new Prague boroughs applied to join. Therefore, there are still 21 boroughs involved, as was the case last year. There were several drinking water incidents in 2021 where we launched a special campaign to publicise the fact that bagged water would be available for delivery to disabled persons, but in the end the drinking water supply in the affected area was always restored before this action actually became necessary.

### **Technological supervision**

In the field of drinking water technology, PVK provides water quality control and other services to Vodárna Káraný, a.s. and Želivská provozní a.s. PVK also contributed to the evaluation of the seventh year of GAC model testing at the Želivka water treatment plant. This will serve as a basis for forecasting the depletion of the GAC used in the plant's process equipment. Starting in January 2021, following the completion of the new granular activated carbon filtration hall, PVK was involved in putting the GAC filters into operation and integrating them into the existing water treatment technology. At the same time, the one-year trial operation of the new technology was initiated. PVK continues to provide technological supervision of electrolysis operations at Jesenice I Water Reservoir.

As part of the restart of permanent operations at the Podolí treatment plant, the trialling of granular activated carbon filtration here, commissioned by PVS, was also initiated. The aim of this trial operation is to assess how the newly added GAC sorption stage and UV radiation affect the quality of drinking water.

Altogether, PVK's drinking water engineers were involved in the supervision of 23 water supply facilities, 9 of which were treatment plants. In 2021, PVK's wastewater engineers oversaw or guided and prepared management agendas at the CWWTP, 20 PVK-operated BWWTPs, and 70 WWTPs operated or serviced by 1. SČV, a.s.

Cooperation with Krušovice brewery also continued to progress well.

### **Flood control measures**

PVK collaborates with Prague City Hall on flood defences. It maintains mobile pumps and conducts testing at pumping stations in cooperation with Česká voda - Czech Water, a.s.

In 2021, PVK was responsible for 34 flood-protection pumping points on the sewer network. It purchased eight GODWIN mobile suction pumps – two CD250 pumps (200 l/s) and six CD150 pumps (100 l/s) – as back-up pumping equipment. Despite the epidemiological measures, 34 scheduled tests were conducted at pumping points in 2021.

In May, the Čertovka flood gates were closed after flood level I was reached. The Hergetova cihelna pumping point was activated as the gates were being closed and remained so until the gates were reopened. One QI200 mobile pump was deployed at the pumping point. Pumping was carried out from 14 to 16 May 2021.

### **Laboratory services**

The PVK laboratory collects and analyses samples both for internal requirements and for external customers on the basis of contracts or purchase orders. Prominent external laboratory services include water quality control for Želivská provozní a.s. and Vodárna Káraný, a.s., which supply water to the distribution system operated by PVK, extended cooperation with PVS related to disinfection and the commissioning of newly built water supply systems, and cooperation in detecting sewer contamination and the protection of wastewater treatment plants. Wastewater quality control in the trial operation of the New Water Line (NWL) was another significant area of laboratory services.

In 2021, PVK laboratories collected and analysed samples for external customers for fees totalling CZK 48.7 million, up CZK 7.7 million on the year previous.

### **Pest control**

Taking 2021 as a whole, PVK used 13,500 kg of rat bait at 13,500 sewer entry points across Prague as part of a programme that covered city-wide, targeted, and preventive extermination. PVK carried out vermin control for 50 external customers and insect control for 11.

### **Hydrant standpipe rentals**

In 2021, customers rented 395 metered hydrant standpipes. These rentals came in three sizes: 184 small HN DN 20-25 standpipes, 210 large HN DN 40-65 standpipes, and one large HN DN 100 standpipe.

### **Sewerage network servicing**

PVK provides sewerage network servicing to customers. In 2021, it emptied and disposed of the waste from 297 septic tanks, cleaned and disposed of the waste from grease traps at 359 sites, and built 259 new access points to the public sewerage system.

### **Domestic wastewater treatment plants**

For customers who cannot connect to the sewerage network, PVK staff successfully supplied and serviced domestic wastewater treatment plants. In 2021, they sold, serviced, consulted on and inspected 11 domestic WWTPs.

## **09 CUSTOMERS**

PVK's main objective is to foster long-term partnerships with its customers that are based on mutual trust, and to provide them with a high-quality and professional service. It is also as accommodating as possible in how it interacts with customers. Besides modern tools such as the online customer account, the Moje Voda mobile phone app, and the SMS INFO information service for outages and incidents, the company has maintained more traditional channels – a customer hotline and a customer service centre in Dykova Street, Prague 10, for those who prefer personal contact.

The Company pays particular attention to customers with special needs. It tailors its services to accommodate the needs of disadvantaged customers so that they can still use them even if they are facing more challenging circumstances in life. PVK communicates with the visually impaired in a way that is fully understandable to them – by voice message. The SMS INFO information service is able to convert text into voice messages. Visually impaired citizens and customers of PVK benefit from this service because it also enables them to order packaged water in the event of a water outage or similar emergency. They place a request with PVK for delivery by voice message and packaged water is then delivered to them within two hours.

## Satisfaction survey

As a customer-centric company, PVK is committed to quality of service and customer satisfaction. Adherence to the Customer Service Commitments adopted by the Company in 2012 is another avenue that can lead to improvements in customer service. Indeed, compliance with the Commitments was reflected in the high level of customer satisfaction in 2021. This was borne out by the traditional autumn telephone satisfaction survey conducted for PVK by the independent research agency IBRS – International Business and Research Services s.r.o. The survey, conducted in Prague from 13 September to 10 October 2021, revealed that satisfaction with PVK's services had improved on 2020. The research involved a cohort of 880 customers from Prague, comprising a mix of single-family building owners, multi-family building managers, housing cooperatives, industrial customers and corporates.

In all, 96% of respondents said they were happy with the services offered by PVK. This was 1% higher than in 2020. Some 95% of respondents are satisfied with the professionalism of the Company's employees, 96% are happy with the continuity of drinking water supply, and 93% are satisfied with the quality of the water supplied. It is the high quality of water that has long made the drinking of tap water popular in households. Almost four out of five people habitually drink tap water at home.

According to the survey, the internet is the most favoured information channel, closely followed by the customer service phone line. Businesses are more likely to prefer the internet, housing associations the customer service line, and individual customers' preferences are evenly split. Additionally, more than four out of ten people agree that the COVID pandemic influenced the way they handle their needs and requirements. Generally speaking, younger people prefer to deal with their requirements online, while older people are more likely to phone. 99% of customers were satisfied with their use of the customer portal.

## Certification

The customer services provided by PVK have been certified according to ČSN EN ISO 9001 since 2003. Since 2006, customer services have been certified as part of the Company-wide integrated management system certification. In November, the Company underwent its sixteenth regular audit under ISO 9001, ISO 14001, ISO 50001, and the ISO 45001 standard for occupational health and safety management systems. The ITC auditors acknowledged the professional approach of all audited staff and did not identify any non-conformities or shortcomings.

## Contract customers and billing

PVK provides services to **93,521 customers**, up 524 from 92,997 in 2020. It supplies them with drinking water and drains and treats their wastewater under a contract. Contract customers include individual customers (68,383), multi-family residential buildings and cooperatives (17,042), and corporates and others (8,096). As certain customers may have more than one contract in place, PVK recorded 116,386 supply points for billing purposes at the end of 2021.

In 2021, PVK continued to enter into new contracts with customers as required of it by an amendment to the Water Supply and Sewerage Systems Act (Act No 275/2013). Under that amendment, all customers must have a new contract in place by 1 January 2024. By the end of 2021, PVK had registered 103,469 updated contracts, i.e. 88.38% of all its contracts.

Almost 65,000 customers had their bills emailed to them in 2021. PVK also offered to send tax documents via email. This means that legal entities, after paying a deposit, receive a tax document in advance so they have problem-free "VAT control statements". Customers also paid their bills via the

lottery terminals of SAZKA a.s. These terminals read the barcode contained on PVK bills to obtain the payment details, and then issue a receipt confirming the customer's cash payment. Bills totalling CZK 32 million were paid in this way. Another avenue for customers to pay their bills was online via the customer portal. Over CZK 24 million was paid in this way.

Customers were also able to use the QR code printed by PVK on all its billing documents to make cashless payments. Customers used this QR code to pay almost CZK 185 million for services.

Almost 41,000 customers have registered with **the customer portal and opened an online customer account**. This is the method of choice for housing associations and companies in the handling of enquiries. Secure online accounts give customers a constant overview of their water consumption, bills, deposits, payments, and meter readings. In the customer portal, customers can also pay bills and deposits online, report self-readings, submit requests or questions via the e-registry, make appointments online, and register for the SMS INFO service. They will also find a range of important information here, including a map of current incidents and planned outages, and information about the water quality in their street.

As the portal is interlinked with smart metering, users who have installed "smart" remotely read water meters can monitor their water consumption in real time and set alarms (related to the temperature at the meter, high consumption, or consumption during night hours) alerting them to high water consumption caused, for, by a dripping tap or a leaking toilet. All this information is available in the Readings and Consumption section, offering a full consumption and meter reading history, plus easy access to the self-reading feature.

Besides the portal, the **Moje voda** mobile app has been developed for contract customers and consumers and is downloadable for both the Android and iOS user interfaces.

### SMS INFO

To date, 40,266 customers have signed up for the SMS INFO service to receive text messages about incidents, water supply outages, the estimated downtime, etc. As such, registered customers receive, free of charge, important information about water via text message transmitted to their mobile phone. In 2021, 38,347 text messages about incidents and outages were sent to registered customers. Almost a million text messages have been sent since the service was launched.

### Joint opinion portal

In January 2021, PVK teamed up with Pražská vodohospodářská společnost a.s. (PVS) to launch a joint opinion portal. This speeded up the processing of applications for opinions on design documentation and activities related to already built water and sewer connections. Instead of having to approach each of the companies separately, applicants can now submit a single application, which will be processed by both companies simultaneously. All communication with the applicant takes place under a single reference number via an email address and a form. The portal makes it possible for applicants to submit requests for opinions on individual stages of building permit proceedings under Act No 183/2006 on spatial planning and the Building Code (the Building Act), as amended, as well as opinions on pre-project preparations or technical applications related to supply or drainage pipes that have already been installed.

### Call centre

In 2021, PVK's customer service line handled 82,534 customers with a 91.42% service level. Enquiries tended to centre on drinking water supply. Customer service line operators also respond to

customers' emails. During 2021, they handled 54,620 customer emails and sent 21,463 text messages. Besides dealing with customers' calls and emails, operators also help to promote service provision, register customers for the SMS INFO service, and offer email billing, insurance to cover emergency situations, the activation of the customer portal and Moje voda mobile app, and other services.

The PVK call centre's organisation is in the hands of Solutions and Services, a.s. (the provider of ICT services within Veolia Group).

	2021	2017	2018	2019	2020
Number of calls handled	82,534	91,967	91,543	90,300	84,012
Service level	91.42%	93.7%	95.1%	91.4%	93.04%
Number of customer emails handled	54,620	43,458	40,873	47,846	52,443

### Customer Service Centre

The Customer Service Centre in Dykova Street, in the Vinohrady district of Prague, was closed to the public from January to April 2021 in order to safeguard the health of customers and employees.

Starting on 3 May, customers were able to visit the centre by prior appointment. On 1 June, the Customer Service Centre was reopened without restrictions, but from 6 December, with the epidemic situation worsening again, operations were once more restricted and visits were only possible by prior arrangement.

In 2021, 7,293 customers visited the Customer Service Centre to deal with all things contractual. Overall, 877 customers made use of the booking system and reserved an appointment in advance. At the centre, customers can pay water and sewage bills and for water analyses, hydrants, etc., over the counter. 1,383 payments amounting to approximately CZK 8.86 million were made in this way.

### Complaints and claims

In 2021, the categories of complaints and claims were revised and subsequently adjusted so that they would better match the definitions of complaints and claims set out in the Claims Procedure and the PVK CEO's directive. Since 2021, the PVK has whittled down the original ten categories of complaints to just three categories (types) of complaints and the original eight categories of claims to nine categories (types) of claims. It is therefore statistically impossible to compare the numbers in each category of complaints or claims in 2021 with previous years; the only possible comparison concerns the total number of complaints and claims.

#### **Total number of submissions (sum of claims and complaints):**

2018: 876

2019: 946

2020: 775

2021: 812



In 2021, PVK received 55 complaints, of which 16%, i.e. 9 cases, were found to be justified (in 2020, 17% of the total number of complaints received were considered to be justified).

Including repeat cases, 757 claims, broken down by the main subject of the claim into nine categories, were processed in 2021. Of that total, 32%, or 242 cases, were legitimate claims (compared to 36% legitimate claims in 2020). The highest number of claims was in the billing and water meter category.

### **Home assistance and refunds in case of water leaks – for contract customers**

Since 2015, PVK has made insurance cover available to its contract customers for emergencies related to leaks downstream of the water meter. This service, provided by UNITED ASSISTANCE, a.s., is free of charge to customers.

The assistance service is on hand round the clock. In an emergency, the assistance service crew visits the customer and carries out two hours' technical work. Customers do not pay for the call-out or essential work. PVK customers are entitled to make use of the assistance service three times a year per supply point free of charge. Customers can call the assistance service on 212 812 212.

In 2021, 4,440 PVK customers called this line. On-the-spot assistance was required in 487 cases, with all costs covered by UNITED ASSISTANCE, a.s. The most common emergency was a ruptured riser or a pipe directly downstream of the water meter.

### **Theft – illegal connections**

PVK is strongly committed to investigating water theft and illegal wastewater connections. In 2021, PVK staff proved water was being stolen in 113 out of the 160 cases investigated. The most common causes were meter tampering (81%), non-metered taps upstream of the water meter (8%), and unregistered supply pipes (8%).

In wastewater production, 165 of the 178 cases investigated were proven to be illegal. In 93% of these cases, the drainage pipe had not been registered or the wastewater was channelled directly into an inspection shaft.

PVK billed over CZK 3.3 million for water theft and for illegally discharged wastewater. The total amount includes the cost of the investigation, the damage caused, and penalties.

PVK identifies potential water theft by running checks on offtake points in its own database. If an existing water charging contract does not include a provision on the disposal of wastewater or stormwater down a public sewer, the property is inspected. PVK also checks structures that are not in its database (because they have their own wells) for connections to the public sewerage system. PVK employees may only enter private buildings in the presence of the owner. Where necessary, PVK seeks the assistance of the competent local authority (the state building supervisory body). PVK also draws on camera surveys and special operations to investigate the situation surrounding wastewater discharges.

### **Customer communications**

During the year, PVK published numerous informative materials for customers and the general public. *Voda pro Vás* ("Water for You"), a customer magazine, was published three times. It was included as an insert with the main daily newspapers and also distributed directly to people's letterboxes. PVK's services were also promoted in the form of PR campaigns in daily newspapers, via advertising, and in regular communication with the media. The Company's website was an important

means of communicating information, and was visited on average by more than 70,000 users every month.

## 10 RESPONSIBILITY

The worsening COVID-19 epidemic made 2021 another entirely different and challenging year, particularly in terms of staffing and personnel. PVK once again showed itself to be a stable and responsible company that creates above-standard conditions for its employees and provides them with staunch support as they strive to cope with crisis situations.

All levels of the organisational structure banded together so that services could be provided to customers even in the severest months of the epidemiological measures in the winter and spring. The Company shouldered the costs associated with the need for isolation, quarantine and childcare so that employees would not lose income. It made the most of work-from-home opportunities and rotating operations teams that worked in “bubbles”.

Nor did open social dialogue and cooperation with the trade union let up. We met our commitments under the collective agreement and even managed to enter into a collective agreement for 2022 reflecting the higher-level Collective Agreement with the DLV trade union that had been adopted for Veolia in the Czech Republic Group.

### Our employees

At the end of 2021, PVK had 1,141 employees. The average full-time equivalent number of employees in 2021 was 1,133. During the year, 78 employees left and 83 joined. Turnover therefore stood at 6.9%, 1.5% less than in the previous year. The total number of employees increased by five year on year. This increase was prompted in particular by the reopening of the water treatment plant in Podolí and a rise in the number of laboratory staff to handle the introduction of a new analytical method based on determining the content of SARS.CoV-2 virus in wastewater.

Of the total number of employees, 850 (74%) were men and 291 (26%) were women. The Company employed 21 part-timers (1.8%), 96 temporary staff (8.4%), 17 persons with disabilities (1.5%), and 65 members of staff who had reached retirement age (5.7%). The average employee age was 46, the same as in the previous year.

The 5% average wage rise in 2021 was above the inflation rate, which was reported at approximately 3%. This growth more than meets the long-term commitment to increase real wages, which are now almost 130% of the average wage in the national economy. There were 26,656 hours of overtime, averaging 23 hours per employee per year.

### Employee benefits

In 2021, PVK spent CZK 38 million, i.e. 5% of total personnel costs, on social expenditure for employees. Of this amount, CZK 1.5 million was spent on the trade union organisation’s activities, CZK 0.5 million was spent on sport and cultural events, and CZK 1 million was channelled into personal and work anniversaries. CZK 0.1 million was spent on social assistance and CZK 1.7 million was granted to employees as housing loans.

Personal pension plans and life assurance are an important part of employee benefits and are used by 80% of staff. The Company contributed almost CZK 13 million overall to these particular benefits.

Employees were able to draw on a number of other benefits, such as the employer's meal allowance of CZK 78 per voucher (provided as a meal card), and the extension of the cheaper employee mobile phone rate to family members. Employees enjoy extended annual leave of six weeks.

### **Employee training**

One of the Company's priorities is to improve the skills and training of its employees. A systematic approach to education brings a number of advantages and enhances employees' motivation and stability. 23% of the Company's employees hold a university degree, 40% have full secondary education, and 31% have a vocational qualification. The cost of continuing staff training totalled CZK 6 million in 2021.

PVK spent the largest share, 78%, of these expenses on increasing professional qualifications; 17% was spent on mandatory training and training for special professions, and 5% was spent on improving employees' language proficiency.

The training of employees of PVK and other Veolia in the Czech Republic Group companies is mainly provided by the Group's company, Institut environmentálních služeb, a.s. (IES), which offers wide-ranging courses and training programmes.

Staff training was affected by the epidemic. In the first half of the year, training exclusively took the form of webinars and online courses. Training that was legally required but could not be conducted online was suspended during the state of emergency. Once the state of emergency was lifted, employees progressively underwent all the mandatory training required for the performance of their work.

### **Occupational safety**

Occupational safety is one of the strategic elements established internationally for the entire Veolia Group, including PVK. Veolia Group is committed to guaranteeing a healthy and safe working environment. The OHS ground rules contained in the Labour Code, applicable legislation and other regulations on OHS are also conveyed by the internal Code of Occupational Safety. Above and beyond their mandatory training, all employees take a hands-on first-aid course once every two years. In 2021, first-aid training was delivered via webinar to senior staff and specialists.

Since January 2007, the Company has held an occupational health and safety management system certificate. In November 2021, the Company successfully retained all certificates for its integrated management system, including ČSN ISO 45001, as part of its regular audit.

Long-term OHS targets are to drive down accidents at work to a minimum and eliminate fatalities altogether. The prevention policy has helped to reduce the number of accidents at work.

In 2021, there were no work-related injuries at PVK requiring more than three calendar days of incapacity. This pushed the accident frequency indicator down by 0.27 points to zero, the lowest level in 15 years. Every September, PVK participates in the International Health and Safety at Work Week. The main motto for 2021 was "A Step to Safety", with the focus once again on raising risky behaviour awareness.

### **Occupational medicine services**

As with training, routine occupational health care was suspended for the duration of the state of emergency. Following the end of the state of emergency, there were three months during which all

medical examinations and tests had to be compulsorily undertaken. The doctors from SALUBRA s.r.o. even worked through the summer months to get the examinations done.

In 2021, the staff sickness rate was maintained at 3.5%. The COVID situation would definitely have made the actual sickness rate higher, but because PVK had taken the precaution of allowing staff to work from home and take turns in coming to the office, there was no need for them to request sick leave in order to quarantine. The low sickness rate was also helped by the fact that PVK arranges for employees to undergo periodic medical examinations beyond the scope of mandatory checks. In cooperation with SALUBRA, medical examinations were arranged for employees, including the vaccinations set out in the collective agreement and other statutory examinations. A general practice at the Hostivař complex serves employees and their family members. Work performance was regularly surveilled in workplaces to identify and assess risk factors. In the autumn of 2021, 150 PVK employees took up the traditional offer of a flu vaccination.

As part of preventive occupational medicine care, each employee received Benu pharmacy vouchers worth CZK 2,000 for health-promoting products, in particular vitamins and vitamin supplements, vaccinations, etc.

### COVID-19

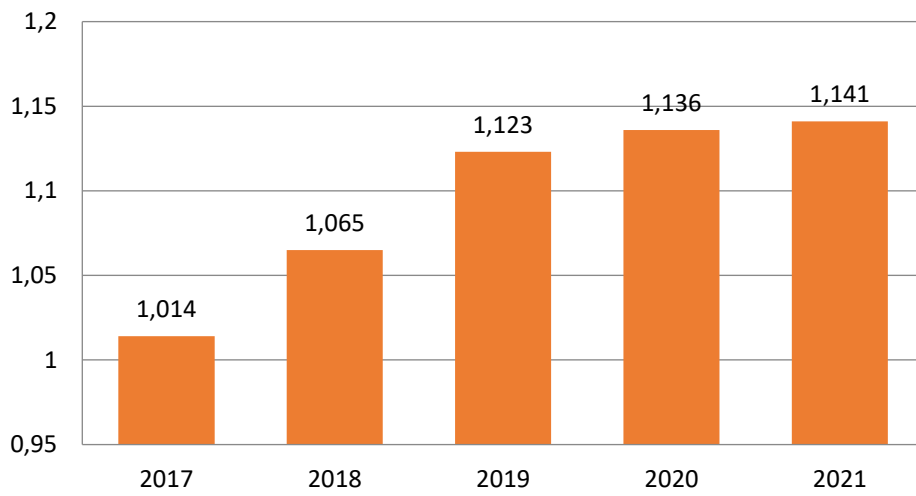
Ever since anti-epidemiological measures were announced, PVK made sure that employees were provided with all the protective equipment they needed in sufficient quantities. In the spring, staff were ordered to undergo mandatory antigen testing in order to contain the spread of the virus. Testing was carried out in two ways. The first was with the assistance of SALUBRA doctors and the second involved self-testing. Mobile testing teams were set up so that PVK employees could be tested in their own workplaces. Doctors conducted tests not only at the outpatient clinic in Hostivař, but also at the Customer Service Centre in Dykova Street and at the CWWTP. From March to June, 2,600 tests were carried out.

The priority vaccination of employees assigned to roles within critical infrastructure was launched in April in partnership with Thomayer University Hospital. These staff received their second shot in June. Altogether, nearly 600 employees were vaccinated at this hospital.

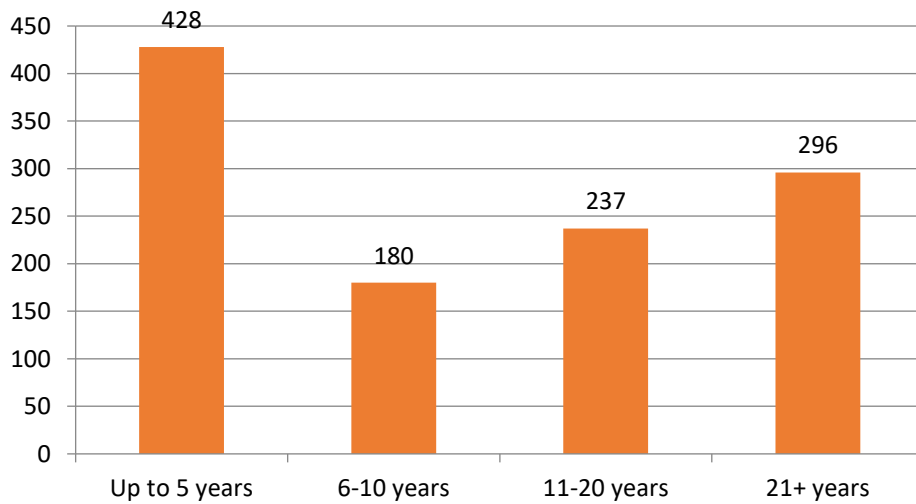
SALUBRA provided further vaccinations for PVK employees, primarily at the outpatient clinic in Hostivař. The first jabs (38 doses) were administered at right at the beginning of spring 2021. In the next wave of inoculation in November, 382 members of staff were vaccinated, mainly with the third booster shot. By the end of 2021, the Company had managed to achieve a high uptake of vaccination against COVID-19. At the end of the year, 939 employees (82%) had completed their vaccinations and 455 employees (40%) had received a booster jab.

As a thank you to employees for their responsible approach to vaccination, PVK started distributing medical vouchers to employees for each new vaccination shot in autumn 2021.

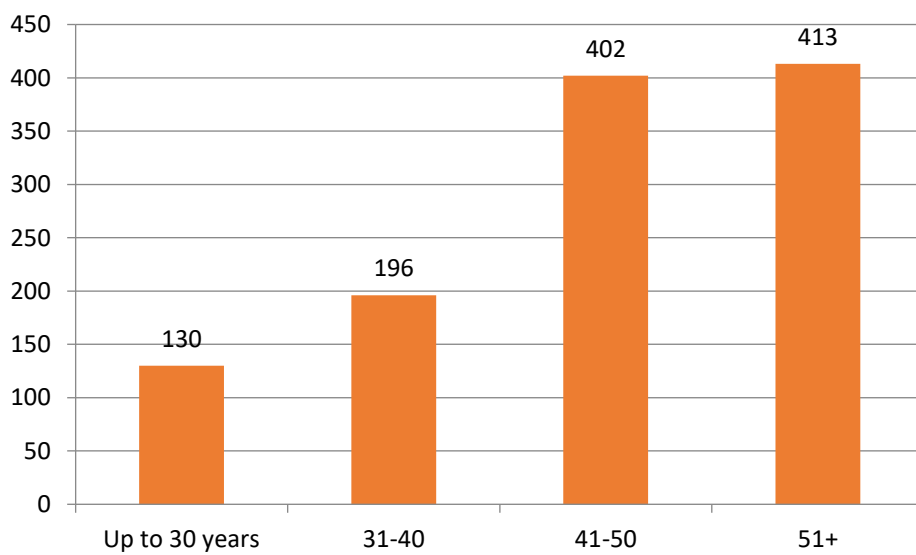
### Number of employees by year



### Employee structure by length of service

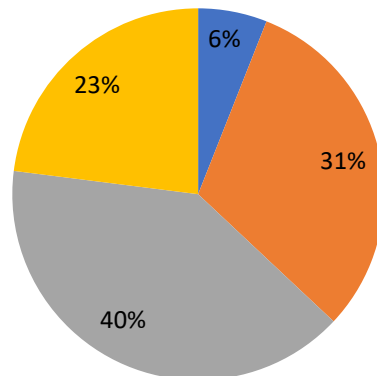


### Employee structure by age



## Employment structure by level of education

■ Lower secondary ■ Apprenticeship ■ Upper secondary ■ Higher education



## INTERNAL COMMUNICATIONS

PVK recognises that if it communicates with employees properly, this will increase their loyalty, motivation, and overall satisfaction. Management uses a varied toolkit to ensure that there is a two-way line of understanding and that everyone is kept up to date. The main channels of communication were: meetings at all management levels, the intranet, emails, magazines, and internal training programmes, although anti-epidemiological measures forced most of these online in the first half of the year so that they would be “contactless”. The intranet, emails, online meetings, briefings, and Group videoconferences were of particular importance.

In 2021, the intranet was overhauled by converting it to the next-generation SharePoint Server 2019. This version, enjoying a high level of availability, was guaranteed to work at optimal efficiency for up to several hundred simultaneous users. What has simplified the use of this intranet set-up is that documents can be viewed and edited directly in the browser. The intranet graphics have also been replaced by a new modern version. All technical, operational, economic and other data was periodically updated throughout the year.

The in-house magazine *Pévékáčko* (“PVK”) is a popular vehicle for communication. Reporting on important news and interesting facts at the Company, it was published six times over the course of the year. The *Naše Veolia* and *Planeta* magazines shed light on the latest news within Veolia Group.

In the second half of the year, the Company held an in-house photo competition for employees, in which they were invited to convey the essence of their work for PVK in a photograph. Staff entered dozens of stunning photographs into the competition, many of which featured solid teamwork in the performance of their work duties.

Another of the effects of the anti-epidemiological safeguards was that there were far fewer of the informal get-togethers that help to promote teamwork. Employees took part in the Vodohospodářská 50 (“Water 50”) sports event, but in the autumn there was only one meeting between staff and management.

Voice of Resourcers 2021, a wide-ranging internal satisfaction survey organised by Veolia Group, was conducted from 2 to 19 November 2021. Some 956 (88%) of PVK staff took part in the survey. Ipsos polled employees for their opinions.

Results of key indicators:

% agreement in 2021

My work targets are clearly defined	95%
I find my work meaningful	96%
I am satisfied with the working atmosphere at my department/facility	90%
I am proud to work for a Veolia company	88%
I am satisfied with my work-life balance	91%
I feel sufficiently appreciated and rewarded for my work	69%
We respect and stand in solidarity with each other at our facility/department	92%
There is a good level of cooperation at my department/facility	94%

#### CORPORATE SOCIAL RESPONSIBILITY AND ENVIRONMENTAL PROTECTION

PVK is a company that benefits society through its operations. One of the Company's core activities, wastewater treatment, makes a major contribution to the environment. However, PVK's operations are not merely geared towards the production of drinking water and wastewater collection and treatment. In its activities, it also strives to benefit the inhabitants of Prague and the environment and to achieve a sustainable future for everyone.

#### SPONSORSHIP AND PATRONAGE

As a socially responsible company, PVK regularly contributes to various socially beneficial, educational and environmental projects.

In 2021, PVK sponsored numerous projects organised by Prague City Hall and individual city boroughs. These included the traditional Primátorky rowing race, the Water is Life awareness-raising event, Sciencefest, Farewell to Summer in Prague 6, and Midsummer Festival. The Company also contributed to the running of outdoor ice rinks in Prague 1 and 10. In addition, PVK partnered with important cultural events and exhibitions, such as the Ivan Exner Exhibition in the Belvedere, the exhibition to celebrate the 600th anniversary of Strahov Monastery, Comic-Con Prague, and the Prague Underground photographic exhibition in the Vrtba Garden. The Company is also a partner of the Želivka Water House, which it uses, among other things, for its educational events. As for socially beneficial projects, PVK has contributed, for example, to the handicapped at Asistence, Deaf with Hope, Dolní Počernice Children's Home, and Tapatan, which runs a children's reading room.

#### EDUCATIONAL PROGRAMMES AND AWARENESS RAISING

Since 2000, PVK has been running educational programmes for primary school children that guide them towards environmental protection. It works closely with Prague's primary, secondary and nursery schools on a wide range of educational competitions and events. In 2021, in cooperation with the non-profit organisation Recyklohraní, it held a competition targeting water consumption for preschoolers, schoolchildren and young people in secondary school. The children learnt that their water use was by no means confined to drinking, cooking and washing, but that there was also such

a thing as a “water footprint”, i.e. water that has to be consumed to make the food, clothing, technology and other products or services that we use in our everyday lives. The exercise involved 247 nursery, primary and secondary schools and over 4,000 students. An accompanying instructional video was prepared to help the children to handle the assignment and the information comfortably, even at a time when many schools were alternating between in-person and distance learning.

PVK also helped to prepare a teaching guide called “ECO ALPHABET – Let’s be Water Friendly!”, which aims to arm teachers with information on water conservation in the context of limited natural water resources. It takes a closer look at the water cycle, water conservation in the home and at school, and what does and does not belong in wastewater. The guide comes with an appendix consisting of scenarios for different age categories (nursery school, both tiers of primary school, and secondary school). These offer practical exercises and experiments that will help pupils and students to understand and remember the information more easily.

The Water Guards Club (*Klub vodních strážců*), which introduces children aged 6 to 15 to water and the environment in a fun way, was also successful despite being restricted in some of its activities. PVK founded the club more than 20 years ago. During the year, club members received two issues of the club magazine. The spring event was replaced by a photo contest, but the autumn event did go ahead at Lake Katlov, where the children fished with celebrity angler Jakub Vágner.

The club’s website at [www.vodnistrazci.cz](http://www.vodnistrazci.cz) was expanded considerably, with its graphic and content changes attracting a lot of traffic.

When the epidemiological situation allowed, PVK organised educational lectures on the water management process for primary schools. The programme for the first tier of primary schools was limited to June-October. In the circumstances, only one guided tour of a wastewater treatment plant was possible for pupils. More than 30 lectures combined with water experiments were held.

Other educational events for the general public that have become traditional over the years and that used to be held under the auspices of the City of Prague were cancelled, except for September, when three such events took place. The most popular event was Sciencefest, where PVK engineers presented their work and engaged in lively discussions with curious visitors.

#### PRAGUE WATERWORKS MUSEUM

The history of the water industry is on show to the public when they visit the Prague Waterworks Museum in Podolí Waterworks. Because of the COVID-19 pandemic and the government regulation designed to limit the spread of the coronavirus, the museum was closed from January until May, and the traditional open days marking World Water Day were cancelled. The museum was re-opened over the time that the restrictions were eased from June to end of 2021. The museum was visited by 1,874 people in 2021, up 1,117 on 2020. The Open Day was reinstated, but there was a change compared to previous years, with tours limited to a single day, by prior registration and for a maximum of 35 visitors. Even so, 280 people turned up. In 2021, the museum was again involved in the “Experiential Tourism” project, which attracted 480 people.

#### CONSERVATION OF BIODIVERSITY AT PVK COMPLEXES

At PVK, has long placed an emphasis on doing business in a way that minimises the impact on biodiversity. In tandem with this, it strives to promote biodiversity in the landscape by engaging in wide-ranging activities. This is reflected in the fact that, since 2011, it has been working on the principles that underpin broader species diversity with the Czech Union for Nature Conservation. It focuses on monitoring and assessing the impact that activities have on local ecosystems and on



implementing measures to preserve biodiversity and support ecosystems. The main ambition is to create – using simple procedures – urban biodiversity hotspots that come close to invaluable natural habitats. The grassland maintenance methodology developed in 2020 was extended to other sites in 2021 (the New Water Line, Modřany North II), the number of beehives was expanded to 26 (Havlín, Andělky, Modřany North II, Lhotka, Flora, and Vypich), and tree planting continued, with self-produced compost used as a substrate.

## MISTING

The joint PVK/PVS misting project is a response to Prague's changing climate, manifested by the increasing average daily temperature, the urban heat island effect and heat waves. Under the project, 25 misting systems have been installed in Prague that artificially produce tiny water droplets which evaporate before they can reach any surface, thus cooling the air. The outdoor misters, designed to look like bent straws, consume about 18 litres of water per hour. They draw on drinking water directly from the water mains.

## PVK IS A "RESPONSIBLE COMPANY"

PVK consistently involves itself in activities related to sustainability and social responsibility. For example, continuing on from the Enough Plastic Already project from previous years, it introduced the use of returnable lunch boxes delivered from the canteen of one branch to another. Selected establishments (depending on the number of employees) are supplied with containers for sorting biodegradable waste, metals, and Tetra Pak packaging. This has expanded waste sorting opportunities. In addition, vermicomposters have been set up at 4 sites to recover biodegradable waste. These are looked after by employees themselves.

In 2021, the PVK VISION educational project was implemented to provide a comprehensive overview of all activities undertaken by PVK in five core areas – the planet, employees, society, customers, and shareholders. The new [www.vize.pvk.cz](http://www.vize.pvk.cz) site informs visitors what environmental and social activities we have been carrying out in those areas. To promote the project, PVK held an employee photo competition called "Purpose", aimed at showing that all staff are part of one big well-functioning company and that every single activity is important if the Company is to be run smoothly. In their photographs, employees portrayed how they view the purpose of their work at PVK. Nearly 100 members of staff took part, some in larger collaborative teams. The competition clearly showed that all our Company's activities are meaningful both in their details and in their totality.

## WASTE GENERATION

In 2021, PVK generated 175,500 tonnes of waste, 47% of which was sludge from municipal wastewater treatment, 42% was construction waste from repairs and incidents on the Prague water supply network, and only about 0.01% was hazardous waste. The share of hazardous waste at the Company has long been negligible. In 2021, PVK produced 83,000 tonnes of construction waste, which was passed on to contractual partners for reuse. Of this amount, 99% was processed at recycling facilities and 1% was used for site remediation. Sludge from municipal wastewater treatment is used on farmland in compliance with all the principles and requirements of applicable legislation. Treated sludge is a resource rich in organic matter, essential nutrients and trace elements for depleted soil in the Czech Republic. Spreading sewage sludge on agricultural land improves its fertility. For cooperating farmers, this sludge plugs the gaps left by lower quantities of farmyard manure from livestock production, while reducing the need for artificial fertiliser. In 2021, PVK worked with 28 agricultural holdings in three regions (the City of Prague, Central Bohemia, and Ústí nad Labem) and nine districts (Louny, Litoměřice, Mělník, Kladno, Beroun, Praha-východ, Praha-

západ, Kolín, and the City of Prague), and with several composting plants. Treatment plants produced 83,300 tonnes of sludge, of which 86% was applied to farmland and 14% was processed by composting plants (in Praha-východ and Kutná Hora).

#### WASTE RECOVERY

PVK operate facilities for the processing of selected types of biodegradable waste. The Company offers the disposal or materials recovery of this waste and, in doing so, contributes to the circular economy. In 2021, the CWWTP processed almost 14,000 tonnes of biodegradable waste. Of this amount, the CWWTP found itself in receipt of 7,500 tonnes of grease which would otherwise have been discharged into the Prague sewer network. PVK also offered a mobile collection service that removed 755 tonnes of greasy waste from the grease traps of catering and restaurant establishments.

#### CARBON FOOTPRINT

PVK has a long-standing commitment to social responsibility and was one of the first major water companies to determine its carbon footprint. The Company first assessed its carbon footprint in 2010.

Since then, numerous projects have been carried out with the primary aim of saving and efficiently using electricity and heat, optimising chemicals and fuel consumption, and seeking new sources of energy from renewables. All these activities are gradually reducing the Company's carbon footprint.

PVK's overall carbon footprint for 2021 was some 37,280 tonnes of CO<sub>2</sub> eq.

However, PVK is going even further and has launched the ZERO CARBON 2035 project in cooperation with the owner of the water infrastructure, PVS. This ambitious plan envisions the attainment of carbon neutrality by 2035.

The most important step in the process of preparing for carbon neutrality is to fine-tune the calculation of the Company's existing carbon footprint, analyse it thoroughly, and define the core areas where CO<sub>2</sub> and other greenhouse gas emissions will be eliminated or offset.

The determination of PVK's CO<sub>2</sub> emissions will be standardised according to relevant standards (the GHG Protocol, ISO 14064) and then certified.

Projects that have led or will soon lead to a carbon footprint reduction include:

- the replacement of the fleet with CNG-fuelled vehicles (where technically feasible)
- the use of heat pumps on water mains to produce heat and cold
- the reuse of wastewater heat
- the recovery of waste heat from blower house operations
- the installation of new energy sources – photovoltaics
- biomethane production
- the priority procurement of products and services with a lower carbon footprint

#### COOPERATION WITH THE VEOLIA FOUNDATION

Pražské vodovody a kanalizace has been working with the Veolia Foundation since its inception. Every year, it makes financial contributions to projects implemented in Prague for PVK employees. The Veolia Foundation's main programmes benefiting from PVK's support are:

MiNiGRANTS®

Veolia Group employees are eager volunteers. Once a year, all employees may apply for funds in support of a good cause for which they volunteer in their free time. Between 2008 and 2021, the Veolia Foundation donated more than CZK 44 million. The fourteenth year of the scheme yielded support of more than CZK 4 million for 137 projects. In 2021, 29 PVK employees were awarded CZK 828,800 for their projects.

The Veolia Foundation responded flexibly to the 2021 state of emergency by adapting most of its programmes to immediate needs. Under the MiNiGRANTS scheme, the Foundation steered away from the traditional project focus and helped non-profit organisations to cover their running costs instead.

#### Let's Return Water to Nature

The Veolia Foundation is helping to restore wetlands. The Let's Return Water to Nature (Vraťme vodu přírodě) project focuses on wetlands because these play a crucial role in retaining water in the landscape. Here, the Foundation works with the Czech Union for Nature Conservation, providing it with funds to purchase land for the restoration of these valuable natural sites. The project can be supported by buying items from the Veolia Foundation's e-shop. Since the project launched in November 2018, the Veolia Foundation has donated more than CZK 3.2 million to this cause.

#### Keep Smiling – Active All Life Long

This programme gives seniors the opportunity to be involved in the community and have fun. It advocates positive and active ageing, intergenerational coexistence within the community, the fostering of conditions for the elderly to live in their home environment, and new approaches to ageing. In the six years of the programme, the Veolia Foundation has supported 124 projects with almost CZK 11 million.

In Prague, the project supports Domov Sue Ryder (Sue Ryder Home) and its training programme for health and social care professionals looking after medically frail seniors in residential care and for students of related disciplines.

## 11 INNOVATION

The production and distribution of drinking water and the drainage and treatment of wastewater are being constantly improved by PVK to make them as reliable and efficient as possible. PVK invests in the development of smart technologies that enable it to reduce the environmental burden caused by its own activities and, in doing so, save costs for its customers.

### **Water Quality Map**

A change has been made in how information on drinking water quality is relayed to consumers. PVK staff have introduced a "Water Quality Map", available at [www.pvk.cz](http://www.pvk.cz), as part of normal operating practices. Distribution network engineers make active use of the online Water Quality Map, hosted on PVK's website, when communicating with consumers, dealing with complaints and fielding various water quality enquiries. Since the Water Quality Map was introduced, there has been a fall in the number of water quality statements issued and enquiries made about the quality of the drinking water supplied.

### **GAC at Podolí Waterworks**

PVK employees were actively involved in restoring the operation of the Podolí water treatment plant to the Prague distribution network in June 2021. The recommissioning of the plant was preceded by the completion of the investment project “Supplementation of Technology, Upgrade and Reconstruction of the Water Treatment Plant Process Line”. This included the addition of GAC filters and UV radiation to the existing treatment technology. In 2021, other major investment projects were completed at the water treatment plant concerning the renovation of the automatic control system and data network at the Podoli water treatment plant, the replacement of control valves throughout the old filtration hall (pneumatics), the replacement of washing pumps and blowers, the addition of UV radiation to the technology, the overhaul of the treated water pumping station, etc.

### **KemConnect SD – Optimisation of Mechanical Sludge Dewatering at the Prague CWWTP**

In 2021, the “Optimisation of Mechanical Sludge Dewatering at the Prague CWWTP” project, using a KemConnect SD unit from KEMIRA, was launched. The entire project is broken down into several sequential stages aimed at continuously regulating the flocculant dosage and centrifuge settings based on measurements of the quality of the rising sludge and the quality of the fugate (sludge water). This solution should have the added benefit of reducing the cost of flocculant and the disposal of dewatered sludge.

During the past year, a device for measuring suspended solids in the fugate on one centrifuge was installed and successfully tested. The online measurements can be used to detect deteriorating fugate conditions early and modify the dewatering process. Any deterioration in the quality of the fugate has an adverse impact on the wastewater treatment plant. It puts a strain on the biological stage of treatment and ultimately affects the quality of the outflow. Until now, it has only been possible to check the quality of the fugate by having the operator visually inspect it or by laboratory analysis.

### **Grant projects**

In 2021, PVK followed up on the successful implementation of grant projects from previous years. One new project focusing on mathematical modelling and the creation of a dynamic model of drinking water distribution was successfully launched. The topics of the projects now being implemented focus primarily on the development and testing of technologies in the fields of water management and environmental protection. In 2020, against the backdrop of the COVID-19 pandemic, one of the projects had been expanded to include the long-term monitoring of the presence of SARS-CoV-2 – the causative agent of COVID-19 – in wastewater. PVK further developed this issue in 2021, sampling wastewater from various sites at regular intervals (twice a week to once every 14 days), and sampling the influent at the Prague CWWTP and selected schools, homes for the elderly, and halls of residence. While the results of wastewater sampling over a larger area are excellent predictors of the next wave of the pandemic, the building-specific results target the adoption of specific hygiene measures.

Consequently, PVK employees handled six grant projects from three grant providers: the Technology Agency of the Czech Republic, the Ministry of Industry and Trade of the Czech Republic, and the Ministry of the Interior of the Czech Republic. Two projects were successfully completed in mid-2021, and their results will be deployed in practice.

### **Satellite imagery**

Last year, PVK continued its satellite imaging of the water supply network. This time, the focus was on the left bank of the Vltava River. Here, 1,000 kilometres of the network were checked and 207

sites potentially concealing drinking water leaks were detected by satellite. Investigators subsequently confirmed fifty leaks.

PVK deploys technology developed by the Israeli company Utilis, which uses equipment that is based on the principle of a synthetic-aperture radar (SAR) and is attached to a satellite of the Japanese space agency JAXA. The satellite sensor picks up transmitted radar pulses that can distinguish the type of leak, i.e. whether it involves surface water, wastewater or drinking water. The system is operational in all weather conditions and the radar echoes penetrate up to three metres, depending on the type of surface. It takes several days to assess the images.

### **PVK as part of Prague's AI ecosystem**

PVK is involved in the activities of the Prague Innovation Platform (IP) for the exploitation of artificial intelligence (AI), which is overseen by the Prague Innovation Institute.

Prague City Hall has identified AI advancement as one of the pillars of the innovation strategy pursued by the City of Prague, which is currently preparing a grant scheme to support innovation and entrepreneurship in 2022-2025. The aim is to arrange cooperation, expertise, feedback and suggestions from representatives of educational and research institutions, industry, and the public sphere so that the existing activities and capacities of Prague's AI ecosystem can be leveraged and the allocated resources can be spent effectively to develop Prague as a smart city.

PVK is preparing a pilot project that will test the feasibility of effectively using an interactive conversational application. This could significantly streamline and simplify customer services (e.g. information about breakdowns and shutdowns based on a given address).

### **New leak detection technology – SmartBall**

PVK is intensifying its search for hidden leaks in the drinking water network with the help of another modern technology – this time, Xylem's SmartBall technology.

A leak inside a pressure pipe produces a specific acoustic signal. As the SmartBall device approaches the leak, the acoustic signal detected by SmartBall technology increases in intensity. The acoustic signal is at its strongest harmonically at the immediate point of leakage, then decreases proportionally as the SmartBall moves away. In 2021, PVK used this technology to inspect two cast-iron water mains (DN 450 and DN 550) from 1925 between the Bruska and Andělky water reservoirs in the Dejvice district of Prague.

### **Faster and more precise water quality overview**

Two new modern water analysis methods were introduced at PVK's accredited laboratory. They are faster and more accurate, improve control over the process of producing and distributing drinking water, and expand the opportunities for analysing water samples.

#### Polymerase chain reaction (PCR) method

This is a method for the detection of bacteria or viruses that involves the rapid amplification of a selected section of the DNA of the target microorganism. It is a very sensitive method that theoretically enables a single copy of the DNA of the target microorganism to be detected in a sample. This method is now commonly used in medical and pharmaceutical laboratories, but for water laboratories it is a novelty being applied to modern water quality control procedures.

Existing microbiological methods use standard culture-based methods in the processing of samples and the results of these analyses are usually known a few days after sample collection (typically

between one and three days). PCR methods deliver results within hours. In particular, they can rapidly detect the contamination of drinking water after interventions in the water supply network and after incidents. By quickly and accurately detecting E.coli bacteria, we can determine whether drinking water has been contaminated.

This method is very useful for the detection of Legionella bacteria, which are a problem especially in hot water. Again, the main reason why this method is so beneficial is that it enables the microorganism detection time to be reduced from days to a few hours.

#### Liquid chromatography – mass spectrometry (LC-MS) method

This method draws on the principles of liquid chromatography coupled with mass spectrometry (LC-MS) to detect high-risk water contaminants.

A liquid chromatograph and mass spectrometer are used to separate individual substances from a mixture, and to detect and confirm the identity of molecules with high specificity and sensitivity. This is a modern analytical method used to detect contaminants present in water at very low concentrations of several ng/l. This method can detect a wide range of substances, such as pesticides and their metabolites, pharmaceuticals, hormones, and industrial substances that contaminate water and other components of the environment.

LC and MS are often used together because liquid chromatography can separate complex mixtures of natural and other substances (such as the pesticides and pharmaceuticals mentioned above) that are to be quantified in the analysis of water samples. These water contaminants need to be monitored throughout the drinking water treatment and distribution process in order to assess the quality of the water for treatment and the various technological elements of water treatment, as well as to propose, where appropriate, the inclusion of new technologies so that the PVK is able to deliver high quality water to consumers.

#### **Opinion portal – a joint PVK/PVS project**

In January 2021, PVK went live with the opinion portal. This portal makes it possible to submit requests for opinions on design documentation or on activities related to existing water and sewerage connections electronically. The opinion portal's chief benefit is that it speeds up the issuance of PVK and PVS opinions. Instead of having to approach each of the companies separately, applicants can now submit a single application from the comfort of their own home and have it processed simultaneously by both companies. All communication with the applicant takes place under a single reference number via an email address and a form, so is no need to register new applications if design documentation has been submitted incorrectly.

In 2021, 16,159 applications were submitted via the opinion portal.

#### **Renovation of facilities**

##### **Pumping stations and drinking water reservoirs**

The reconstruction of the 2 x 6,000 m<sup>3</sup> water reservoir at Kozinec was completed and the entire complex's mechanical and electronic security system was overhauled.

At the Kopanina pumping station and reservoir, Chamber 5 was reconditioned and the roof of the new reservoir was rebuilt.

At the Jesenice II reservoir, the two storage chambers were completely reconditioned.

Backup power sources were installed at the Strážovská and Děvín pumping stations to cover any long-term power outages. At the Strážovská pumping station, the power source can cope with full-scale pumping into the Kopanina water reservoir. The power source at the Děvín pumping station can be used to cover the electricity requirements of the radio transmission systems operated by PVK and the security of the facility.

Battery backup power supply units were installed at the Andělky, Vyhličky, Ládví II and Ládví III reservoirs to cover telemetry data transmissions and to secure the facilities in the event of a long-term power outage.

### **Branch wastewater treatment plants**

A new higher-capacity coagulant tank for the chemical precipitation of phosphorus was installed at the Vinoř wastewater treatment plant.

### **Wastewater pumping stations**

The Přátelství wastewater pumping station was renovated. This involved the complete replacement of mechanical and electrical technology. The pumps at the Dubinská, K Podchodu, K Dálnici, Středohorská, and Hodějovská wastewater pumping stations were reconditioned.

### **GPS in tanks facilitates faster water refilling**

Tank trailers designed to provide replacement drinking water are fitted with GPS technology, which also measures the quantity of drinking water left. When the water level drops below a certain point, the trailer can transmit information about the need for the water to be refilled.

### **Waste water and irrigation**

In mid-2021, in cooperation with Pražská vodohospodářská společnost, the University of Chemistry and Technology, and the Czech Technical University, we started running research at the Central Wastewater Treatment Plant into the implications of reusing treated wastewater for the irrigation of urban greenery.

The aim of the project is to determine how recycled wastewater benefits plants and whether it could possibly be used for the irrigation of urban parks. Besides the ecological aspects, the economics of recycling and transporting the water to the point of use are also taken into account. The project is part of a broader international collaboration that also involves researchers from Italy, the Netherlands and Ghana. As part of the project, the researchers are assessing the effects on the common vegetation most typically found in urban parks – grass, flowering plants and ornamental trees.

### **Development of IT technologies**

In 2021, work continued on the intensive development of the IT technologies used by PVK with a view to simplifying data processing, making the work of PVK employees easier, and optimising and accelerating processes at the Company. Much emphasis was placed on increasing employee mobility through both the standard use of laptops and the further development of Android mobile apps.

Cooperation with Solutions and Services, a.s., which provides most of the information technology services for PVK, continued and advanced. A new version of the Company's intranet was launched on Microsoft SharePoint, which offers better data sharing and uses modern means to display content.

Joint IT projects with PVS were completed, mainly in the context of the Helios Green technical system and GIS. The new joint opinion portal (for receiving requests for opinions on design documentation etc.) was launched.

A separate area of development in 2021 was cybersecurity. New security solutions were deployed and new processes improving IT and OT (operational technology) security were introduced.

## 12 INSTITUT ENVIRONMENTÁLNÍCH SLUŽEB

### IES shareholder structure:

Campus Veolia France 40%

Pražské vodovody a kanalizace, a.s. 30%

Veolia Energie ČR, a.s. 30%

### IES highlights in 2021

<b>Revenue:</b> CZK 30,137,000
<b>Profit before tax:</b> CZK 565,000
<b>Number of employees:</b> 10 (8.25 FTE)

	<b>in-person</b>	<b>webinar</b>
<b>Number of educational events held</b>	710	39
<b>Number of training sessions</b>	7,778	117
<b>Number of training hours</b>	97,798	3,853
<b>Number of lessons</b> (of 60 minutes each)	19,260	403
<b>Number of participants in in-person educational events and webinars</b>	12,580	683

	<b>e-learning</b>
<b>Number of graduates of e-learning courses through IES eCampus</b>	36,992
<b>Number of types of e-learning courses delivered</b>	135
<b>Number of training hours</b>	19,050

<b>TOTAL</b>	
<b>Number of training events</b>	<b>884</b>
<b>Total number of participants in educational events</b>	<b>50,255</b>
<b>Number of training hours</b>	<b>120,701</b>



Like 2020, 2021 was adversely affected by the COVID-19 pandemic. Nevertheless, Institut environmentálních služeb (Institute of Environmental Services – IES) succeeded in making considerable improvements in a number of key indicators compared to 2020. There was some recovery in in-person training without compromising the rules that had been put in place. For example, compared to 2020, the number of participants in in-person training increased by 20.5%, the number of training workshops grew by almost 139%, and the number of training hours went up by 13.5%. In 2021, we once again managed to post a profit – of CZK 565,000 – before tax.

The process of digitalising all aspects of IES's activities as a strategic project to ensure its sustainable development continued in 2021. As a result, distance learning via the eCampus training portal again played a crucial role in IES's activities. Here, functionalities – especially the full integration of webinars – were further expanded.

Although the number of those participating in e-learning courses decreased by more than 20% compared to 2020, there was a significant surge in the shift to distance learning in the form of webinars. The number of webinars rose by 225%, the number of participants by a phenomenal 544%, and the number of training workshops by almost 144%. This is extremely compelling evidence that the process of digitalisation in corporate training within Veolia Group is the right approach.

The following topics were added to the wide range of e-learning courses: occupational health and safety for rank-and-file employees, Veolia's Purpose (IMPACT 2023) in various language versions (CZ, RO, ARM, BG), versions of the e-course How to Deal with Corruption: Anti-bribery Management (ISO 37001) adapted for the various Veolia Group companies in the Czech Republic and Slovakia, Cybersecurity and GDPR, and Veolia Health Care by MEDDI.

In 2021, statutory and professional courses organised by IES were attended by a total of 7,609 Veolia Group employees: 2,119 in the Czech Republic, 1,063 in Slovakia, plus 4,427 employees of companies which are not from Veolia Group or in which Veolia Group has only a minority shareholding.

Courses and webinars focusing on the compliance programme, particularly crime prevention, were highly important areas of training in 2021. Close attention was paid to the implementation of and preparation for the ISO 37001 anti-bribery management audit at Pražské vodovody a kanalizace, where 596 employees were trained in compliance (figures cited are for the Czech Republic), 844 employees in the Code of Ethics, 1,125 employees in how to deal with corruption, 391 employees in the Anti-corruption Code of Ethics, and 106 employees in the GDPR – personal data protection; 61 PVK managers attended a Transparency International webinar.

The OHS electronic library was again supplemented to include the latest posters, brochures, internal materials and videos produced as part of the Veolia 2021 International Health and Safety Week. The OSH library is organically tied in with a number of OSH e-learning courses. In the eCampus electronic library, documents on ethics and compliance – guarding against criminal liability – were updated and supplemented.

The IES is an authorised entity in the National Qualifications System under Act No 179/2006. It has the right to examine whether applicants for certificates of professional qualifications have actually mastered all the skills required of them (the IES has the right to hold examinations for 26 qualifications).

Since 2003, an integral part of the Veolia Santé project has been practical first aid training, which has saved 10 human lives. In 2021, 785 employees of PVK, MOVVO, Česká voda - Czech Water, and Veolia Energie ČR attended this training course, mostly in the form of webinars. More than 1,102 Veolia in

the Czech Republic Group employees took part in a new instructional webinar on Veolia Health Care by MEDDI.

In May 2021, the IES opened another course of the revised study programme “Water Supply and Sewage Network Operator” for the needs of the Water Supply and Sewerage Association of the Czech Republic (SOVAK). There are currently 26 participants on this course. In keeping with anti-epidemiological arrangements, this study programme was also held either in small groups or via webinars. In 2021, 36 participants from the previous course successfully completed this programme by passing their final examination on Water Management Structures at the Post-Secondary Vocational School of Civil Engineering and Secondary School of Civil Engineering in Vysoké Mýto. These graduates also met the qualification requirements under Act No 274/2001 on water supply and sewerage systems.

The IES also continued to organise undergraduate and graduate management studies. In 2021, 24 students studied under the two degree programmes, both entitled “Economics and Management”.

For the Water Supply and Sewerage Association of the Czech Republic, the IES has created and now runs the “eSOVAK” e-learning educational portal, which covers dozens of e-learning courses.