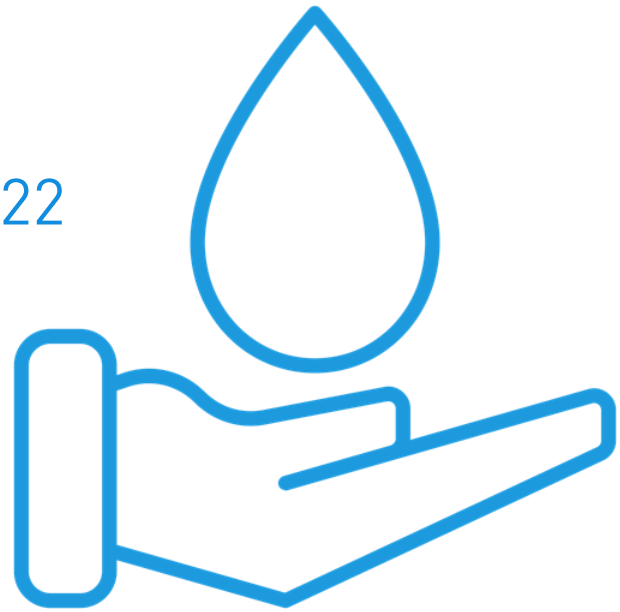
AS Tallinna Vesi

Environmental Report 2022



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Chairman's Statement

Our activities involve extensive use of natural resources both in the supply of drinking water and in the treatment of wastewater. We are committed to reducing the impact of our activities on the natural environment while continuing to provide customers with a reliable and high-quality service. In 2022, we developed a Climate Impact Reduction Plan and also continued the activities of setting up a cogeneration plant at the wastewater treatment plant.

Investments in infrastructure and water and wastewater treatment

We aim to grow investments in fixed assets to secure sustainable infrastructure and continuity of the service. In 2022, we invested €25 million in our capital assets, reconstructing, amongst other things, the 19 kilometers of water pipes and sewers.

In Water Treatment Plant at Ülemiste, we continued the reconstruction of filters and installed UV equipment in several pumping stations that will help to improve water quality in water networks. A number of ongoing projects continued also at the Wastewater Treatment Plant at Paljassaare, including the reconstruction of aeration tanks and effluent outlet tower, and in addition, a new point of reception for sewage sludge from septic trucks was completed and the new raw sludge thickeners were installed.

The investment plan for next years will be based on the Tallinn Public Water Supply and Sewerage Development plan that was prepared together with the City of Tallinn. To this end, a pipeline reconstruction program has been prepared in cooperation with the Tallinn Technical University.

Reducing environmental impacts

In addition to investments in water and wastewater assets, properly maintained water and sewerage network, we have also taken action to reduce Company's environmental impact. From the second half of 2021, the electricity energy used at our facilities and in treatment processes is produced from renewable sources only.

In 2022, we prepared a Climate Impact Reduction Plan for the Company and set ourselves several ambitious targets. One of the targets is to produce at least 50% of all electricity and heat needed within the Company by 2030. To this end, we have signed a contract for setting up a combined heat and power plant at the Wastewater Treatment Plant at Paljassaare by the end of 2023. Both electricity and heat produced from biogas, which is generated in wastewater treatment process during the stabilization of sewage sludge, will be fully used for the own use of the treatment plant and it will cover up to 70% of the plant's current average annual electricity demand.

The digitisation process is supported by the transition to remote water meters, which was started in 2022. The goal is to replace all water meters in our licensed territory with smart meters by the end of 2026. The main advantage of smart meters is the speed and accuracy of data transmission, as well as security and reliability. In addition to consumption data, the smart meter also communicates information about any failures and possible leakages. This in turn helps to save clean water and resources needed for treating water.

High quality of drinking water and treated effluent

The quality of drinking water in Tallinn remained stable at a high level, the quality of 99.8% of drinking water samples taken from the consumer's tap were fully compliant. Last year, we took a total of 3,086 water samples from consumer's taps and only 5 of them were non-compliant. High-quality tap water is ensured with a continuous development and maintenance of the water network.

Treated effluent quality from the Wastewater Treatment Plant at Paljassaare was at a high level in 2022, being again fully compliant with all the set requirements. In order to assess the efficiency of the treatment process and

the quality of the treated effluent, the concentration of pollutants in influent and in effluent leaving the plant are constantly monitored. The rate of removal of the main pollutants nitrogen and phosphorus was more than 90%.

Customers and community

We continue to work to increase the reliability of tap water and the environmental awareness of consumers through campaigns and outreach at public events, in the media, in kindergartens and schools.

In 2022, we were again able to open our Water Treatment Plant at Ülemiste and Wastewater Treatment Plant at Paljassaare for visitors. In addition to these open house events, we were again able to organize tours at water treatment plants for schools and water- and environment themed discussion groups in kindergartens. We continue to support public events in our licensed territory by providing them with tanks with fresh drinking water for free. In 2022, we also set up 3 new public drinking water taps.

We provide vital services to nearly one third of Estonia's population and it is therefore of the utmost importance that our customers are satisfied with our work. Every year, an independent survey company, Kantar Emor, conducts a satisfaction survey among our customers. The results of the survey indicate satisfaction among both contract customers and end-users who do not have a direct contract with us, such as residents of apartment buildings. The survey carried out in 2022 showed that the level of satisfaction among our customers remains high and 86% of end-users drink tap water. We continue to strive to provide our customers with high-quality service and a seamless customer experience in every area.

Finally, I would like to thank the entire dedicated team in Tallinna Vesi and Watercom, colleagues from Utilitas and the City of Tallinn, and all our customers, consumers and cooperation partners for their long-term and professional cooperation.

Aleksandr Timofejev

Chairman of the Management Board

TALLINNA VESI IN BRIEF

AS Tallinna Vesi is the largest water utility in Estonia, providing drinking water and wastewater services to nearly one third of Estonia's population. We serve 23,900 private customers and businesses and over 470,000 end consumers in Tallinn and its surrounding areas: City of Maardu, City of Saue, Harku Small Town and Saku Municipality. As of 31 December 2022, AS Tallinna Vesi employed 269 people. The activities of the Company according to NACE are 3600 and 3700.

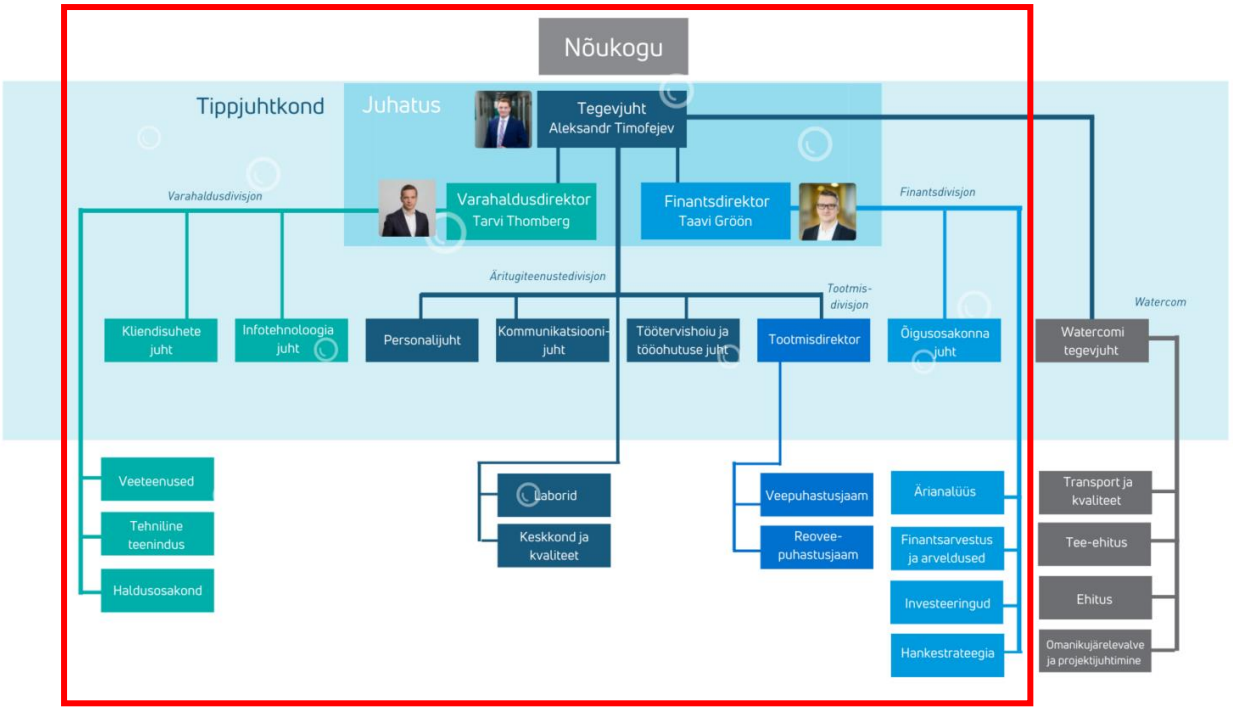


Figure 1: The structures of AS Tallinna Vesi and Watercom OÜ. EMAS is only implemented in AS Tallinna Vesi (marked in red)

The Company has two main treatment plants, the Water Treatment Plant at Ülemiste and the Wastewater Treatment Plant at Paljassaare. Tallinna Vesi also has an accredited water laboratory and an accredited wastewater laboratory.

AS Tallinna Vesi was privatised in 2001. Pursuant to the Services Agreement signed with the City of Tallinn upon privatization, which expired on 30 November 2022, the Company was required to fulfil 97 levels of services until the end of 2022. The new Administrative Agreement, which set out the service quality requirements and the reporting obligation with effect from 01/01/2023, was entered into with the City for the period of 01/12/2022-30/01/2032. Along with the approval of the administrative duty, AS Tallinna Vesi was appointed as the water undertaker within the main licensed territory of the public water and sewerage system in Tallinn until 30 November 2032 (incl.).

The public water supply system comprises more than 1,200 km of water pipes, 21 water pumping stations and 44 ground water pumping stations with 90 boreholes. The catchment area in Harju and Järva Counties covers around 1,800 km^2.

The public sewerage system comprises also nearly 1,187 km of wastewater network, 520 km of stormwater network and 176 wastewater and stormwater pumping stations across the licensed territory.

MAIN PRODUCTS AND SERVICES

Collection, treatment and supply of water

Collection, treatment and disposal of sewage and storm water

Design works

Water and wastewater services

Laboratory services

Pipe construction works

OPERATIONAL SITES

- Head Office, customer service and support services are located at Ädala 10, Tallinn.
- Ülemiste Water Treatment Plant, water and microbiological laboratory are located at Järvevana tee 3, Tallinn.
- Paljassaare Wastewater Treatment Plant, composting fields and wastewater laboratory are located at Paljassaare põik 14, Tallinn.
- The catchment area of ca 1,800 km^2 is located in Harju and Järva Counties.

OUR MISSION

We create a better life with pure water.

OUR VISION

Everyone wants to be our customer, employee and partner, because we are the leading water services company in the Baltics.

OUR VALUES

Commitment

We work with passion, doing the maximum to achieve the objectives.

Teamwork

We all form one team, whose success depends on my and my colleagues' contribution.

Customer focus

Our actions help our customers and colleagues to find solutions.

Proactivity

Working today for a better tomorrow.

Creativity

We have the courage and the energy to seek for new opportunities and achieve better solutions.

Environmental Policy

We are the largest water company in Estonia and our activity influences nearly one third of Estonia's population. We acknowledge that by providing the service that is compliant with all requirements. We influence the quality of life of the citizens of Tallinn, neighbouring municipalities as well as inhabitants living by the Baltic Sea. Therefore, we take into account the impact we have on the surrounding natural habitat and living environment and consider our association with the interest of various stakeholders.

- We act responsibly – we take into account our impact on the surrounding natural habitat and on the community.
- We follow and fulfil all legal requirements, but we are continuously dedicated to do more than we are expected.
- We protect and value the natural environment we operate in. For cleaner natural environment we continue our efforts to reduce and avoid pollution.
- We use natural resources, including energy and water, sparingly. We consistently seek new ways to make the processes more environment-friendly and efficient.
- We act in an environmentally conscious manner, introducing our knowledge and mindset to the community and partners.
- We continue to improve our environmental management system.

Environmental Management System

We have implemented an integrated management system that meets the relevant quality, environmental and occupational safety standards. The Company's environmental activity complies with the requirements of the international environmental management standard ISO 14001 and the Regulation (EC) No 1221/2009 EMAS (Eco-Management and Audit Scheme), as well as the requirements of amendments thereto enforced by the Commission's Regulations (EU) 2017/1505 and (EU) 2018/2026.

The environmental management system covers all the activities of AS Tallinna Vesi: the abstraction and treatment of ground water and surface water to become drinking water, drinking water supply to the licensed territories areas in Tallinn and surrounding municipalities, collection and treatment of wastewater and stormwater, and customer service to provide the relevant services.

The environmental management system forms a part of the Company's management system, as we strive to make the links between the Company and the environment part of our strategy and to take them into account in our everyday operation.

The basis for the environmental management system is the identification of environmental risks, environmental aspects and consequent potential environmental impacts, which form the basis for setting the Company's environmental objectives and tasks to improve the environmental performance. Significant environmental aspects are such activities which, directly or indirectly, influence the nature, quality of services, co-operation with stakeholders, health and quality of life of residents, and our business performance. The assessment is based on the connection of the activity and legal acts, the frequency of its occurrence, the impact on reputation and cooperation with stakeholders, and the environmental impact and its extent.

Environmental management system has been aligned with the company structure. The main responsibility for ensuring and improving the functioning of the environmental management system lies with the senior management and the heads of structural units. Environmental aspects, objectives and targets are prepared at the initiative of the Environmental Specialist in cooperation with the unit managers, who involve their staff. We measure, monitor and evaluate environmental performance indicators at least quarterly, and based on those results we produce each year our environmental report, which is made available to public.

ENVIRONMENTAL ASPECTS AND OBJECTIVES

Table 1: SIGNIFICANT ENVIRONMENTAL ASPECTS 2022

Activity	Environmental aspect	Direct or indirect impact	Environmental impact of the aspect	Trend of the impact*	Further actions
Maintaining of sanitary protection areas	Land use to support biodiversity	Indirect	Sanitary protection area protects drinking water sources and the natural environment, supports the improvement of the biodiversity around Lake Ülemiste and in the lake, and helps to preserve green areas within the City	+	Maintain the sanitary protection areas, co-operation with the legislator and local governments to retain the areas
Use of biogas to produce heat and electricity	Prevention of emissions to air	Direct	Energy is produced on site from biogas, which is a residue of the sludge digestion process. It reduces the ecological footprint and dependence on non-renewable sources of energy.	+	Maximise the use of biogas produced, implement the CHP technology
Use of chlorine in water treatment	Risk of an environmental accident	Direct	Improper handling may result in leakage and environmental contamination, chlorine is an explosive chemical	-	Monitor and analyse the optimum use of chlorine, minimise the risk of possible leaks
Construction waste	Waste generated during the laying and repairing of pipes	Direct	Construction waste has a low potential of being recovered and is bulky, causing soil damage	-	Maximise the use of no-dig methods. Reduce the size of excavations and extend the use of trench support.
Use of electricity	Production of electrical energy from fossil fuels generates waste gas emissions	Indirect	Electricity production emits waste gas emissions that cause air pollution and greenhouse effect	-	Analyse electricity consumption, introduce more energy efficient equipment and energy saving modes. Extend the separate sewer system.
Use of green electricity	Prevention of emissions to air	Indirect	Green electricity production has lower greenhouse gas emissions and using green electricity reduces carbon footprint	+	Continue using green energy while looking for solutions to reduce electricity consumption
Water abstraction	Use of water resource	Direct	Has impact on energy and chemical consumption and the resulting effects on the environment	-	Reduce water leakages and amount of process water, apply new technologies, influence population's consumption habits through awareness campaigns, develop smart metering
Use of process water	Use of water resource	Direct	Increased need for water treatment and the resulting further use of resource and effects on the environment	-	Increase analysis and control, reduce the amount of process water in production and in networks

Supply consumers with clean drinking water meeting all the requirements	Waste prevention	Indirect	Consumer has the opportunity to prefer tap water to bottled water, thus reducing the impact from the use of disposable plastic bottles. Impact on public health.	+	Continuous work in all stages of water treatment and distribution, publish information about water quality, maintain the sanitary protection areas, hold awareness campaigns
Illegal connections to sewer and stormwater network	Risk of environmental pollution	Direct	Causes environmental pollution, adversely affecting the marine environment, marine life and the quality of living environment	-	Find and close illegal connections
Sludge handling	Waste prevention	Indirect	Recovery of sewage sludge reduces the amount of waste landfilled	+	Look for contract partners, maximise the amount of sewage sludge recovered
Discharge of untreated wastewater into the environment	Pollutants contained in wastewater	Direct	Causes environmental pollution, adverse effect on the marine environment, marine life and the quality of living environment, causes smell problem	-	Reconstruct the treatment process, extend the separate sewer system in cooperation with the Tallinn Urban Environment and Public Works Department, system monitoring
Discharge of partly untreated wastewater into the environment	Pollutants contained in wastewater	Direct	Non-compliant water adversely affects the marine environment, marine life and the quality of living environment	-	Continuously analyze, monitor and, if necessary, reconstruct the treatment process
Discharge of treated effluent into the sea	Pollutants contained in wastewater	Direct	Treated effluent (compliant and non-compliant) adversely affects the marine environment, marine life and the quality of living environment	-	Analyze, monitor and, if necessary, reconstruct the treatment process
Discharge of polluted stormwater into the sea	Pollutants contained in stormwater	Direct	Polluted stormwater adversely affects the marine environment, marine life and the quality of living environment	-	Continuously monitor the outlets and detect sources of pollution

* Aspect with a positive or a negative impact

Tabel 2: ENVIRONMENTAL OBJECTIVES AND RESULTS FOR 2022

Objective	Indicator	Result by the end of 2022
Reduce the percentage of clean water losses by reducing the leakages	≤ 13%	16,02% The annual target was not met due to the snowy and cold winter that prevented leak detection and access to pipelines
Activities comply with the terms set out in the environmental permits issued by the Environmental Board	0 non-compliances	0 non-compliances
Stabilised sewage sludge recovery	0 tons of stabilised sewage sludge landfilled	39,350 tons of stabilised sewage sludge handed out to contractual partners and 0 tons landfilled
Reduce the quantities of non-stabilised sewage sludge	≤ 500 tons of non-stabilised sewage sludge landfilled	108.4 tons of non-stabilised sewage sludge landfilled
Recovery of grit taken out from grit traps	0 tons of washed sediments from grit traps landfilled	0 tons of washed sediments from grit traps landfilled
Reduce the Company's carbon footprint	Action plan is prepared	Action plan is prepared and approved
Set up a cogeneration plant at the wastewater treatment plant	Electricity production > 0 kWh	Contractor found and contract concluded at the end of 2022. Objective is postponed.
Raise the environmental awareness of various stakeholders reg. the Company's activity to improve and keep the Company's good image (reputation)	Draw media attention to environmental issues (≥ 4 media initiatives)	16 media initiatives
	≥ 3 water- and environment related campaigns or participations in outdoor events	3 participations in outdoor events and 1 open house event in each plant (WTP and WWTP)
	Carry out environmental awareness month activities	Environmental awareness month activities have been carried out
The Environment and Quality Department will get an electric car	The car is purchased	The car is purchased
Increase sorting of waste	Have 25% of generated municipal waste sorted	In total, 22.5% of municipal waste was sorted and the target was not met. We continue to contribute to the training of employees, but will not set ourselves any new numerical targets, as it is difficult to control and evaluate the generated waste quantities.

Table 3: ENVIRONMENTAL OBJECTIVES FOR 2023

Objective	Task	Indicator	Due date
Reduce the percentage of clean water losses by reducing the leakages	Fast detection and repair of leakages, improving the efficiency of work processes	≤ 14%	December 2023
Activities comply with the terms set out in the environmental permits issued by the Environmental Board	The assigned specialists monitoring the obligations arising from the requirements and ensuring that these are complied with by their activity	0 non-compliances	December 2023
Disposal of stabilised sewage sludge	Recovery of sewage sludge by producing compost soil that can be used in planting green areas, agriculture or re-cultivation. Finding potential partners and customers.	0 tons of stabilised sewage sludge landfilled	December 2023
Reduce the quantities of non-stabilized sewage sludge	Keeping optimal sludge balance and treatment to avoid the need for removing non-stabilized sludge from the process	≤ 500 tons of non-stabilized sludge landfilled	December 2023
Recovery of grit removed from grit traps	Washing the grit removed from the process and mixing with sewage sludge to produce compost soil	0 tons of washed sediments from grit traps landfilled	December 2023
Reconstruct the fish pass on Vaskjala water reservoir	Signing the construction contract and reconstructing the fish pass	The fish pass is reconstructed	December 2023
Set up a cogeneration plant at the wastewater treatment plant	Reconstructing and commissioning the cogeneration plant	Electricity production > 0 kWh	December 2023
Reduce the Company's electricity consumption	Implementing the projects to reduce electricity consumption	Electricity consumption has dropped by 400,000 kWh compared to 2022	December 2023
Reduce the quantities of waste generated with the construction and reconstruction of water and wastewater networks by increasing the use of no-dig methods	Perform as many reconstruction works on sewer systems as possible using no-dig methods	25% of all reconstruction works related to sewer systems are carried out using no-dig methods	December 2023
Raise the environmental awareness of various stakeholders reg. the Company's activity to improve and keep the Company's good image (reputation)	Organise environmental education classes for various age groups. Organise activities (campaigns, open houses, events, cooperation etc.) to raise awareness among Company's employees, consumers and the community	≥ 1500 people participated in classes/tours ≥ 4 water- and environment related campaigns or participations in outdoor events (incl. open houses) International Water Day and environmental awareness month activities carried out	December 2023

Carbon Footprint and Climate Impact Reduction

Being the largest water company in Estonia, we also use a lot of natural resources. In order for natural resources to be available also for generations to come, we must minimize our impact on the environment. Since 2020, we have assessed the company's CO_2 footprint, and in 2022 we also prepared a Climate Impact Reduction Plan and set ourselves the following goals:

- The Company is carbon-neutral by 2040 at the latest. To become carbon-neutral, we need carbon capture mechanisms, such as clear and transparent CO_2 offset, or greenhouse gas (GHG) capture technologies. We are closely monitoring the market and technological developments in this area and will meet the ambitious goal at the earliest opportunity.
- By 2030, we have reduced GHG emissions from Scopes 1 and 2 by at least 50% compared to 2020. For Scope 3, we apply principles of green procurement and other mitigation measures to emissions that can be influenced by choices made by the Company.
- We only use electricity from renewable sources and have replaced natural gas with heat from renewable sources by 2030.
- We produce at least 50% of all electricity and heat needed within the Company by 2030 at the latest. For this, we use the energy (biogas and heat) contained in wastewater and build solar parks.
- We have reduced the heat and electricity consumption by at least 10% by 2030, compared to 2020.

CARBON FOOTPRINT

The greenhouse gas footprint of AS Tallinna Vesi has been calculated in accordance with the internationally recognised and most widely used greenhouse gas reporting standard *GHG Protocol Corporate Accounting and Reporting Standard*. This standard includes the assessment of emissions of seven greenhouse gases — carbon dioxide (CO_2), methane (CH_4) nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3).

The standard divides greenhouse gas emissions from the company's operations into three scopes (areas of impact). Direct emissions from sources owned or controlled by the company fall within Scope 1. Scope 2 covers indirect emissions from purchased energy. Scope 3 covers all other indirect emissions produced as a result of upstream or downstream activities in the company's value chain.

In 2020, the Company's CO_2 footprint was 61,218 tons of CO_2eq, of which Scope 1, the Company's direct emissions, accounted for 49%. Scope 2, or used electricity and heat, accounted for 37% of the Company's carbon footprint. Indirect energy emissions, chemicals, pipes and spare parts, waste and employee mobility, making up Scope 3, accounted for 14% of the company's CO_2 footprint. The assessment of Scope 3 took into account the CO_2 impact of upstream supply chain activities.

In 2022, the Company's CO_2 footprint was 37,419 tons of CO_2eq, of which Scope 1 accounted for 75.1%, Scope 2 for 0.5% and Scope 3 for 24.4%. The highest impact on the Company's carbon footprint come from the mechanical and chemical-biological treatment of wastewater and composting of sewage sludge, these two together account for 97% of Scope 1. The biggest impact in the wastewater treatment process comes from N_2O and CH_4. Nitrous oxide (N_2O) is generally produced during the biological nitrogen removal process and occurs in all wastewater treatment plants applying biological treatment. Methane (CH_4) is the largest component of biogas that we use to produce heat. Methane is released into the environment mainly in the treatment process, from leaks in the system, and also during the composting of sewage sludge. Since N_2O and CH_4 have a global warming potential of 298 and 25 times that of CO_2, respectively, they produce a significant proportion of the Company's footprint.

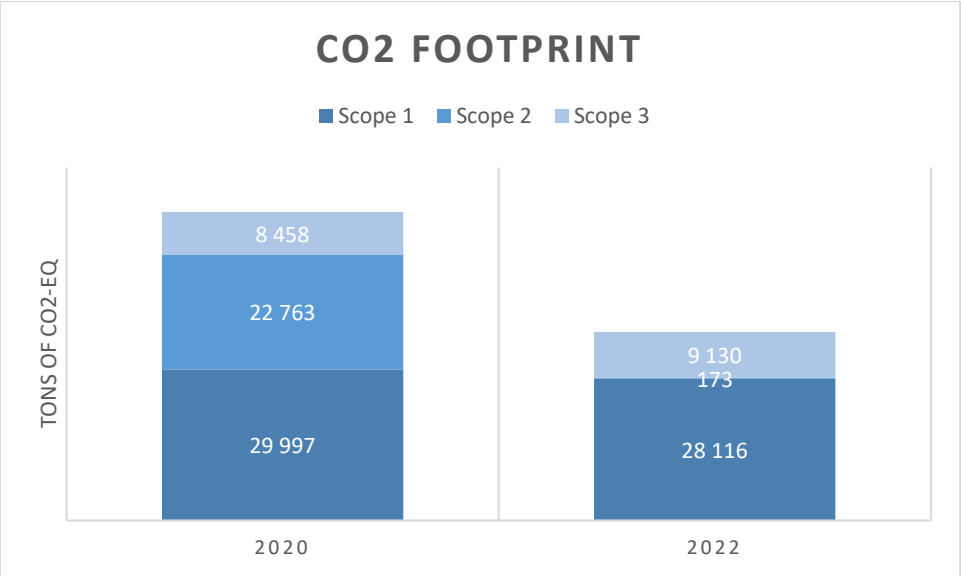
In 2022, the Company's carbon footprint fell 39%, or 23,798 tons of CO_2eq, compared to 2020. The most significant reduction was is Scope 2 due to the shift to the use of electricity from renewable sources.

From now on, we will calculate our carbon footprint every year.

Table 4: AS TALLINNA VESI'S CO_2 CARBON FOOTPRINT IN 2020 AND 2022, tons of CO_2-eq.

Scope	Emission source	2020	2022	Change, %
Scope 1	Wastewater treatment	17,156	15,898	-7
	Composting of sewage sludge	7,624	7,621	0
	Production and incineration of biogas	939	838	-11
	Fossil fuels	959	1,166	+22
	Discharge of treated effluent and stormwater into the sea	3,319	2,594	-22
Scope 2	Electricity and heat	22,763	173	-99
Scope 3	Purchased goods and services	5,636	5,923	+5
	Activities related to fuels and energy	1,920	2,232	+16
	Capital goods (fixed assets)	15	42	+177
	Waste	650	686	+6
	Business travel	4	13	+183
	Employee mobility	233	233	0
Total		***61,218***	***37,419***	-39

Chart 1: AS TALLINNA VESI'S CO_2 FOOTPRINT IN 2020 AND 2022, tons of CO_2-eq.



Compliance with Environmental Requirements

To a large extent, the Company's environmental activities are regulated by requirements arising from the European Union (EU) as well as national legislation and the legal acts issued by local governments.

At the EU level, this means ensuring compliance with the EU Water Framework Directive (2000/60/EC). At the national level, compliance with the Water Act, Public Water Supply and Sewerage Act, Waste Act, Chemicals Act, Atmospheric Air Protection Act as well as implementing acts must be ensured. Besides these, we are governed also by other environmental legal acts. Pursuant to the Water Act, we must ensure that the effluent discharged from the wastewater treatment plant complies with established limits, and we act in accordance with the requirements of the Public Water Supply and Sewerage Act in our process of service and connection contracts. In organising the recovery of sewage sludge, we rely on the Waste Act. Under the Chemicals Act, AS Tallinna Vesi classifies a Category B major-accident company and is subject to specific requirements. The Atmospheric Air Protection Act specifies the air quality limit values and reporting obligations.

At the local level, we are obliged to comply with various rules and requirements applicable in Tallinn and in the surrounding municipalities, where AS Tallinna Vesi provides services.

We consistently monitor the amendments being made to the requirements and legislation. If changes are made to the legislation that concerns the Company, those are communicated to the managers and specialists responsible for the relevant areas, allowing them to assess the impact of such amendments on the Company and propose their changes, and upon entry into force amend the company processes accordingly if necessary.

In cooperation with the Estonian Waterworks Association (EVEL), we participate in the drafting and rounds for comments on the draft acts and draft implementing acts pertaining to the water sector and environmental matters, by taking part in the working groups, presenting our opinions and proposing changes to the drafts under discussion. Where necessary, we have also communicated our positions directly to the relevant ministries without doing it via EVEL.

In 2022, we contributed to identifying bottlenecks in the current legislation, for example, by providing feedback, submitted via EVEL, at the request of the Ministry of Environment on the draft Act on Public Water Supply and Sewerage, which is expected to enter into force on 1 January 2023, and also on the draft Water Act and draft sub-acts to be adopted on the basis thereof (e.g. drinking water regulation), and on the draft Act on Amendments to the General Part of the Environmental Code Act and Other Acts. Additionally, we put forward proposals regarding sewage sludge as type of waste, with the aim of supporting more extensive waste recovery. Also, our specialists continued to participate in the work of EurEau Committees on Drinking Water and on Waste Water, contributing to the preparation of the new EU legislation. In 2022, AS Tallinna Vesi also had the opportunity to present its opinion via EVEL at EU level, by providing feedback on the impact of the new Urban Waste Water Treatment Directive.

ENVIRONMENTAL PERMITS

We act in accordance with the requirements as well as the terms and conditions set out in the environmental protection permits issued to the Company. Environmental Board has issued the following environmental permits to us:

- 5 environmental permits (details on page 19);
- 1 integrated permit (details on pages 19, 39 and 43);
- 1 air pollution permit (details on page 43).

REQUIREMENTS OF THE SERVICES AGREEMENT

On 12 January 2001, AS Tallinna Vesi concluded a trilateral Services Agreement with the City of Tallinn and the investors. Under the Services Agreement, the Company is obliged inter alia to comply with 97 levels of service, which makes it the most regulated water undertaking in Estonia. Our activities and levels of service are assessed once a year by an independent monitoring unit, Supervisory Foundation for the Water Companies in Tallinn, to whom the Company annually, i.e., by the end of the first quarter of the following year, submits the report on compliance with the levels of service. At the end of 2022, a new service contract was concluded with the City of Tallinn until 2032, which revised and supplemented the existing requirements. The new Administrative Contract is aimed at ensuring high-quality water services for city residents and entrepreneurs, adherence to the principles of environmental protection, and increased attention to investments in order to ensure the continuous rehabilitation of networks and the sustainability of the company.

In 2022, all of the contractual levels of service, agreed upon by the parties to the Services Agreement, were delivered and in many cases outperformed. Water quality at customer taps was 99.18% compliant with the standards in 2022, outperforming the quality level specified in the Services Agreement by 4.8%. Also, the leakage rate continues to stay below the 26% limit. In 2022, the leakage rate of 16.02% was achieved. The number of blockages in 2022 was 600.

REQUIREMENTS FOR CONTRACTUAL PARTNERS

Given the strict requirements applicable to our activities, it is fundamental that our suppliers and contractors meet the environmental and occupational safety requirements as well. Among other things, the contractors must confirm that they comply with occupational safety and environmental protection requirements at our repair and construction sites. We have established several criteria in our procedures allowing us to have control over our partners with regard to our expectations. Our specialists monitor the occupational safety and environmental performance in the activity of suppliers/contractors at sites on a daily basis.

MANAGEMENT SYSTEM CONTROL AND AUDIT

In May 2022, AS Metrosert, accredited certifier, carried out a certification audit of the management system in the Company. The aim of the audit was to assess the performance and compliance of the Company's quality management system, environmental management system and occupational health & safety system with the requirements of the standards ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018, with the statutory requirements of the industry and the documentation established in the Company.

The audit concluded that the Company's documentation of the quality, environmental and occupational health & safety management systems comply with the requirements of the standards ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018. The audit report also stated that the management system of the Company is able to meet the legislative, regulatory and contractual requirements.

An audit to verify the EMAS certificate was carried out in May 2022. The aim of the audit was to confirm the compliance of Company's environmental management system and environmental report with the requirements of EMAS Regulation (EC) No 1221/2009, amended with the Regulations (EU) 2017/1505 and (EU) 2018/2026. The audit established three non-conformities: 1) NACE codes were not reported in four digits; 2) the structure and sites included in EMAS report were not indicated; (3) for major changes, the reasons were not described. The audit report stated that based on the audit results and after remedying the non-conformities, the Company's environmental management system would comply with the requirements set out in the EMAS Regulation (EC) No 1221/2009, amended with the Regulations (EU) 2017/1505 and (EU) 2018/2026.

Besides external audits, regular internal audits were carried out in the Company as per the internal audit plan to assess the performance of the management system. The internal auditors of the Company did not establish

any non-conformities during the internal audits. As a result of the internal audits, our internal auditors put forward 22 improvement proposals, which have been analysed by the responsible managers and corrective actions have been performed.

In 2022, the Estonian Accreditation Centre carried out a surveillance visit to the Company's laboratories to verify the compliance with the requirements of EVS-EN ISO/IEC 17025. The surveillance visit did not establish any non-conformities.

Environmental Education and Consumer Awareness

We keep working hard to promote an environmentally-conscious way of thinking and acting amongst our community members. We encourage people to drink tap water and explain how to handle wastewater in a way that is good for the environment. We highlight the stable quality of tap water that meets high standards and encourage our consumers to prefer tap water at home as well as when dining out. The public water taps are open for all Tallinners from the very first warm days of spring until the weather gets cold in autumn. In cooperation with the City, we set up a total of 3 new public drinking water taps in 2022. Locations of all public drinking water taps can be found here. Confidence in tap water remains high, the annual customer satisfaction survey carried out in 2022 indicated that 86% of end consumers (2021: 89%) drink tap water.

- We work consistently to ensure that children grow up environmentally conscious and learn to treasure the nature. Each year, we organize water-themed discussion groups in kindergartens and schools, discussing matters relating to water cycle, sustainable water consumption and sewer blockages. In 2022, water- and environment themed discussion groups were conducted with a total of 960 children.
- In 2022, we were again able to organize open house events and tours at the Water Treatment Plant at Ülemiste and Wastewater Treatment Plant at Paljassaare. A total of 454 people attended the open house events and 665 people, mainly school students, took part in the tours at the plants.
- In 2022, we were present with our educational materials at the Tallinn Old Town Days and the family day in Nõmme Snow Park. Public events provide an opportunity to meet our consumers and customers and discuss how to become an environment-friendly water user and prevent sewer blockages.
- Since environmental protection and behavior that treasures nature is important to us, we also wish to keep improving our employees' awareness of these topics. In June 2022, in order to promote the environmental awareness of our employees, we organized an environmental awareness month, which has become a tradition, during which we visited the Tallinn Waste Recycling Centre and invited a specialist from the Environmental Board to visit us and speak to our employees about how to sort waste correctly. During the environment awareness month, seminars were organized to introduce green products and services to our employees, encouraging them to make more environmentally conscious choices. Besides the activities of the environment awareness month, we also participated in the World Cleanup Day in September, tidying up the Paljassaare special conservation area, and conducted an inhouse training on waste in November.
- Over the years, we have prepared many educational study materials about water and environmental subjects for children and teachers. These include, for example, a study material series "Blue Classroom" for the teachers in nature studies, supporting the national study program in water-related classes. Furthermore, we have prepared game and puzzle books for kindergartens and primary schools, e.g., Tilgu play cards and a puzzle book „Puzzle with Tilgu". The latest material prepared in 2021 — an educational animation on with Tilgu matters relating to water cycle, saving water and sewer blockages — also targets for the kindergartens and primary schools is the latest one issued

- All materials are available on our website.

Quality and Use of Water Resources

ENVIRONMENTAL PROTECTION PERMITS FOR SPECIAL USE OF WATER

Our activities in using water resources are regulated by the Water Act and its implementing acts. As a water company we must hold environmental protection permits and pay environmental charge for the water resources we have used. The permit sets us certain obligations and restrictions. For instance, it determines the allowed water abstraction volume (m^3), obligation of keeping account over the amounts of water used, requirements for sampling, monitoring and analysis, as well as the allowed limit values for pollutants in effluent, requirements for monitoring of pollutants and measures to reduce the impacts arising from special use of water.

All requirements established in the permits were met in 2022. The water abstraction charge is paid for the amounts of water taken from Lake Ülemiste into the water treatment plant and for the ground water pumped from the aquifers. In 2022, the water abstraction charge amounted to 3.4% of the costs of goods/services sold (2021: 3.9%).

Table 5: VALID PERMITS REGULATING THE SPECIAL USE OF WATER, ISSUED TO AS TALLINNA VESI

Environmental protection permit no.	Valid until	Description of environmental protection permit
L.VV/331954	31.12.2030	**Licensed territory of public water supply and sewerage system in Saue City** Ground water abstraction from four boreholes, over 5 m^3/day.
KL-506050	unlimited validity	**Main licensed territory of public water supply and sewerage system in Tallinn, Tallinn surface water catchment system facilities' area in Harju and Järva Counties** Regulating surface water resources in water bodies of Ülemiste-Pirita-Jägala surface water system, surface water abstraction from Lake Ülemiste, ground water abstraction from Ordovician-Cambrian, Cambrian-Vendi and Quaternary aquifers, and stormwater discharge into the receiving water.
L.VV/328381	31.12.2042	**Harku Municipality** Ground water abstraction from borehole, over 5 m^3/day.
L.VV/328349	unlimited validity	**Licensed territory of public water supply and sewerage system in Maardu City** Abstraction of drinking water and water for industrial use from Cambrian-Vendi aquifer to supply water to Maardu City and areas in Kallavere and Muuga, and stormwater discharge into the receiving water.
L.VV/333205	19.08.2024	**Building of an alternative water intake for Lake Ülemiste** Drowning of solid substances into Lake Ülemiste to ensure water intake mainly from the waters of the surface water catchment system, where appropriate.
Integrated environmental permit No KKL-509326	unlimited validity	**Paljassaare Wastewater Treatment Plant** Regulating the discharge of biologically treated effluent into the Bay of Tallinn, using a deep-sea outlet, and the use of emergency overflows.

WATER CATCHMENT

Nearly 90% of our consumers in Tallinn and Maardu get their drinking water from surface water resources. Even though Lake Ülemiste is the main drinking water source for people in Tallinn, the natural catchment of the lake itself is small. To increase the water volume and ensure that the needs of City of Tallinn are met, we have established a water catchment system, which consists of hydropoints constructed on rivers as well as water reservoirs and channels connecting those. Our water catchment system mainly comprises Harju sub-basin and the river basins of Soodla, Jägala and Pirita rivers, with a total area of ca 1,800 km^2. Paunküla water reservoir on the headwaters of the Pirita River (9.9 million m^3) and Soodla water reservoir on the Soodla River (7.4 million m^3) supply additional water resources for Lake Ülemiste and can also be used if there is a need to improve the raw water quality in Lake Ülemiste.

The volume of water reserves in Tallinn surface water catchment system primarily depends on the annual amount of precipitation. Continuous information on the flows enables us to use the water resources most efficiently. To regulate the water resources in an optimal and accurate manner we have established water metering units at all hydropoints, which enable us to meter the flows conducted to the channels as well as the sanitary flows in the rivers. The measurements are carried out on a regular basis in accordance with the requirements of the environmental permit.

In 2022, the average flow rates in the rivers of the catchment area were significantly lower. Winter was lower in precipitation than usual and unstable month by month due to fluctuations in temperatures. Permanent ice cover on water reservoirs and rivers only formed for a short time, depending on the flow rates. Seasonal high water was not observed, the flow rates in rivers were highest in mid-April and started to drop after that. At the beginning of May, flow rates in rivers remained within usual range and in mid-month the rates started a downward trend, which continued also in June. The summer period was marked by low rainfall and higher-than-average air temperatures, with the exception of a short-term rise in river flows caused by rains in the second decade of July. Starting from August, the flow rates in rivers were very low, at times below the ecological minimum flow rate, and a similar situation continued until mid-September. River flows in September, October and November were significantly lower than usual again due to a shortage of rainfall. The same situation continued through the beginning of December, with some increase in flow rates at the end of the month and then a stabilisation of water regimes in rivers at a level characteristic to 2022. The water regimes throughout the year can be characterised as follows: winter was unstable in terms of temperatures, with a smaller snow cover on average, and with unstable and at times permanent ice cover. The summer and autumn periods in particular were drier than average, which significantly affected the flow rates of rivers in the catchment area of the water catchment system. Water regimes started to improve due to the effects of precipitation at the end of December.

In order to protect the water resources and the water body used for the abstraction of drinking water, a sanitary protection zone has been established around Lake Ülemiste. Sanitary protection zone, comprising Lake Ülemiste, water catchment facilities, bank reinforcements and the land in close vicinity of the lake, needs to be kept in its natural conditions. Such sanitary protection zones have also been formed in the catchment area to protect the dams and other facilities of Soodla, Kaunissaare, Paunküla and Aavoja water reservoirs.

USE AND QUALITY OF SURFACE WATER

According to the environmental permit No KL-506050, the Company is allowed to abstract up to 47.60 million m^3 of surface water per year from Lake Ülemiste. The actual surface water abstraction in 2022 was 26.60 million m^3. Water abstraction has increased in recent years mainly due to the increase in consumption.

Table 6: SURFACE WATER ABSTRACTED FROM LAKE ÜLEMISTE AND COMPLIANCE WITH THE ENVIRONMETAL PROTECTION PERMIT No KL-506050, mln m^3

	2018	2019	2020	2021	2022
Surface water abstracted from lake Ülemiste	24.31	25.00	25.24	25.85	26.60

Maximum amount permitted 47.6 mln m^3/year

Water quality in surface water sources is monitored in line with the program determined by the environmental permit. We take raw water samples from the intake of our water treatment plant on a daily basis to ensure compliance. Nitrogen and phosphorus compounds and total organic carbon are determined in raw water once a week. Furthermore, an in-depth analysis of raw water is carried out once a month in accordance with the quality monitoring programme established for a drinking water source. We study the results of the analyses to understand the changes and processes in the catchment area and decide upon the necessity to replenish the water stock in the lake.

Table 7: WATER QUALITY IN LAKE ÜLEMISTE IN 2018–2022

Parameter	Unit	Average results				
		2018	2019	2020	2021	2022
Colour	mg/L Pt	39	31	39	37	33
Turbidity	NTU	9.6	6.9	6.9	6.2	7.0
pH		8.23	8.19	8.43	8.22	8.12
Permanganate index (COD_{Mn})	mg O_2/l	11.8	9.8	11.1	10.1	9.7
Total organic carbon (TOC)	mg C/l	11.2	10.1	11.0	10.4	10.2
Total phosphorus	mg/l	0.047	0.048	0.048	0.029	0.029
Total nitrogen	mg/l	1.50	1.30	1.43	1.20	1.27
Ammonium	mg/l	0.085	0.074	0.019	0.085	0.071
Phytoplankton abundance	objects /ml	7,500	6,300	16,804	21,975	15,812

Through the years, the phytoplankton abundance has increased due to changes in their species composition. In addition, the abundance has also been affected by the extreme weather conditions in recent years.

USE AND QUALITY OF GROUND WATER

Approximately 10% of consumers in Tallinn are supplied with water abstracted from the Cambrian-Vendian and Cambrian-Ordovician aquifers. In our licensed territory, ground water is supplied in Saue City and districts of Nõmme, Laagri, Merivälja, Pirita and Tiskre in Tallinn. A total of 2,732,375 m^3 of ground water was abstracted in 2022.

Table 8: GROUND WATER ABSTRACTED AND COMPARISON WITH THE MAXIMUM AMOUNTS SET BY THE ENVIRONMENTA PROTECTION PERMITS, thousand m^3

Parameter	Maximum volume permitted	Average results				
		2018	2019	2020	2021	2022
Tallinn (Permit No KL-506050)	7,749.80	2,323.8	2,349.1	2,400.4	2,603.6	2,367.5
Saue (Permit No L.VV/331954)	445	290.5	309.4	331.2	350.0	364.4
Harku (Permit No L.VV/328381)	40	41.1	21.1	0.11	0.4	0
Maardu (Permit No L.VV/328349)	720	0.28	0.39	3.1	0.1	0.2

According to the EU Water Framework Directive (2000/60/EC), the qualitative or chemical conditions of ground water are regarded to be good if the concentration of pollutants does not indicate any inflow of salty water or other water, nor exceed the relevant quality standards. In 2022, the quality of drinking water at the borehole pumping stations complied with the requirements of the Regulation No 61 issued by the Minister of Social Affairs. There were no ground water pollution incidents or potential pollution incidents demanding us to notify the City of Tallinn and the Estonian Health Board.

We monitor the ground water quality parameters in accordance with the environmental protection permits, and if necessary, the ground water undergoes a treatment process. On a monthly basis we monitor the treated ground water quality (content of iron, manganese, and ammonium) in 21 ground water pumping stations, which have filters installed and continuously provide water to the public network. All currently operated borewells are equipped with automatic hydrostatic pressure sensors allowing to measure the static and dynamic level of ground water. Those results enable us to assess the recovery of ground water resources. Over the last years, this trend has been positive, indicating the recovery of resources.

Ground water in Northern Estonia (Cambrian-Vendian aquifer) contains natural radionuclides. The natural radioactivity of Estonian ground water has been thoroughly studied by Eesti Geoloogiakeskus OÜ as well as by the Radiation Monitoring Bureau of the Estonian Environmental Board. Repeated radiological analyses in all borewells are carried out every ten years, in accordance with the requirements.

Drinking Water Production and Quality

In 2022, we supplied 28.3 million m^3 of pure drinking water to our consumers. Drinking water quality is required to comply with the Regulation No 61 "Quality and Control Requirements and Analysis Methods for Drinking Water", issued by the Minister of Social Affairs on 24 September 2019 (hereinafter referred to as the Regulation No 61), originating from the Estonian Water Act and the European Union's Drinking Water Directive 98/83/EC. The water quality is monitored in accordance with the monitoring programmes approved by the Northern Regional Department of the Estonian Health Board. Samples are taken from the raw water (Lake Ülemiste, its catchment area, and ground water), treatment process, water tanks at the ground water pumping stations as well as the customer taps. The quality indicators of the drinking water supplied from the Water Treatment Plant at Ülemiste as well as the drinking water supplied from ground water resources in 2022 are available on the website of AS Tallinna Vesi.

Water analyses are carried out by the Company's water and microbiology laboratory, which is one of the largest water laboratories in Estonia. The quality of analyses is guaranteed both by certified samplers and laboratories accredited with the quality management system (EVS-EN ISO/IEC 17025 standard), modern equipment and professionals. In 2022, our water and microbiology laboratory performed a total of 98,000 analyses.

SURFACE WATER TREATMENT PROCESS

Water abstracted from the lake is treated at the Water Treatment Plant at Ülemiste, using a treatment scheme widely used throughout the world. Due to the quality of surface water in Lake Ülemiste and to ensure the drinking water quality, the surface water must undergo mechanical and chemical treatment, including preliminary ozonation, coagulation, clarification, filtration, and disinfection. In 2022, we continued with the reconstruction of sand filter walls and replaced the mesh in microfilters.

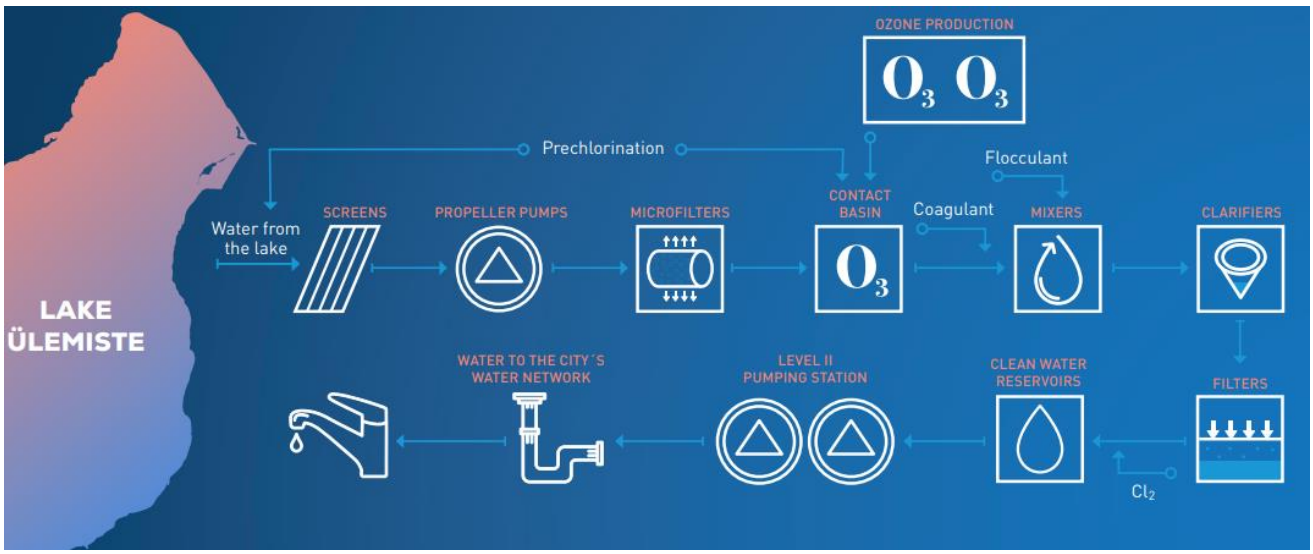


Figure 2: Water treatment process at Ülemiste Water Treatment Plant

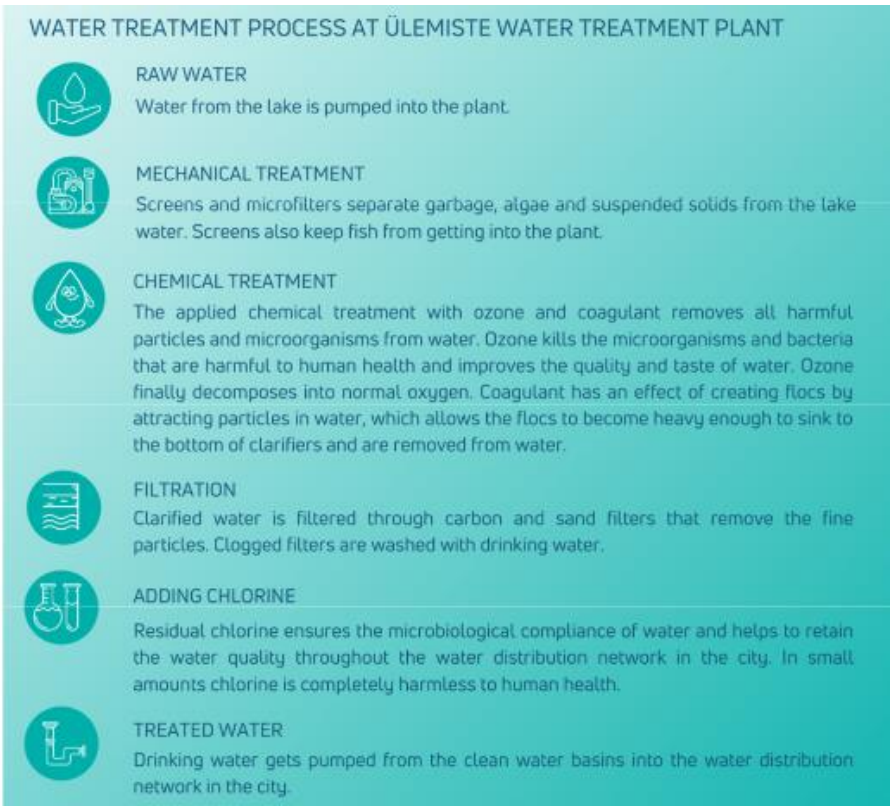


Figure 3: Description of water treatment process at Ülemiste Water Treatment Plant

GROUND WATER TREATMENT

The Water Act requires that the status of ground water be maintained as similar to its natural conditions as possible, therefore, as a rule, no chemicals are used in treating ground water. To supply compliant drinking water, we treat ground water by filtration and aeration to remove excess iron, manganese and ammonium from the water. Samples taken after the ground water treatment process show that the treatment significantly reduces the turbidity as well as concentrations of ammonium, iron and manganese, improves the colour and stability index, and increases the oxygen concentrations in water.

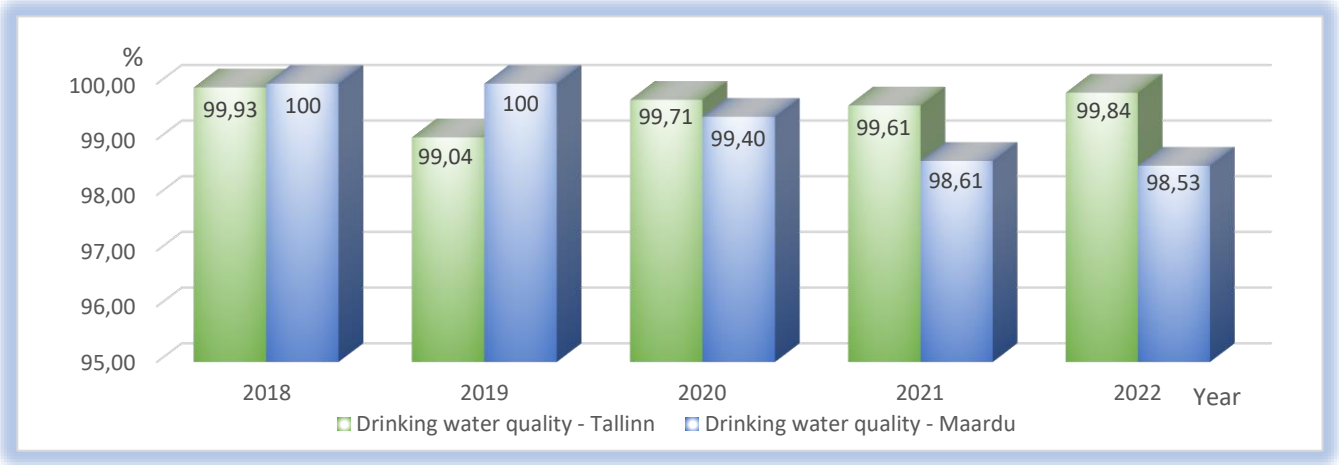
DRINKING WATER QUALITY IN THE NETWORK AND AT CUSTOMER PREMISES

The quality of drinking water in Tallinn and Maardu remains excellent. Throughout the year, we took samples at the sampling points (at customer premises), which had been specified based on the monitoring programs approved by the Estonian Health Board, twice a month.

In 2022, we took a total of 3,086 samples across the licensed territory in Tallinn (besides Tallinn also in Saue and Harku Small Town). The quality of drinking water taken from the customer taps was 99.8% compliant with the requirements. Consistently high quality of tap water is ensured with the ongoing development and maintenance of the water network across the licensed territory.

98.5% of the 168 water samples taken in Maardu in 2022 complied with the requirements.

Chart 2: COMPLIANCE OF THE QUALITY OF DRINKING WATER WITH THE REQUIREMENTS SET OUT BY THE MINISTER OF SOCIAL AFFAIRS REGULATION NO 61 IN 2018–2022, %



WATER NETWORK MAINTENANCE AND RELATED INVESTMENTS

We are continuously performing maintenance and rehabilitation works on the network to retain and improve the drinking water quality. To guarantee the availability of high-quality drinking water to our consumers we regularly clean and flush the water network. During the cleaning process the sediment build-up is removed from the pipes, which is one of the key methods for improving water quality in distribution networks. In 2022, the Company performed air-scouring works on a total of 137 km of water network. We also continued flushing the network to reduce water retention time in the pipes.

Table 9: WATER NETWORKS CLEANED IN 2018–2022, km

	2018	2019	2020	2021	2022
Cleaned water network	135	40	136	136	137

Investments in the replacement of old water pipes have contributed to both improved water quality at customer premises and a more efficient use of water resources. Each year, we renovate at least 5 km of wastewater network and 5 km of water network, in line with the Services Agreement signed with the City of Tallinn. In 2022, the Company reconstructed 19 km of water and wastewater networks, whereas 50.5% of all the reconstruction works were performed using no-dig methods.

LEAKAGES AND INTERRUPTIONS TO WATER SUPPLY

One of our key objectives is to keep the loss of water in the water distribution network at a minimum level. The Services Agreement applying to the licensed territory in Tallinn sets out the obligation for the Company to reduce the leakage rate to 26%. We have managed to keep the leakage at a considerably lower level than required for several consecutive years already, achieving 16.02% in 2022. Compared to previous years, the leak rate is slightly higher. This was affected by higher leakage rates at the beginning of the year, caused by the snowy and cold winter that prevented leak detection and access to pipelines.

Table 10: LEAKAGE RATES IN 2018–2022, %

	2018	2019	2020	2021	2022
Leakage rate	13.71	12.98	12.42	15.00	16.02

The monitoring of daily water loss helps to find leakages as fast as possible and reduce the leakage rate. Our specialists use specific equipment for finding leakages which, along with the zoning of network and remote reading system, allow faster detection of leakages in the network. In order to mitigate the inconveniences resulting from an interruption to the service, we try to notify our customers always in advance of any unplanned interruptions. In 2022, we gave prior notifications of unplanned water interruptions in 96.9% of the cases. As a provider of vital services, we deem it important to provide customers with a temporary water supply with water tanks in case of interruptions.

WATER METERING

The water meters we install to measure consumption are of high quality. All new water meters comply with the current European standards and European Measuring Instruments Directive along with the relevant accuracy requirements established therein. The expert studies and verification of water meters are performed by AS Metrosert, the national Central Office of Metrology.

We have installed a total of 25,635 water meters to customers' connection points. Verified water meters allow accurate measurement of water consumption.

Under the currently applicable Metrology Act, we are required to organize the verification of the water meters every five years if the readings of those meters serve as the basis for billing between the water company and customers.

In line with the previously prepared plan, we changed a total of 6,578 water meters in 2022. We will continue our work in 2023 to make sure that all our customers have water meters that are verified on time.

In line with the expectations of various stakeholders, we started the mass deployment of remote reading water meters in 2022. These meters work on an ultrasound principle and in a Narrowband Internet of Things network. We installed more than 1000 water meters for customers who had their water meters last verified 5 years ago by the last quarter of 2021. The plan is to install smart water meters for all the customer, following Company's regular water meter verification program, by the end of year 2026.

Collection of Wastewater

WASTEWATER NETWORK AND COLLECTION OF WASTEWATER

Wastewater is directed to the wastewater treatment plant through a combined sewer system that collects both sewage and stormwater. Some parts of our licensed territory are also covered with a separate storm system with stormwater outlets. However, most of the stormwater is collected to the combined sewer system and ends up at the Wastewater Treatment Plant at Paljassaare.

The condition of a wastewater network is well characterized by the number of blockages. Blockages are mainly caused by sediments build-up in the wastewater network or the misuse of wastewater network by consumers. Initially, the pipes were sized for higher flows, so today's lower water consumption has led to reductions in flow rates and flow speed, which in turn increases the risk of blockages. Continuous expansion of the operated sewer network is also affecting the total number of blockages.

Table 11: NUMBER OF BLOCKAGES IN 2018–2022, pcs

	2018	2019	2020	2021	2022
Number of blockages	650	573	485	553	628

The number of blockages in 2022 was similar to 2018. The number of blockages is affected by extreme weather conditions (both downpours and droughts) and, like 2018, 2022 also had a long dry summer period which led to an increased number of blockages. We have been able to achieve a steadily good level of blockages in the recent years due to numerous preventive actions, such as for example preventive jet washing of pipes. Jet washing uses high pressure to generate a fast flow that carries sediments inside pipes into the nearest cesspool. Sediments are then collected by jet-washing trucks and transported to the Wastewater Treatment Plant at Paljassaare.

Furthermore, the rehabilitation of at least 5 km of problematic sewers each year also contributes to the effectiveness of wastewater collection process.

SEWER DISCHARGE SERVICE

To serve the inhabitants whose properties have not been connected to the sewer system, the Company has provided two sewer discharge stations in Tallinn where septic trucks bring sewage from septic tanks. The availability of discharge stations helps to ensure that the sewage from septic tanks ends up at the wastewater treatment plant and gets treated to the required degree. Consequently, it diminishes the risk of environmental pollution that could, in the absence of a discharge station, result from discharging sewage in a manner and place not intended for such discharge. Since the second half of 2020, the Company has wastewater meters in place its sewer discharge stations to measure all the amounts of discharged sewage.

The sewer discharge services, delivering the sewage from septic tanks to the sewer discharge stations from where it ends up at the Wastewater Treatment Plant at Paljassaare, are provided by our partners in Tallinn. Although the number of inhabitants in Tallinn not connected to the sewer system remains below 1%, the amount of sewage transported from the septic tanks in Tallinn and its neighbouring municipalities to our discharge stations amounted to 54,094 m^3 in 2022.

POLLUTION LOAD FROM WASTEWATER AND STORMWATER

In order to ensure a stable pollution load in the wastewater entering the Wastewater Treatment Plant at Paljassaare, we regularly monitor the wastewater led off from sites in Tallinn and Maardu as well as in the surrounding areas, and check the compliance of pollution parameters with statutory requirements. In 2022, we took a total of 1,065 wastewater samples to identify the wastewater pollution load at various sites and 440 stormwater and other samples for monitoring purposes.

In 2022, the level of precipitation in Tallinn was 447 mm per area unit on average, being lower than in 2021 (620 mm). Consequently, the amount of stormwater and pollutants discharged to the environment through stormwater outlets decreased in 2022.

Table 12: AMOUNTS OF STORMWATER IN 2018–2022, mln m^3

	2018	2019	2020	2021	2022
Stormwater amount	3.8	4.2	4.9	3.9	2.6

According to the requirements specified in the environmental permit, we monitor 29 stormwater outlets, of which Lasnamäe, Rocca-al-Mare and Mustjõe outlets are the largest. In order to achieve the objectives of the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention), we try to prevent and reduce possible damage to the marine environment from the release of pollutants or waste. Every year, we clean up stormwater gullies to prevent pollutants from entering the sea. Starting from 2020, we carry out microbiological studies to detect illegal wastewater connections made to the stormwater system to reduce the amounts of pollutants in stormwater ending up in the receiving waters. Since 2015, we have also been monitoring the concentrations of hazardous substances in wastewater and in treated effluent under the Regulation No 61 issued by the Minister of the Environment.

Table 13: AVERAGE POLLUTANT CONCENTRATIONS FROM OUTLETS IN 2020–2022, mg/l

	2020	2021	2022	Limit value
BOD7	5.4	3.5	2.5	15
COD	37.5	23.5	18.3	125
Oil products	0.1	0.1	0.1	5
N_{Total}	5.2	3.4	3.5	45
P_{Total}	0.5	0.3	0.2	1
pH	8.0	7.9	7.9	6–9
Suspended solids	30.1	14.8	10.5	40

The pollutant concentrations depend on the amount of precipitation, seasonal variation and the time of sampling.

Wastewater Treatment

Wastewater collected from Tallinn and its surrounding areas is treated at the Wastewater Treatment Plant at Paljassaare. We work hard to maintain high standards and outperform the requirements set for the treated effluent discharged into the Baltic Sea. A total of 46,5 million m^3 of wastewater was treated at the Wastewater Treatment Plant at Paljassaare in 2022.

Table 14: AMOUNTS OF WASTEWATER TREATED IN 2018–2022, mln m^3

	2018	2019	2020	2021	2022
Treated wastewater amount	43.92	49.66	52.34	48.20	46.54

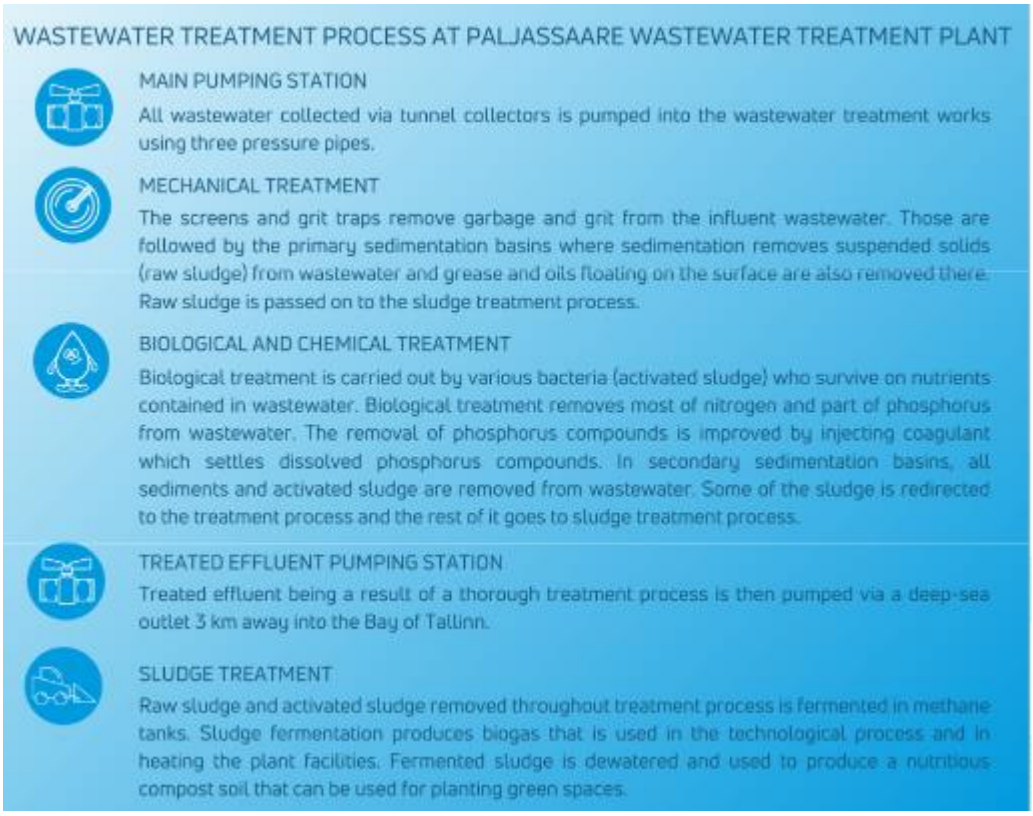


Figure 4: Description of wastewater treatment process at Paljassaare Water Treatment Plant

The pollutant parameters that are important for us include:

- BOD_7 — biological oxygen demand shows the amount of oxygen it takes to decompose the organic matter in the course of 7 days;
- COD_{Cr} — chemical oxygen demand is an indicator of the decomposition of organic matter, measuring the amount of oxygen consumed in chemical oxidation of all the organic matter present in water;
- SS — suspended solids show the amount of solid matter in water which is caught in a filter with a defined mesh size;
- N_{Total} and P_{Total} — total phosphorus and total nitrogen are nutrient salts, which foster the growth of plankton in water. Nitrogen and phosphorus compounds serve as nutrients for plants, leading to the eutrophication of water bodies when present in high quantities;
- oil products — shows the amount of non-volatile oil products in water.

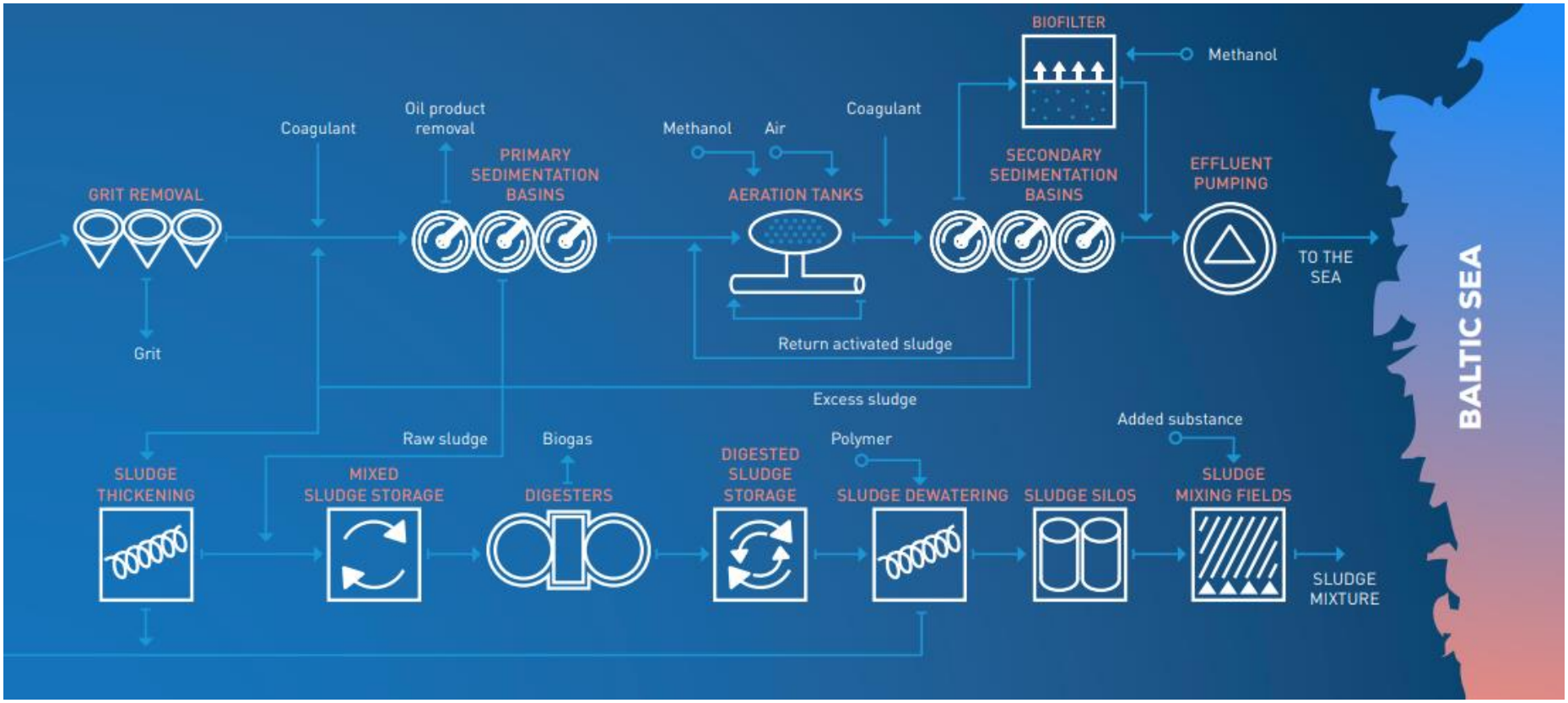
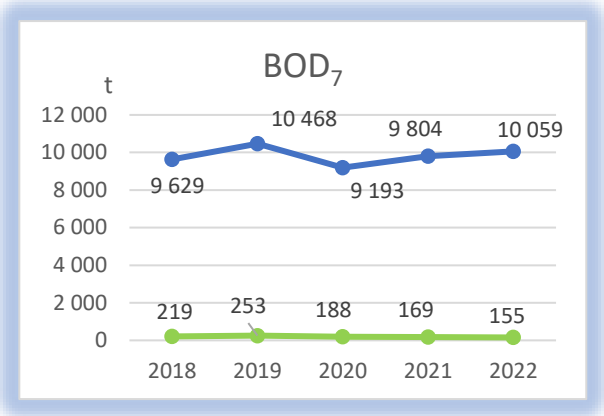
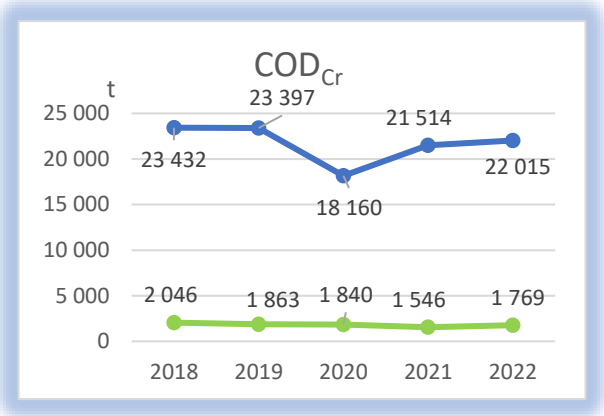
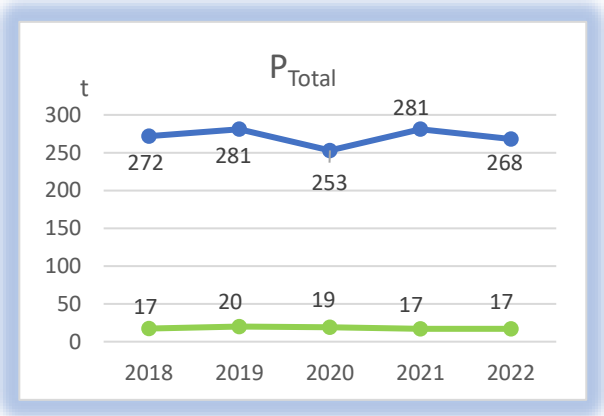


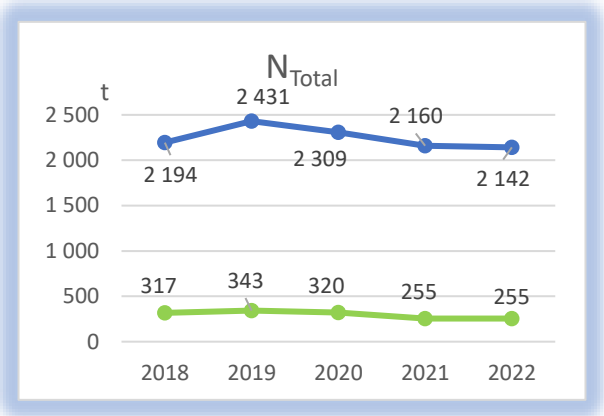
Figure 5. Wastewater treatment process at Paljassaare Wastewater Treatment Plant

Chart 3: AMOUNTS OF POLLUTANTS RECEIVED AT THE WASTEWATER TREATMENT PLANT AND DISCHARGED FROM THE PLANT INTO THE SEA IN 2018–2022, t/y









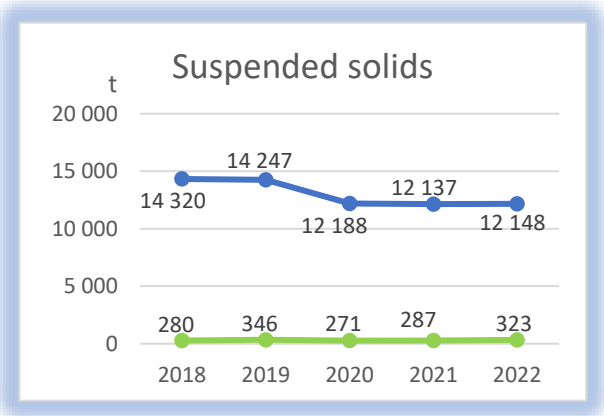
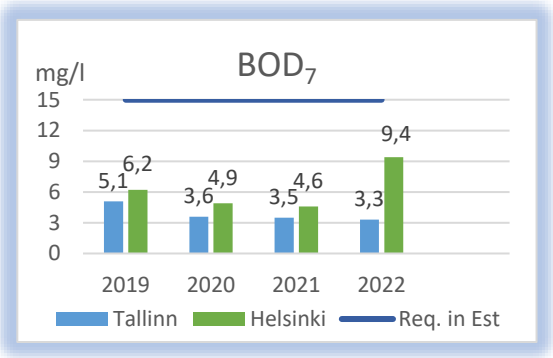
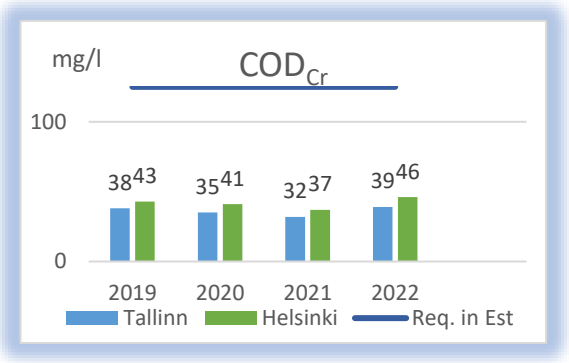
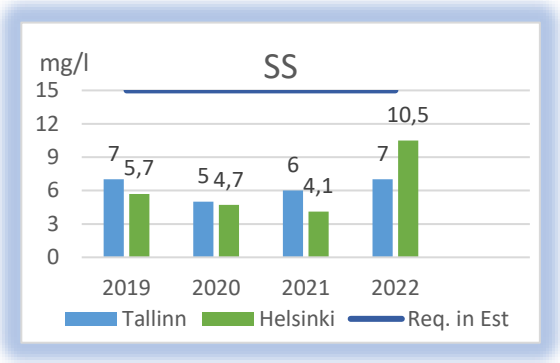
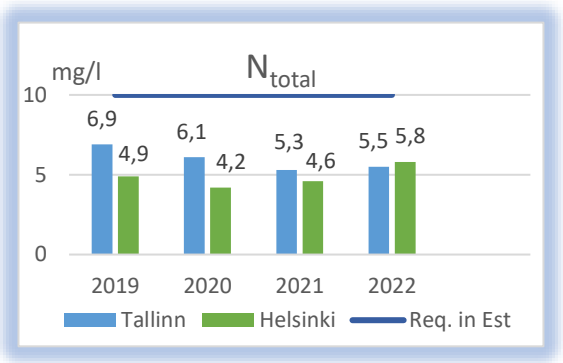


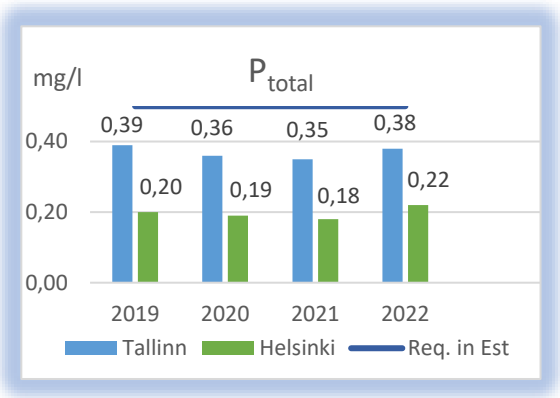
Chart 4: AVERAGE POLLUTION CONCENTRATIONS IN TREATED EFFLUENT IN 2018–2022, COMPARED TO MAXIMUM REGULATORY LIMITS AND PERFORMANCE OF HELSINKI HSY, mg/l











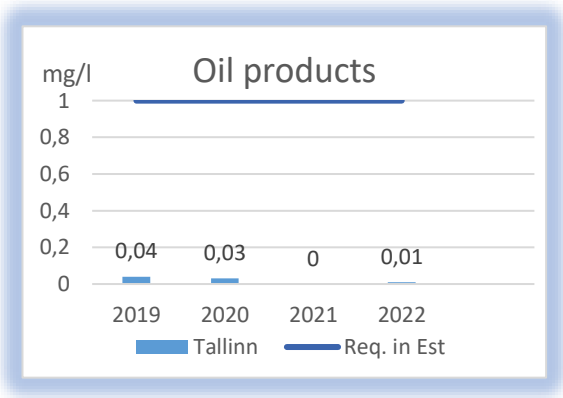
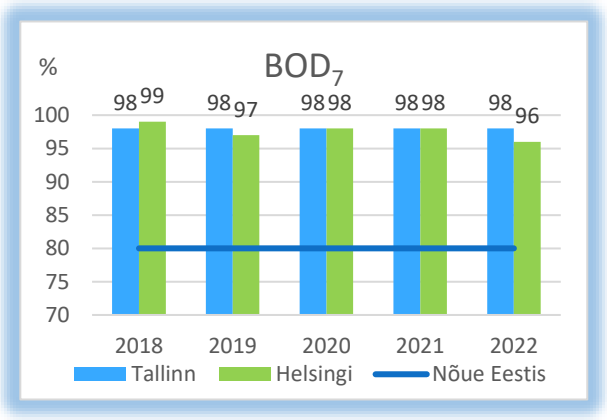
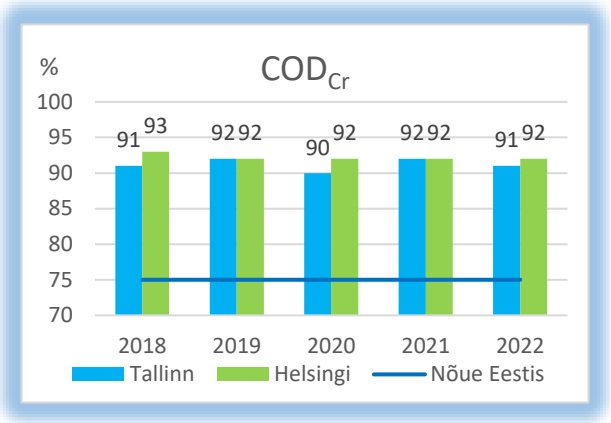
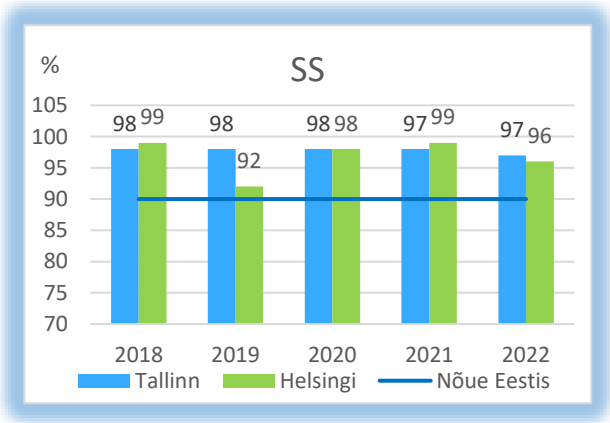
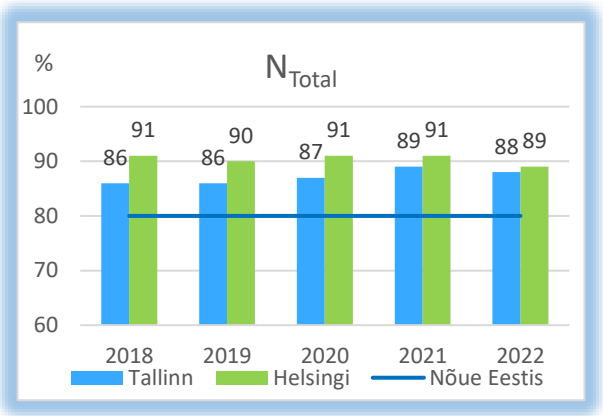


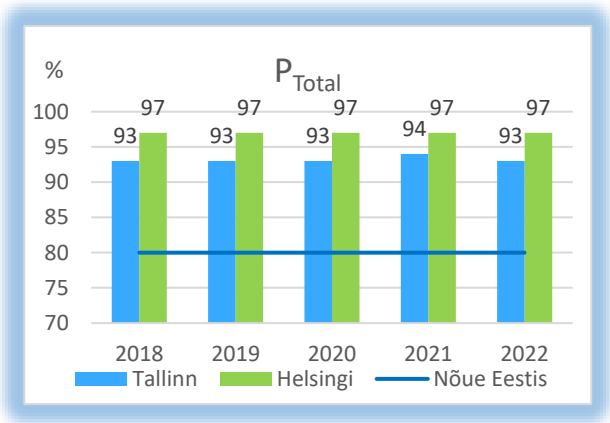
Chart 5: WASTEWATER TREATMENT PLANT'S TREATMENT EFFICIENCY IN 2018–2022, COMPARED TO MINIMUM REGULATORY REQUIREMENTS AND PERFORMANCE OF HELSINKI HSY, %

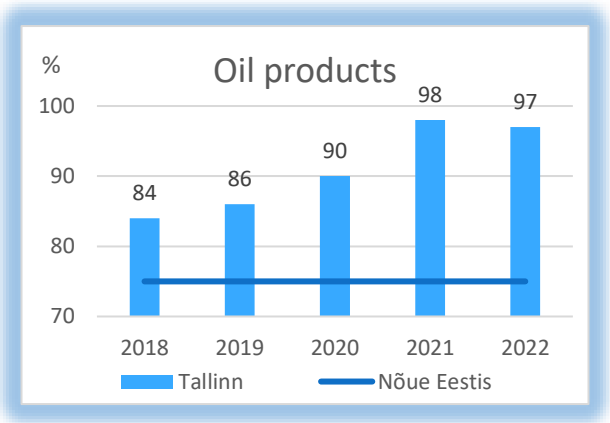












WASTEWATER DISCHARGED TO THE SEA

During 2022, no wastewater diluted with stormwater was discharged directly into the sea. Due to the shock loads exceeding the capacity of biological treatment, a total of 712,099 m^3 of highly diluted and only mechanically treated wastewater was discharged into the sea through a deep-sea outlet in 2022.

Table 15: WASTEWATER TREATMENT PLANT OVERFLOWS IN 2018–2022, thousand m^3/year

	2018	2019	2020	2021	2022
Untreated wastewater discharged to the sea	154.7	80.1	234.1	288.2	0.0
Partially treated wastewater discharged to the sea	590	928	1236	934	712

POLLUTION CHARGES

As a water company we are required to act in line with the environmental permits and pay pollution charges, the purpose of which is to prevent and reduce the potential damage caused by pollutants or waste released into the environment.

The calculation of pollution charge is established in the environmental permit and in the Environmental Charges Act, and applies to the pollutants contained in the effluent and stormwater at the particular outlets. Pollution charge calculations take into account both the receiving water coefficient of the specific outlet as well as compliance with the limit values set for pollutants. In 2022, the pollution charge paid for discharging pollutants into the receiving waters accounted for 2.2% of the cost of services sold (2021: 2.7%).

Use of Chemicals

With regard to the health and wellbeing of our employees, safe handling of chemicals at the work site is extremely important for us. To this end, we have created the conditions necessary for safe storage and use of all chemicals. In 2022, we used a total of 6,100 tons of various chemicals (2021: 5,981 tons) in our operations, whereas no reported accidents with chemicals occurred which could have caused harm to people or the environment.

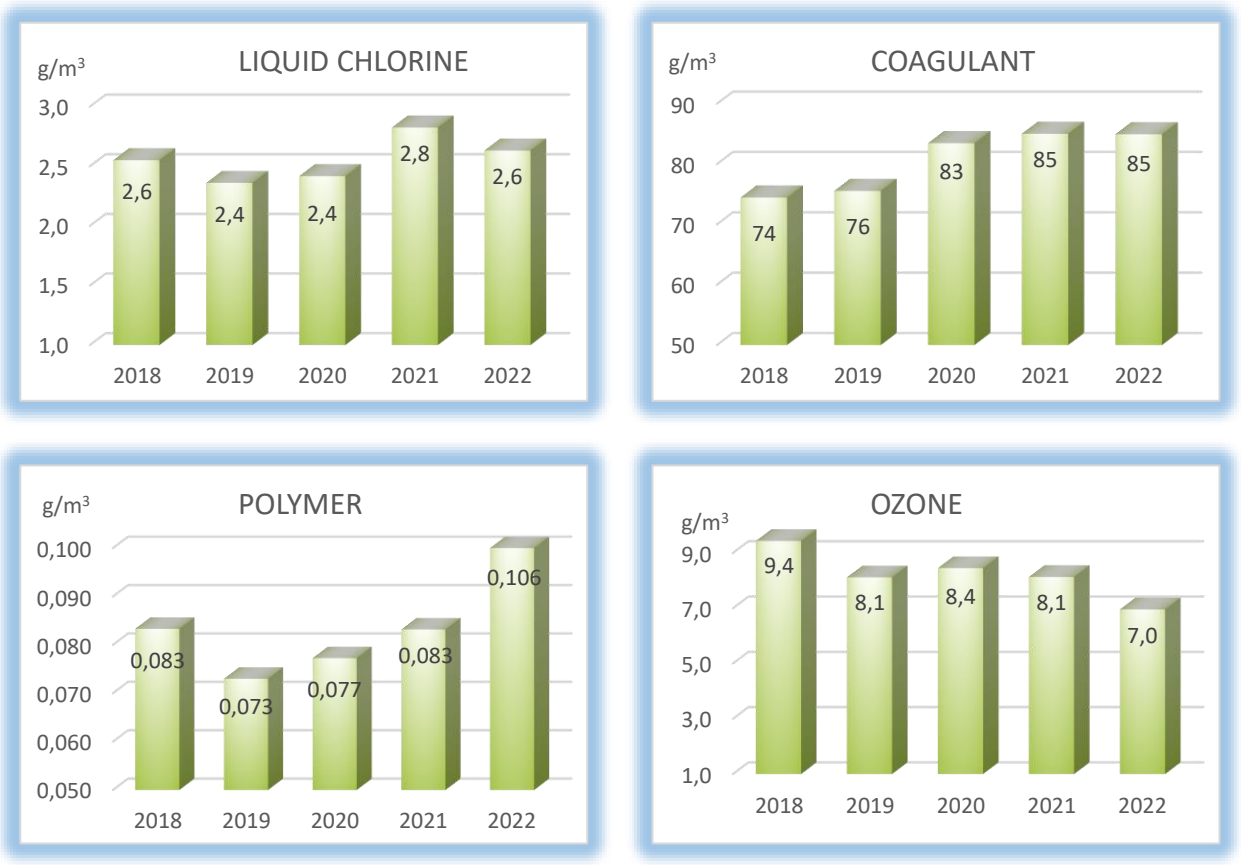
WATER TREATMENT CHEMICALS AND THEIR USE

- Chlorine is an effective disinfecting chemical with a long-term aftereffect. The Regulation No 61 ("Drinking Water Quality and Testing Requirements and Analysis Methods"), issued by the Minister of Social Affairs on 24 September 2019, specifies that the concentration of free chlorine added to the drinking water, produced out of surface water, can be up to 1.0 mg/l leaving the plant and up to 0.5 mg/l at consumer taps. We add chlorine in the final stage of the water treatment process to ensure the microbiological purity of the water and to help maintain water quality in the city's water distribution network. Chlorine has a strong oxidising effect and is extremely poisonous for aquatic microorganisms. Due to the chlorine stored and used, AS Tallinna Vesi classifies as a company with the risk of category B major accident in Estonia. By applying the necessary safety measures, we have minimized the likelihood of chlorine accidents.
- Ozone is a good and quick oxidiser, which effectively breaks down organic matter and microorganisms in raw water and improves the colour of water. Ozone is produced locally on site from ambient air and only in necessary quantities. With a closed process and absence of stock reserve, the environmental risk is taken to minimum.
- Coagulants and polymers are chemicals we use in the treatment process in significant amounts in liquid form. These chemicals are added within treatment to remove smaller particles (e.g., suspended solids and organic substance) from water. The coagulation process significantly reduces the concentration of organic matter in water.
- Sodium hypochlorite (NaOCl) is an effective chemical with a longer-term aftereffect, used by the Company mainly during summer in additional disinfection of drinking water in water pumping stations. NaOCl is added to drinking water to ensure microbiological purity of the water and to help maintain water quality in the city's water distribution network. Chlorine is added to the water before the water pumping station's reservoir to allow adequate contact time for chlorine in the reservoir.

Water quality in Lake Ülemiste is strongly dependent on the weather. However, long-term observations have indicated periodic changes in water quality also over the years. As in 2021, the quality of raw water in 2022 was affected by a warm summer and low levels of precipitation. Due to the warm summer, the evaporation from the water bodies was high, and as the precipitation was also low, Lake Ülemiste was supplied with additional water from the catchment system from spring to autumn.

The amounts of chlorine and coagulant used in the water treatment process have remained stable compared to previous years, ozone consumption has dropped mainly due to the good quality of water in the lake and amounts of polymer have increased to ensure better performance of the water treatment process.

Chart 6: AVERAGE USE OF WATER TREATMENT CHEMICALS PER UNIT OF PRODUCTION IN 2018–2022, g/m³

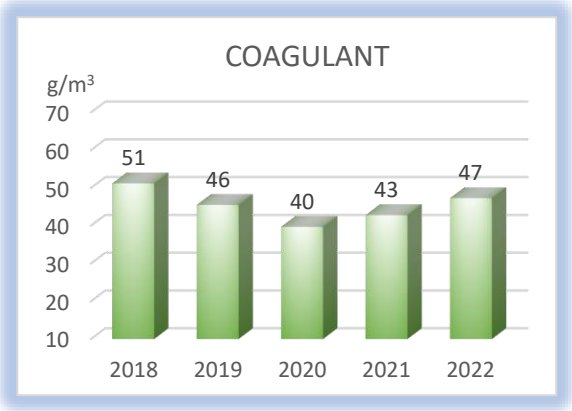


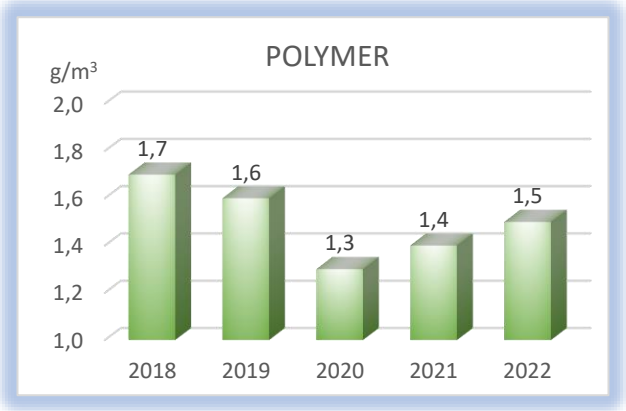
WASTEWATER TREATMENT CHEMICALS AND THEIR USE

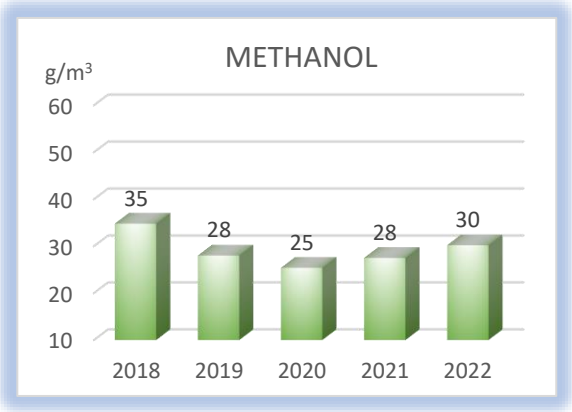
- Methanol is used at the wastewater treatment plant to increase the nitrogen removal efficiency of the bacteria participating in the biological treatment process. Due to the extremely explosive methanol used in the wastewater treatment, AS Tallinna Vesi classifies as a hazardous company in Estonia.
- Coagulants and polymers are chemicals used in the wastewater treatment process in large quantities. Coagulants are used for the chemical treatment of wastewater to remove phosphorus. Polymers are used to change the characteristics of sludge by accelerating the dewatering process.
- Anti-foaming agent is used to remove foam in digesters.

The amount of chemicals used in the wastewater treatment process is dependent on the pollution levels of incoming wastewater, which in turn are affected by the weather. The higher the concentration of pollutants in incoming wastewater and the lower the regulatory limits for pollutants in the treated effluent, the higher is the amount of chemicals used in the wastewater treatment process.

Chart 7: AVERAGE USE OF WASTEWATER TREATMENT CHEMICALS PER UNIT OF PRODUCTION IN 2018–2022, g/m³







Waste Management

WASTE GENERATION

A total of 51,853 tons of waste was generated in the Company in 2022. Sludge from the wastewater treatment process and excavated soil and stones from the pipeline construction constitute the largest part of waste generated.

Table 16: MAIN TYPES AND AMOUNTS OF WASTE IN 2018–2022, t

Type of waste	2018	2019	2020	2021	2022
Mixed municipal waste	72.0	45.1	62.0	81.5	65.5
Paper and cardboard *	5.7	5.7	5.6	6.1	7.0
Packages *	0.9	0.9	1.5	1.5	1.5
Biodegradable waste*	6.4	5.2	7.8	7.1	6.8
Waste from screens	904.4	893.8	882.2	900.7	905.6
Sewage sludge*	40,732.0	38,940.3	37,883.8	39,600.5	37,869.9
Sediments from grit traps	129.0	139.3	178.7	471.0	243.3
Excavated soil and stones	4,767.0	6,148.3	8,012.9	9,366.7	12,503.8
Asphalt waste	518.0	294.9	179.9	130.8	137.8
Construction and demolition waste*	25.6	6.8	2.3	70	47.5
Concrete and bricks	6.5	1.8	0.0	11.7	1.5
Metal scrap*	55.3	29.9	32.7	97.0	410
Hazardous waste	9.3	2.9	3.9	5.8	4.0
Other waste	146.0	6.4	6.3	17.0	17.8
TOTAL	***47,378***	***46,521***	***47,259***	***50,704***	***51,853***

* – can be recovered

Since the sewage sludge generated in the wastewater treatment process accounts for a very large proportion of the total amount of waste we generate, we continued to treat it further for recovery in 2022. Sludge stabilisation process (anaerobic digestion of sludge in digesters) produces biogas which is used to produce heat for the technological process and for heating the buildings. We analyse the samples of greening soil made from sewage sludge at least four times a year, as required by the Regulation No 29, issued by the Minister of Environment on 31 July 2019. The results of the treated sludge analyses were publicly available on the Company's website during the period when the greening soil was handed out.

In addition to sludge, the wastewater treatment process produces significant amounts of other types of waste, such as waste from screens, which we hand over to our waste handling partner. The amount of waste generated within the wastewater treatment process is directly affected by the incoming wastewater flows, the weather, and the efficiency of cleaning the streets and territories in the city. However, people also have an important role to play here as they can avoid throwing waste and hazardous substances into the sewerage system.

Excavated soil, stones, and asphalt waste account for the majority of waste resulting from the maintenance and repair works carried out on the networks. The amount of waste from construction and excavation works is again dependent on the amount of works. In 2022, the amounts of excavations increased and therefore the quantities of excavated soil waste increased as well. However, since 2013, we have been performing most of the reconstruction works on the networks using the so-called no-dig methods. No-dig methods allow carrying out

the works faster and reduce the inconvenience caused by traffic jams during the road works. 50.5% of reconstructions were performed using no-dig methods in 2022.

We collect and sort other types of waste, which account for a smaller proportion of the total amount of waste generated, and hand them over to waste handlers. We separate paper and cardboard, biodegradable waste, hazardous waste, metal, and mixed municipal waste.

SEWAGE SLUDGE

The Company has an integrated environmental permit (KKL-509326), issued in 2020, for handling the sewage sludge produced in the wastewater treatment process. The permit establishes technical and environmental requirements for the waste handling process.

Table 17: INTEGRATED ENVIRONMENTAL PERMIT ISSUED TO AS TALLINNA VESI

Number of integrated environmental permit	Valid until	Description
KKL-509326	Indefinite term	Issued for the recovery of waste on composting fields at Paljassaare, procedure code R12o – biological treatment preceding the recovery of waste

In 2022, a total of 37,870 tons of stabilised sewage sludge and 108 tons of non-stabilised sludge were taken out from the wastewater treatment process and composted to produce the greening soil (by mixing with milled peat and applying aerobic digestion in windrows). In 2022, the Company handed out 39,242 tons of sewage sludge that had been stabilised and had undergone aerobic digestion in composting windrows (hereinafter referred to as 'greening soil'). The main users of greening soil included agricultural companies OÜ Tubren Agro and OÜ Oru Agro.

Table 18: AMOUNTS OF SEWAGE SLUDGE AND GREENING SOIL IN 2018–2022, t/y

Type of sludge	Quantities				
	2018	2019	2020	2021	2022
Stabilised and dewatered sewage sludge taken out from the wastewater treatment process	40,732	36,789	35,200	39,395	37,870
Greening soil handed out (recovery of sewage sludge)	26,944	41,261	45,796	42,402	39,242

Energy Consumption

ELECTRICITY CONSUMPTION

The majority of electricity is used to run the Company's core processes: operating the water treatment plant, wastewater treatment plant and pumping stations on the network.

Although we have been making significant investments aimed at reducing electricity consumption, the energy consumption is still inevitably and closely connected to the operation of our core processes. Those are in turn affected by changes in consumption and licensed territories, as well as by the natural conditions.

From the second half of 2021, we only use electricity produced from renewable sources at our facilities and in the treatment process. Electricity consumption dropped in 2022 mainly due to high electricity prices and as a result optimized processes.

Table 19: ELECTRICITY CONSUMPTION IN 2018–2022, MWh

Unit	2018	2019	2020	2021	2022
Water Treatment	11,782	10,599	10,988	11,181	10,787
Wastewater Treatment	21,949	22,539	22,224	21,865	21,635
Pumping stations on networks, incl. Maardu	6,709	7,286	7,554	7,602	7,159
Other	962	855	622	716	721
TOTAL	***41,402***	***41,279***	***41,388***	***41,363***	***40,301***

The information provided this year for 'Other' electricity consumption in 2019 and 2020 varies from the data reported in the Environmental Report submitted in 2021 because the amount of overall electricity used in the offices in Ädala Street had not been reported in previous years. We have revised this table in the Environmental Report for 2022 and added previously unreported overall electricity consumption under 'Other' electricity consumption in 2019 and 2020.

Chart 8: ELECTRICITY CONSUMPTION PER UNIT OF WATER PRODUCTED AT THE WATER TREATMENT PLANT IN 2018–2022, kWh/m³

In 2022, the electricity consumption in the water treatment process was lower compared to previous years due to the reduced ozone production and optimized electricity consumption in the process.

Chart 9: ELECTRICITY CONSUMPTION PER UNIT OF WATER PRODUCTED AT THE WASTEWATER TREATMENT PLANT IN 2018–2022, kWh/m³

Amount of electricity used in the wastewater treatment process depends largely on the weather. In wastewater treatment, electricity is mainly spent on pumping wastewater and producing air, i.e., aerating activated sludge in the biological treatment stage.

HEAT ENERGY CONSUMPTION

In addition to heating the premises, we also need heat energy to keep our core operations running. At the water treatment plant, heat is produced at the local boiler house from natural gas that is outsourced. Offices in Ädala Street use central heating also powered by natural gas in our area. Most of the heat energy needed at the wastewater treatment plant is covered by biogas generated as a by-product on site.

Biogas is a by-product generated during the digestion of sewage sludge in digesters at the wastewater treatment plant. We use biogas to produce on-site heat energy that is used to heat the premises and keep the operational processes running at the wastewater treatment plant. Due to the nature of biogas production, we are sometimes forced to burn some of the biogas or use some small amounts of natural gas. In 2022, we used up 62% of all biogas generated to produce heat (2021: 63%).

Table 20: HEAT ENERGY CONSUMPTION IN 2018–2022, MWh

Unit	2018	2019	2020	2021	2022
Water Treatment	2,922	2,877	2,685	3,206	3,215
Wastewater Treatment	12,421	13,887	14,311	12,092	11,776
incl. heat energy from biogas	12,400	13,886	14,217	11,991	11,688
Offices in Ädala Street	1,148	1,189	1,215	1,398	1,334
TOTAL	***16,491***	***17,953***	***18,211***	***16,696***	***16,325***

Chart 10: BIOGAS PRODUCTION IN 2018–2022, thousand m³

TRANSPORTATION AND FUEL CONSUMPTION

Road transport accounts for the largest part of our need for transportation. The Company has a total of 99 vehicles to carry out various works and travel between the Company locations and numerous service sites. The largest group of vehicles is passenger cars and commercial vehicles, including also minivans and team vehicles. The Company has a total of 83 commercial vehicles and passenger cars and 16 other, special purpose vehicles (such as tractors, loaders, heavy-duty vehicles, etc).

Table 21: NUMBER OF VEHICLES AND FUEL CONSUMPTION IN 2020–2022

	2020	2021	2022
Total number of vehicles, pcs.	96	100	99
Petrol for vehicles, l	32,153	32,099	37,844
Diesel for vehicles, l	59,226	61,298	56,452
Fuel used by vehicles in total, l	**91,379**	**93,397**	**94,296**
Other petrol, l	4,015	3,306	3,237
Other diesel, l	96,430	96,095	119,266
Fuel used in total, l	**191,824**	**192,798**	**216,799**

From this year on, we provide data on real fuel consumption over the course of the year. The information presented in earlier Environmental Reports contained data on both used and stockpiled diesel fuels, so differences from the previously reported data occur.

We continue to try to control the fuel consumption mainly through fuel limits set for car users and the GPS-tracking devices. in 2022, we acquired the first fully electric car and plan to continue purchasing electric cars. Some of the cars are being shared by employees, i.e., all employees with specific authorisation are allowed to use the cars for their work assignments. This enables the Company to cut down the costs and contribute to the saving of natural resources. Furthermore, all new cars we purchase meet current emission standard requirements. The number of business trips made by our staff inside and outside Estonia is relatively small.

The increase in 'Other' diesel fuel is due to the purchase of a new sewage sludge windrow turner in mid-2021. In the past, sewage sludge windrows were turned 3 times a year, whereas with the new windrow turner, this is done every month. Mixing sewage sludge is necessary to provide sufficient aeration in compostable material to facilitate composting.

Emissions to Air

AS Tallinna Vesi has been issued one air pollution permit, which sets limit values for the sources of pollution at the Water Treatment Plant at Ülemiste and also regulates emissions of ozone produced for the treatment of drinking water. From the second half of 2020, an integrated environmental permit No KKL-509326 is valid for the sources of pollution at the Wastewater Treatment Plant at Paljassaare, which regulates air emissions from combustion units, grit traps, primary clarifiers, aeration tanks, secondary clarifiers, as well as from the sludge and composting fields. The Company pays a pollution charge for the pollutants released into ambient air.

Table 22: ENVIRONMENTAL PROTECTION PERMITS ISSUED TO AS TALLINNA VESI, REGULATING THE AMBIENT AIR POLLUTION

Number of permit	Valid until	Description
Air pollution permit No L.ÕV/319438	indefinite term	Applies to the pollution sources at Ülemiste Water Treatment Plant - the chimney of the boiler house, ozonation, diesel generator. Establishes the list of pollutants emitted into ambient air and the annual emission limits thereof.
Integrated environmental permit No KKL-509326	indefinite term	Applies to the pollution sources at Paljassaare Wastewater Treatment Plant, e.g., chimneys, ventilation pipes, composting fields, primary/secondary clarifiers, etc. Establishes the list of pollutants emitted into ambient air and the annual emission limits thereof.

Table 23: AMBIENT AIR POLLUTION FROM THE POLLUTION SOURCES AT WATER TREATMENT PLANT IN 2018–2022, t

Pollutant	Limit value	2018	2019	2020	2021	2022
Nitrogen dioxide	1.954	0.713	0.763	0.656	0.855	0.894
Carbon monoxide	1.846	0.686	0.688	0.602	0.801	0.812
Volatile organic compounds	0.125	0.046	0.047	0.041	0.054	0.056
Carbon dioxide	1688	634.00	623.00	548.31	736.28	736.34
Sulphur dioxide	0	0.001	0	0*	0	0
Total solid particles	0.004	0.001	0.003	0.006	0.002	0.003

* Sulphur dioxide pollution remained below the threshold limit

Table 24: AMBIENT AIR POLLUTION FROM THE POLLUTION SOURCES AT WASTEWATER TREATMENT PLANT IN 2018–2022, t

Pollutant	Limit value[1]	2018	2019	2020	2021	2022
Nitrogen dioxide	4.49	5.23	6.37	6.57	4.02	3.95
Carbon monoxide	3.15	5.23	6.37	6.21	2.82	2.76
Volatile organic compounds	14.50	0.33	0.39	3.96	14.45	14.41
Carbon dioxide	5789.49	3,186	5,293	5,715	5,262	5,167
Hydrogen sulphide	3.82	16.9	17.3	14.1	3.7	3.7
Ammonia	79.34			19.9	79.3	79.3
Sulphur dioxide	11.98			3.3	11.2	10.9
Total solid particles	4.35			0.87	4.0	3.8

[1] Limit values set in the integrated environmental permit No KKL-509326

Environmental Performance Indicators

In line with the EMAS (Regulation (EU) 2018/2026) requirements, we have outlined below the core indicators characterizing our performance in key environmental areas, such as energy efficiency, material efficiency, water, waste, biodiversity and emissions. At least three elements have been presented for each core indicator:

• a figure A indicating the total annual input/output in the given area;

• a figure B indicating the total amounts of pure water sold and wastewater and stormwater treated at the wastewater treatment plant throughout the year (million m^3);

• a figure R indicating the ratio A/B.

Table 25: ENVIRONMENTAL PERFORMANCE INDICATORS IN 2020–2022

Core environmental performance indicators	Year	Consumption (rounded), i.e., annual input (Figure A)	Annual output of the Company (Figure B)	Ratio R (A/B)
Electricity				
Electricity used, MWh	2022	40,301	64.1	628
	2021	41,363	65.7	630
	2020	41,388	69.9	592
Heat energy				
Heat energy produced from natural gas, MWh	2022	3,303	64.1	52
	2021	3,292	65.7	50
	2020	2,773	69.9	40
Heat energy produced from biogas, MWh	2022	11,688	64.1	182
	2021	12,006	65.7	182
	2020	14,224	69.9	203
Chemical consumption				
Liquid chlorine, t	2022	70	64.1	1.1
	2021	73	65.7	1.1
	2020	61	69.9	0.9
Coagulant, t	2022	4,463	64.1	70
	2021	4,259	65.7	65
	2020	4,187	69.9	60
Polymer, t	2022	144	64.1	2.2
	2021	70	65.7	1.1
	2020	69	69.9	1.0
Ozone, t	2022	185	64.1	2.9
	2021	210	65.7	3.2
	2020	213	69.9	3.1

Methanol, t	2022	1,404	64.1	22
	2021	1,326	65.7	20
	2020	1,330	69.9	19
Anti-foaming agent	2022	13	64.1	0.2
	2021	23	65.7	0.4
	2020	26	69.9	0.4
Water				
Process water, thousand m^3	2022	2,318	64.1	36
	2021	2,400	65.7	37
	2020	2,411	69.9	35
Surface water abstracted, thousand m^3	2022	26,603	64.1	415
	2021	25,850	65.7	394
	2020	25,242	69.9	361
Ground water abstracted, thousand m^3	2022	2,732	64.1	43
	2021	2,954	65.7	45
	2020	2,735	69.9	39
Waste				
Mixed municipal waste, t	2022	65.5	64.1	1.0
	2021	81.5	65.7	1.2
	2020	62.0	69.9	0.9
Recycled paper and cardboard, t	2022	7.0	64.1	01
	2021	61	65.7	0.1
	2020	5.6	69.9	0.1
Recycled packages, t	2022	1.5	64.1	0.02
	2021	1.5	65.7	0.02
	2020	1.5	69.9	0.02
Recycled biodegradable waste, t	2022	6.8	64.1	0.1
	2021	7.1	65.7	0.1
	2020	7.8	69.9	0.1
Waste from screens, t	2022	906	64.1	14
	2021	901	65.7	14
	2020	882	69.9	13
Sewage sludge, t	2022	37,870	64.1	590
	2021	39,601	65.7	603
	2020	37,884	69.9	542
Sediments from grit traps, t	2022	243	64.1	3.8
	2021	471	65.7	7.2
	2020	179	69.9	2.6
Excavated soil and stones, t	2022	12,504	64.1	195
	2021	9,367	65.7	143
	2020	8,013	69.9	115
Asphalt waste, t	2022	138	64.1	2
	2021	131	65.7	2
	2020	180	69.9	3
Construction and demolition waste, t	2022	47.5	64.1	0.7
	2021	7.0	65.7	0.1
	2020	2.3	69.9	0.0
Concrete and bricks, t	2022	1.5	64.1	0.0
	2021	11.7	65.7	0.2
	2020	0.0	69.9	0.0

Recycled metal, t	2022	41.0	64.1	0.6
	2021	97.0	65.7	1.5
	2020	32.7	69.9	0.5
Hazardous waste, t	2022	4.0	64.1	0.1
	2021	5.8	65.7	0.1
	2020	3.9	69.9	0.1
Other waste, t	2022	17.8	64.1	0.3
	2021	17.0	65.7	0.3
	2020	6.3	69.9	0.1
Biological diversity				
Use of land as a total size of the land owned by the company, ha	2022	355.4	64.1	5.5
	2021	355.3	65.7	5.4
	2020	355.3	69.9	5.1
Total sealed area, ha	2022	118.1	64.1	1.8
	2021	118.0	65.7	1.8
	2020	118.0	69.9	1.7
Emissions to air				
Nitrogen dioxide, t	2022	4.8	64.1	0.1
	2021	4.9	65.7	0.1
	2020	7.2	69.9	0.1
Carbon monoxide, t	2022	3.6	64.1	0.1
	2021	3.6	65.7	0.1
	2020	6.8	69.9	0.1
Volatile organic compounds, t	2022	14.5	64.1	0.23
	2021	14.5	65.7	0.22
	2020	4.0	69.9	0.06
Carbon dioxide, t	2022	5,903	64.1	92
	2021	5,998	65.7	91
	2020	6,263	69.9	90
Sulphur dioxide, t	2022	10.9	64.1	0.17
	2021	11.2	65.7	0.17
	2020	3.3	69.9	0.05
Total solid particles, t	2022	3.8	64.1	0.06
	2021	4.0	65.7	0.06
	2020	0.9	69.9	0.01
Hydrogen sulphide, t	2022	4	64.1	0.1
	2021	4	65.7	0.1
	2020	14	69.9	0.2
Ammonia, t	2022	79	64.1	1.2
	2021	79	65.7	1.2
	2020	20	69.9	0.3
Environmental education				
Number of children participated in group discussions	2022	960	64.1	15.0
	2021	0	65.7	0.0
	2020	240	69.9	3.4

Best Environmental Management Practices and Environmental Performance Indicators

The Environmental Report for 2022 takes into account the Commission Decision (EU) 2019/61, which sets out the best environmental management practices and environmental performance indicators for water metering, water leakages, energy-efficient wastewater treatment and energy recovery from wastewater treatment that are related to significant environmental aspects.

Deploying water metering

Water meters are installed for all consumers who have signed a contract. The water supply network is continuously monitored to allow quick reaction to any changes in the network. Consumers are invoice based on the water meter readings.

Table 26: ENVIRONMENTAL PERFORMANCE INDICATORS IN DEPLOYING WATER METERING

Environmental performance indicators[1]	Benchmarks of excellence[2]	AS Tallinna Vesi's environmental performance indicators
Penetration rate of water metering (% of consumers, % of water consumption covered by metering)	The penetration rate of water meters at household or final user level is 99% or higher	All consumers who have signed a contract have water meters installed
Reduction in water use by final users after installation of water meters and/or smart meters (l/user)	All new buildings are equipped with water meters (smart meters in water-scarce areas)	All buildings have water meters

Minimising water leakages

In order to minimise water leakages, the water distribution system is continuously monitored:

1) carry out a detailed water balance of the water distribution system and manage water pressure, avoiding high levels: pumping stations are equipped with SCADA control system;

2) analyse the water distribution network and divide it into adequate district metering areas to detect water leakages: multi-zone sensors in use, which measure pressure, flow rates and noise;

3) respond promptly and adequately to the identified faults and leakages on the network: after detecting and locating the leak, information is transmitted momentarily to plan the repair;

4) establish a database to list and geo-reference all technical installations, the age of pipes, types of pipes, hydraulic data, previous interventions, etc.: Tekla geo-reference system in place, which collects the said data.

[1] Commission Decision (EU) 2019/61, published ELT L 17, 18.1.2019, page 35, i97); i99)

[2] Commission Decision (EU) 2019/61, published ELT L 17, 18.1.2019, page 35, b31); b33)

Table 27: ENVIRONMENTAL PERFORMANCE INDICATORS IN MINIMISING WATER LEAKAGES

Environmental performance indicators[3]	AS Tallinna Vesi's environmental performance indicators
Percentage of water loss out of the system input volume (%)	Water loss in the network was 16.02% in 2022

Energy efficient wastewater treatment

According to the best environmental management practices:

1) at the average dry weather wastewater flow of 5,000 m^3/t, the capacity of the biological treatment is up to 14,000 m^3/t, which is twice the average dry weather wastewater flow;

2) wastewater is biologically treated at nitrifying conditions, performing nitrification and denitrification, as well as chemical phosphorus removal;

3) incoming wastewater and treated effluent discharged are monitored on a daily basis;

6) primary and excess sludge are stabilised in anaerobic digesters;

7) anaerobically stabilised sludge is dewatered;

8) energy-efficient fine bubble aeration systems in the biological stage and energy-efficient pumps are in use.

Table 28: ENVIRONMENTAL PERFORMANCE INDICATORS IN WASTEWATER TREATMENT

Environmental performance indicators[4]	Benchmarks of excellence[5]	AS Tallinna Vesi's environmental performance indicators
Concentrations in the discharged final effluent or removal efficiencies of COD, BOD_5, ammonia, total nitrogen and total phosphorus (mg/l, %)	The removal efficiencies achieved are: at least 98% for BOD_5, at least 90% for COD, at least 90% for ammonia, at least 80% for total organic nitrogen compounds, and at least 90% for total phosphorus	Removal efficiencies achieved in 2022: BOD_5* – 98%, COD – 91%, N_{Total} – 88% P_{Total} – 93%
Electricity use of the wastewater treatment plant per mass of BOD_5 removed (kWh/kg of BOD_5 removed)	–	2.54 kWh/kg*
Electricity use of the wastewater treatment plant per volume treated (kWh/m^3 of wastewater treated)	–	0.45 kWh/m^3

[3] Commission Decision (EU) 2019/61, published ELT L 17, 18.1.2019, page 35, i100)

[4] Commission Decision (EU) 2019/61, published ELT L 17, 18.1.2019, page 36, i102); i103); i104); i105)

[5] Commission Decision (EU) 2019/61, published ELT L 17, 18.1.2019, page 36, b35); b36)

Annual electricity use of the wastewater treatment plant per population equivalents (kWh/population equivalents/year)	The electricity use of the wastewater treatment plant is: 1) lower than 18 kWh/population equivalents/year for large municipal wastewater treatment plants (with a size of more than 10,000 population equivalents) 2) lower than 25 kWh/population equivalents/year for small municipal wastewater treatment plants (with a size of less than 10,000 population equivalents)	40.5 kWh/population equivalent

* This indicator for BOD_5 is calculated as per BOD_7 removed (2.17 kWh/kg).

UNAEROBIC DIGESTION OF SLUDGE AND OPTIMAL ENERGY RECOVERY

Primary and excess sludge is stabilised in anaerobic digesters and biogas produced from sludge is used to heat the buildings and anaerobic digestion processes.

The plan is to set up a cogeneration plant for producing electricity and heat at the wastewater treatment plant by the end of 2023. The cogeneration plant will use the biogas produced as fuel and, under the best conditions, it will be able to cover the total heat consumption and at least one third of the electricity consumption of the plant. In the future, the plan is to further increase the electricity generation capacity by installing solar panels.

Table 29: ENVIRONMENTAL PERFORMANCE INDICATORS IN ENERGY RECOVERY

Environmental performance indicators[6]	Benchmarks of excellence[7]	AS Tallinna Vesi's environmental performance indicators
Percentage of electricity and heat needs of the wastewater treatment plant met by own-generated electricity and heat from biogas on an annual basis (%)	Own-generated electricity and heat from biogas cover 100% of the energy demand at municipal wastewater treatment plants with a size of more than 100,000 population equivalents without on-site thermal sludge drying, and 50% in the case of plants with on-site thermal sludge drying	100% of heat
Electrical efficiency of the generator fuelled with biogas (%)	–	No generator
Specific biogas production (Nℓ/kg organic dry matter input)	–	No biogas valorisation

[6] Commission Decision (EU) 2019/61, published ELT L 17, 18.1.2019, page 37, i108); i109); i110)

[7] Commission Decision (EU) 2019/61, published ELT L 17, 18.1.2019, page 37, b39)

Significant Changes in the Environmental Report

We have added two significant aspects with negative impact in the Environmental Report for 2022. One new aspect concerns illegal connections to sewer and stormwater network, and another new aspect concerns the discharge of polluted stormwater into the sea.

We have included CO_2 footprint calculation results for 2020 and 2022 and outlined the Company's Climate Impact Reduction Plan in the Environmental Report for 2022.

Previously, we reported quantities of suspended solids and oil products (t) from the stormwater outlets (Table 13) under section "Pollution load from wastewater and stormwater". As of this year, we present in this section the average concentrations of pollutants from outlets (mg/l) monitored based on the requirements established in the environmental protection permit issued at the end of 2019 (KL-506050).

We have added data on the overall electricity used in the offices in Ädala Street, which had not been reported in previous years, to 'Other' electricity consumption in 2019 and 2020.

In addition, we have changed the presentation of fuel consumption compared to previous years in Table 21. In previous years, we provided data on the total amount of fuels purchased (incl. stockpiled diesel fuel). This year, we have presented only fuels used by vehicles and other generators and mechanisms.

In previous years, Table 25 included duplicated data on electricity used. Furthermore, differences occur from the quantities of natural gas and biogas presented in previous Environmental Reports. These differences are due to an earlier error in converting units. The formulas used have been revised and corrected.

Validation of the Environmental Report

Bureau Veritas Estonia OÜ, an accredited verifier EE-V-0002, having inspected the Environmental Management System and the Environmental Report for 2022 of AS Tallinna Vesi, confirms that the information and data in the organisation's Environmental Report are reliable, credible and correct and meet the requirements of the Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme. The Commission Regulation (EU) 2017/1505 of 28 August 2017 and the Commission Regulation (EU) 2018/2026 of 19 December 2018 amending the annexes I, II, III and IV to the Regulation (EC) No 1221/2009 of the European Parliament and of the Council, have been applied to this report.

The Environmental Report has been validated on 04/08/2023

Janno Semidor

EMAS Verifier

Bureau Veritas Eesti OÜ

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REG.NO. EE-000001