AS Tallinna Vesi

Environmental Report 2023

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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 recognize this huge responsibility and are committed to minimising the impact of our activities on nature, while providing a reliable and high-quality service to our customers. In 2023, we took important steps towards meeting the ambitious targets set for ourselves in the Climate Impact Reduction Plan. Among other initiatives, we started testing the power generation in the combined heat and power plant installed at the wastewater treatment plant at the end of the year, and successfully launched pipe maintenance service using ice-pigging method, which is better for the environment than any of the methods used so far.

Investments in infrastructure and in water and wastewater treatment

To ensure sustainable infrastructure and service continuity, we have set out to increase investment in our fixed assets. In 2023, we invested 39 percent more, or nearly 35 million euros, in our assets compared to the previous year, including the construction and rehabilitation of more than 27 kilometers of water and wastewater networks. In addition, to ensure security of supply, in 2023 we built another pressure pipeline for the Teletorni wastewater pumping station and rehabilitated the supply pipeline of the Lasnamäe booster pumping station.

At the Ülemiste Water Treatment Plant, the renovation of the high-speed filters was completed and the renovation of the clarifiers began. Preparations are also underway for two major projects — upgrading the ozone production and converting the floating layer clarifiers into flotators. At the Paljassaare Wastewater Treatment Plant, the first of two biogas producing digesters was reconstructed. A new pump has been installed at the main pumping station before the headworks, the reconstruction of the effluent outlet tower at the plant has been completed and the reconstruction works on the aeration tanks are ongoing. Towards the end of the year, testing started in the combined heat and power plant installed at the wastewater treatment plant, which converts the biogas generated during sewage sludge stabilization process into electricity and heat.

The investment plan for the coming years is based on the Tallinn Public Water Supply and Sewerage Development Plan for the years 2023-2034 and aims to reduce the environmental impact of water consumption, ensure the continuity of services and the sustainable development of the urban space.

Current and future investments will continue to ensure high-quality drinking water for Tallinners and help keep nature clean. Using modern technology and materials will increase the average life of pipes and improve treatment efficiency. In this way, we can ensure the continuity of a vital service at an affordable price and with the least possible disruption to people's daily lives.

Reducing environmental impacts

In addition to investments in water and wastewater treatment and a well-maintained water and wastewater network, we have started to take decisive action to reduce the company's environmental impact. To this end, we have developed a Climate Impact Reduction Plan for the company, which sets out a number of ambitious targets.

In 2023, we moved closer to achieving the targets set in the plan with a number of actions. For example, to increase the share of self-generated energy, a combined heat and power plant was built at the Paljassaare Wastewater Treatment Plant. The power and heat generated from biogas, a by-product of the sewage sludge stabilization in the wastewater treatment process, will be used entirely by the wastewater treatment plant itself, and this can cover up to 70% of the wastewater treatment plant's current average annual electricity demand. In addition, electricity generated from wastewater will power all the company's electric cars. This is an important step for us as we move towards carbon neutrality.

This was supported by another major project launched in 2023 at the Paljassaare Wastewater Treatment Plant. In particular, reconstruction of one of the two digesters, which will now allow more biogas to be produced from the sewage sludge and thus increase the output of the CHP plant. In 2024, also the second digester will be reconstructed.

We will also continue to reduce the environmental impact of our networks. In 2023, we rehabilitated more than 12 km of pipelines using no-dig methods, which reduce both the environmental impact and the disruption to customers. Subsidiary company Watercom successfully launched a pipe maintenance service using ice-pigging technology in 2023. Ice-pigging is many times more efficient and faster than any other method of maintenance used so far, and is also better for the environment. More than 140 km of water mains were cleaned during the year using this method.

The process of digitisation is also ongoing, supported by the transition to remote reading water meters. By the end of 2023, more than 40% of Tallinna Vesi's customers had a smart meter installed. By the end of 2026, the entire service area will be covered with smart water meters. Smart meters are accurate, safe and reliable. In addition to consumption data, they also provide information on faults and possible leaks. This, in turn, helps to save clean water and the resources needed to treat it.

High-quality drinking water and treated effluent

The quality of drinking water in Tallinn remained consistently high, with 99.9% of water samples taken from consumers' taps meeting requirements. A total of 3,170 water samples were taken from consumers' taps in 2023. High-quality tap water is ensured by continuous development and maintenance of the water network.

The quality of the effluent treated at the Paljassaare Wastewater Treatment Plant remained very good in 2023, again exceeding a number of quality standards. We monitor the concentration of pollutants in the wastewater received at the treatment plant and in the effluent leaving the plant to assess the efficiency of the treatment process and the quality of the effluent. During 2023, we removed more than 800 tons of debris, 200 tons of grit, 1800 tons of nitrogen and 240 tons of phosphorus from wastewater.

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, the media, kindergartens and schools.

In 2023, we organized open days at the Ülemiste Water Treatment Plant and Paljassaare Wastewater Treatment Plant. In addition to open days, we organised guided tours for schools to water treatment plants and held discussion groups on the topics related to water and the environment in kindergartens. We continue to support public events in our service area by providing clean drinking water. In 2023, we also installed three new public drinking water taps.

We provide a vital service to almost a third of Estonia's population, so it is vital that our customers are satisfied with our work. Each year, an independent research company, Kantar Emor, conducts a satisfaction survey among our customers. The results of the survey show satisfaction both among contractual customers and end-users who do not have a direct contract with us, for example, residents of apartment buildings. The 2023 survey showed that nearly 90% of customers drink tap water, which is a sign of their trust and the good quality of the water. We want to continue to provide a high-quality service to our customers and to improve the customer experience in all areas.

Finally, I would like to thank the entire dedicated team of Tallinna Vesi and Watercom, the members of the Supervisory Council and our customers, consumers and partners for the good 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 24,000 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 2023, AS Tallinna Vesi employed 282 people. The activities of the company according to NACE are 3600 and 3700.

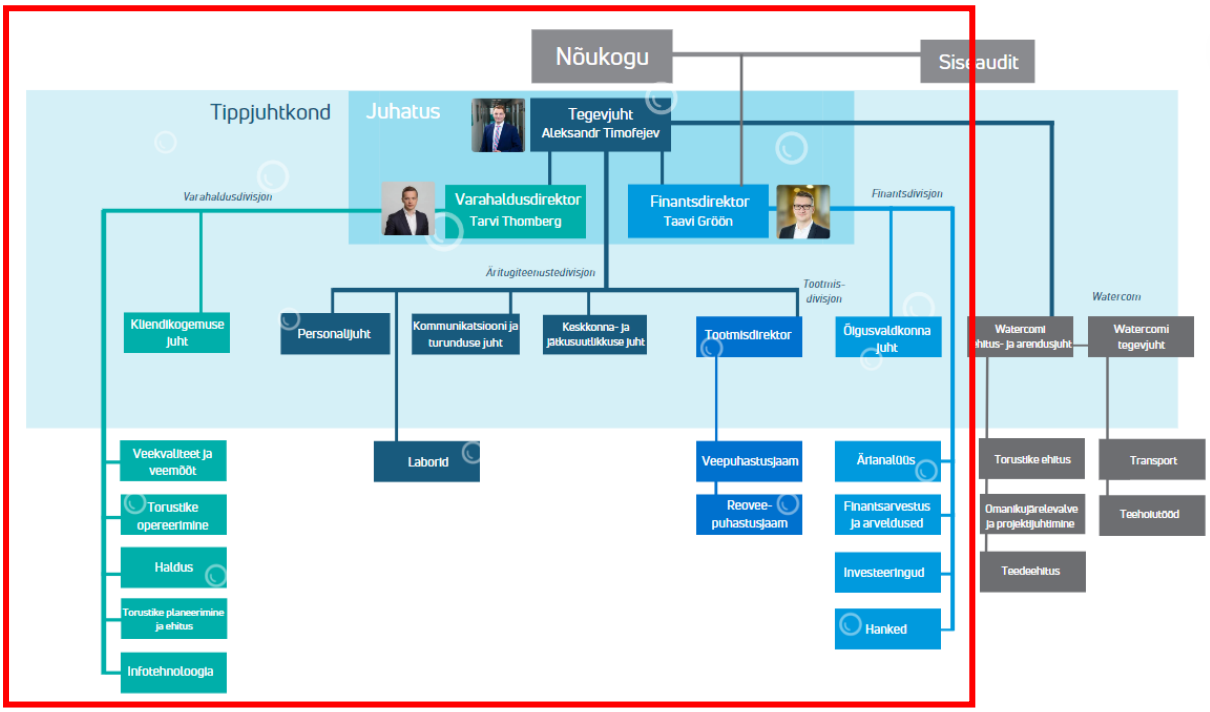


Figure 1: The structures of AS Tallinna Vesi and Watercom OÜ. EMAS is only implemented in AS Tallinna Vesi (marked in red)

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, 22 water pumping stations and 49 ground water pumping stations with 91 boreholes. The catchment area in Harju and Järva Counties covers around 1,800 km^2.

The public sewerage system comprises also nearly 1,200 km of wastewater network, 520 km of stormwater network and 178 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 targets 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.

Table 1: SIGNIFICANT ENVIRONMENTAL ASPECTS AND OBJECTIVES IN 2023

Activity	Environmental aspect	Direct or indirect impact	Environmental impact of the aspect	Impact trend*	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 generation	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	Use of natural resources for the production of electricity	Indirect	Natural resource depletion, greenhouse gas emissions from biomass electricity production	-	Analyse electricity consumption, purchase more energy-efficient equipment and use more energy-saving modes, increase electricity production from biogas and solar energy. Construction of a separate sewerage 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 for own use	Use of water resource	Direct	Increased need for water treatment and the resulting further use of resource and effects on the environment	-	Improve analysis and control, reduce the amount of water for own use in production by improving processes and in networks by using the ice-pigging method
Supply consumers with clean drinking water meeting all the requirements	Waste prevention	Indirect	High-quality drinking water has a positive impact on public health. Consumers can choose tap water over bottled water, reducing the environmental impact of single-use plastic bottles	+	Continuous work in all stages of water treatment and distribution, publish information about water quality, maintain the sanitary protection areas,

					hold awareness campaigns, provide drinking water at public events and from public water taps
Illegal connections to sewer and storm-water network	Risk of environmental pollution	Direct	Causes environmental pollution, adversely affecting the marine environment, -life and the quality of living environment	-	Find and close illegal connections
Wastewater treatment	Exhaust and greenhouse gas emissions	Direct	Exhaust gas emissions adversely affect ambient air quality and nature, and GHG emissions cause global warming	-	Commission the CHP plant, reconstruct the technology, implement the Climate Impact Reduction Plan
Sludge handling	Avoiding landfilling of sewage sludge	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 and waste from the wastewater	Direct	Environmental pollution, adversely affecting the marine environment, -life and the quality of the living environment	-	Reconstruct the treatment process, extend the separate sewer system in cooperation with the Tallinn City
Discharge of partly untreated waste-water into the environment	Pollutants from wastewater	Direct	Non-compliant water adversely affects the marine environment, - life and the quality of the living environment	-	Continuously analyze and monitor treatment process
Discharge of treated effluent into the sea	Pollutants from wastewater	Direct	Discharges (both compliant and non-compliant) adversely affect the marine environment, -life and the quality of the living environment	-	Analyse, monitor and, if necessary, reconstruct the treatment process
Discharge of polluted stormwater into the sea	Pollutants from stormwater	Direct	Polluted stormwater (microplastics, nutrients) adversely affects the marine environment, -life and the quality of the 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 2023

Objective	Indicator	Result by the end of 2023
Reduce the percentage of clean water losses by reducing the leakages	≤ 14%	12.93%
Activities comply with the terms set out in the environmental permits issued by the Environmental Board	0 non-compliances	1 non-compliance: Due to a communication failure at the Laagri wastewater pumping station, the pumps stopped pumping and the emergency system failed to start, and an estimated 240 m^3 of untreated wastewater was discharged into the environment. The amount of wastewater discharged into the environment was declared in the KOTKAS information system and the pollution charge was paid. It was an accident, and the Environment Agency did not initiate misdemeanour proceedings, but the company considered it a non-compliance with environmental requirements
Stabilised sewage sludge recovery	0 tons of stabilised sewage sludge landfilled	37,888 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
Reconstruct the fish pass on Vaskjala water reservoir	The fish pass is reconstructed	The fish pass is reconstructed
Set up a CHP plant at the wastewater treatment plant	Electricity production > 0 kWh	The CHP plant produced ca 450 MWh of electricity during 2023
Reduce the company's electricity consumption	Electricity consumption has dropped by 400,000 kWh compared to 2022	The target was not met, as about 6.5 million m^3 more wastewater entered the treatment plant for treatment compared to 2022, and wastewater treatment required more electricity
Reduce the quantities of waste generated with the construction and rehabilitation of water and wastewater networks by increasing the use of no-dig methods	25% of all rehabilitation works related to sewer systems are carried out using no-dig methods	46% of all rehabilitation works related to sewer systems were carried out using no-dig methods
Raise the environmental awareness of various stakeholders reg. the company's activity to improve and keep the company's good image (reputation)	≥ 1,500 people participated in classes/tours ≥ 4 water- and environment related campaigns or participations in outdoor events (incl. open houses) World Water Day and environmental awareness month activities carried out	2,667 people participated in discussion groups/tours. Participated in at least 4 outdoor events (open day at WWTP and WTP as

	part of Open House Tallinn, Impact Day, Tallinn Old Town Days). A media article highlighting the importance of clean water and wastewater treatment was published on World Water Day. The company's environmental awareness month was held in June.

Table 3: ENVIRONMENTAL OBJECTIVES FOR 2024

Objective	Actions	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 2024
Reduce the company's process water consumption	Reuse of filter backwash water and installation of screens on technical water at the WWTP	Activities carried out	December 2024
Reduce the number of sewer blockages compared to 2023	Timely network maintenance	Number of blockages per year < 533	December 2024
Increase the number of people using public sewerage by reducing the number of people treating wastewater locally	Encourage customers to use the already installed supply points	Reduce the number of idle supply points by 10%	December 2024
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 2024
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 2024
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 2024
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 2024
Produce our own electricity	Produce electricity from biogas as well as heat	17% of the company's total electricity generation is produced with CHP	December 2024
Replace natural gas at the WTP	Connect WTP to district heating network	Connection to the district heating network at the WTP is completed	December 2024
Reduce the quantities of waste generated with the construction and rehabilitation of water and wastewater networks by increasing the use of no-dig methods	Carry out as much sewer rehabilitation as possible using no-dig methods	25% of all rehabilitation works related to sewer systems are carried out using no-dig methods	December 2024

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	≥ 1,500 people participated in classes/tours Draw media attention to environmental issues (≥ 3 media initiatives) ≥ 2 campaigns or participation in outdoor events related to water and the environment topics Carry out an environmental awareness month	December 2024
Climate impact risk assessment	Assess the impact of the activities in the Climate Impact Reduction Plan on the company's CO_2 reduction	A climate impact risk assessment has been carried out	December 2024
Reduce Scope 1 and 2 emissions > 300 t compared to 2023	Reduce the amount of natural gas purchased, produce heat and electricity in CHP, reduce energy consumption	Scope 1 and 2 emissions reduced by at least 300 t compared to 2023	December 2024
Replace existing combustion cars with electric cars	Prepare and carry out a procurement process and purchase electric cars with suitable parameters	At least 2 new electric cars are purchased	December 2024
Integrated environmental permit renewal	Renew the integrated environmental permit to reflect the installed CHP plant	The integrated environmental permit is renewed	December 2024
Enhance biodiversity in WTP & WWTP territories	Create test areas in the WTP & WWTP territories where different seed mixtures will be sown to increase biodiversity. Also reduce lawn mowing in the territories	Test areas to increase biodiversity created in the WTP & WWTP territories. Lawn mowing reduced	December 2024

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.

In 2023, the company's CO_2 footprint was 37,694 tons of CO_2eq, of which Scope 1 accounted for 76.7%, Scope 2 for 0.3% and Scope 3 for 23%. 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 93% of Scope 1.

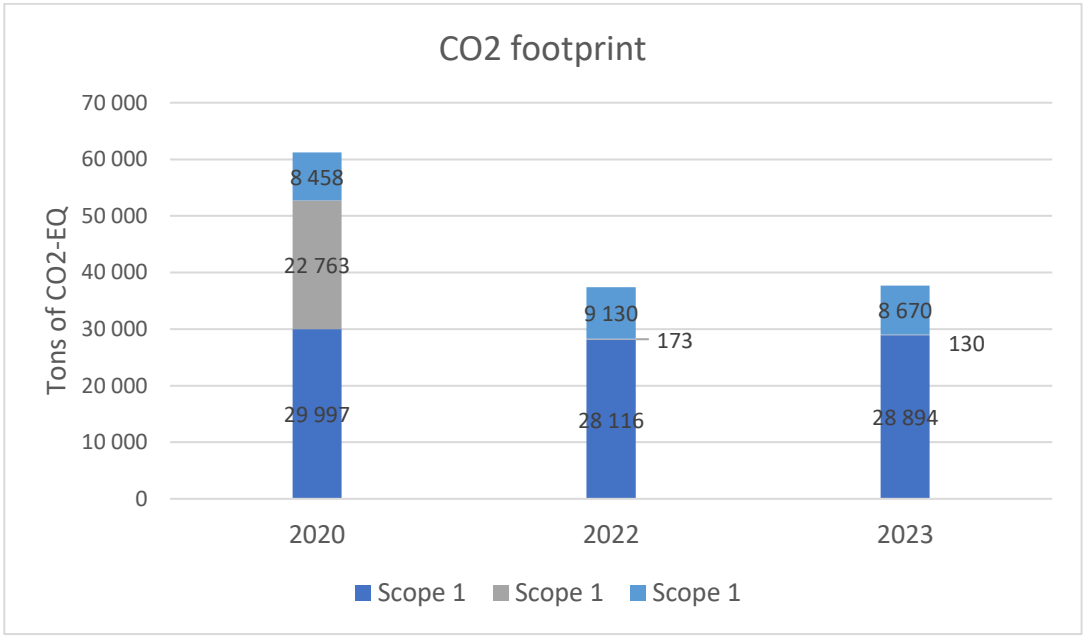
The biggest impact in the wastewater treatment process comes from N_2O and CH_4. Nitrous oxide (N_2O) is generally produced during the biological nitrogen removal process and occurs in all wastewater treatment plants applying biological treatment. Methane (CH_4) is the largest component of biogas that 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 2023, the company's carbon footprint fell 398%, or 23,523 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.

Table 4: AS TALLINNA VESI'S CO_2 CARBON FOOTPRINT IN 2020, 2022 AND 2023, tons of CO_2-eq

Scope	Emission source	2020	2022	2023	Change compared to 2022, %
Scope 1	Wastewater treatment	17,156	15,898	15,948	0
	Composting of sewage sludge	7,624	7,621	7,826	3
	Production and incineration of biogas	939	838	807	-4
	Fossil fuels	959	1,166	1,200	3
	Discharge of treated effluent and stormwater into the sea	3,319	2,594	3,113	20
Scope 2	Electricity and heat	22,763	173	130	-25
Scope 3	Purchased goods and services	5,636	5,923	5,087	-14
	Activities related to fuels and energy	1,920	2,232	2,778	24
	Capital goods (fixed assets)	15	42	26	-38
	Waste	650	686	535	-22
	Business travel	4	13	11	-15
	Employee mobility	233	233	233	0
Total		***61,218***	***37,419***	***37,694***	1

Chart 1: AS TALLINNA VESI'S CO_2 FOOTPRINT IN 2020, 2022 AND 2023, 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 2023, we contributed to the identification of bottlenecks in existing law, for example by proposing amendments through EVEL to the new Public Water Supply and Sewerage Act, which came into force on 1 July 2023. In addition, we have contributed to the development of implementing acts of this law, some of which have already entered into force today. We also presented our proposals to initiate the amendment of Regulation No 49 "Sampling Methods". We have also provided feedback on the draft Water Act and its sub-acts, including the intention to draft a law amending the Water Act concerning the local treatment of wastewater. In addition to the above, we have participated in the drafting of the Climate Act, and have submitted proposals for the draft laws amending the Environmental Charges Act and the Forest Act. We also put forward proposals for an action plan to improve the status of water bodies for 2024–2026. Our specialists have also continued to participate in EurEau committees (on drinking water, wastewater, and legal and economic issues), which continue to contribute to the development of EU legislation. AS Tallinna Vesi also had the opportunity to express its opinion at EU level through EVEL, providing feedback on the impact of the new Urban Waste Water Treatment Directive. In addition, we participated as a representative of EVEL in the discussions on the water service reform initiated by the Ministry of Climate at the end of 2023.

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:

- 6 environmental permits (details on page 19);

- 1 integrated permit (details on pages 19, 39 and 43);

REQUIREMENTS OF THE ADMINISTRATIVE CONTRACT

At the end of 2022, a new administrative contract was signed between the City of Tallinn and AS Tallinna Vesi, the main purpose of which is to supply water to the customers of the public water supply and sewerage system in Tallinn, and to collect and treat wastewater, stormwater, drainage water and other soil and surface water. The new Administrative Contract took effect from 2023. Under the Administrative Contract, all investments in the public water supply and sewerage facilities will be recovered through the charges authorised by law, in particular the prices for water services and connection charges. Supervision of the performance of the Administrative Contract is carried out by an authority of the City of Tallinn or by an agency or person authorised by the City of Tallinn in accordance with the rules provided for by law and following the principle of avoiding conflicts of interest.

In 2023, all of the contractual levels of service, agreed upon by the parties to the Administrative Contract, were delivered and in many cases outperformed. Water quality at customer taps was 99.87% compliant with the standards in 2023, outperforming the quality level specified in the Administrative Contract by 4.8%. Also, the leakage rate continues to stay below the 20% limit. In 2023, the leakage rate of 12.93% was achieved. The number of blockages in 2023 was 532.

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 2023, OÜ Bureau Veritas Estonia, 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 April 2023. 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 identified two minor non-compliances: 1) insufficient justification for non-compliance with the environmental objectives; 2) terminological inconsistency in the 2023 objectives and discrepancies in the thermal energy figures compared to last year's report. The audit report stated that, based on the audit findings and after immediate correction of the non-conformities, the company's environmental management system complies with the requirements of EMAS as set out in Regulation (EC) 1221/2009 (as amended by Regulations (EU) 2017/1505 and (EU) 2018/2026).

We also have an ISO/IEC 27001:2017 certified information security management system in place since 2023 to more effectively operate and protect our information systems and infrastructure.

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 who audit the company's management system are usually company employees (except for information security, where we use external experts) who have undergone appropriate training to become internal auditors. All activities of the company covered by the management systems are audited at least once every three years. To ensure that internal audits are carried out systematically, a detailed annual plan is drawn up as to who audits what. The annual plan appoints auditors in such a way that they do not audit activities/processes for which they are directly responsible. The results from internal audits are managed in a central register of findings. The company's Quality Manager will ensure that all non-conformities and findings are resolved by the deadline.

In 2023, 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 2023. Thus, in 2023, a total of 41 public drinking water taps were opened throughout the capital city. 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 2023 indicated that 86% of end consumers (2022: 86%) 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 2023, water- and environment themed discussion groups were conducted with a total of 1,035 children.
- In 2023, 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 300 people attended the open house events and 1,332 people, mainly school students, took part in the tours at the plants.
- In 2023, 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.
- We took around 100,000 litres of fresh drinking water to the rehearsals and performances of the 13th Youth Song and Dance Celebration “Holy is the Land”, which took place during the hottest period of the year 2023. In this way, we were able to save the resources it would have taken to produce, transport and dispose of more than 200 thousand plastic bottles. Just in time for the Song Festival, four drinking water taps for public use were set up on the Tallinn Song Field, one of which was fully financed by Tallinna Vesi. Following the song festival, these drinking water points remained available for use by citizens and visitors.
- We provided clean and refreshing drinking water at many events, such as the Investment Festival, Tallinn Old Town Days, Tallinn Maritime Days, Kalamaja Days, Tallinn Urban Space Festival, Midsummer’s Day in Põhja-Tallinn, KopliFest and Uue Maailma Street Festival, and at several sporting events, such as the 51st Lake Ülemiste Run and IRONMAN.
- In 2023, we participated for the first time in Open House Tallinn, an architectural event that invites people to discover urban space. We opened to the public the oldest part of the Ülemiste Water Treatment Plant, Estonia’s first functionalist building, completed in 1927 and one of the finest achievements of industrial architecture in the 1920s. Introducing the history, we also talked about the importance of having clean drinking water both today and in the future.
- We were present with our materials and stand at Impact Day, a sustainability festival promoting environmental education. We showed the environmental footprint of drinking bottled water every day and why fresh tap water might be a better choice to quench one’s thirst.
- In the hot summer of 2023, we once again explained to our consumers why it is important to save clean drinking water and reminded them that it is best for the environment to use rainwater to water the garden.

- Environmental protection and behaviour that values nature is important to us and we also want to improve the awareness of our employees on these topics. In June 2023, we organized an environmental awareness month, which has already become a tradition, to promote environmental awareness among our employees. This year the focus was on promoting cycling among our employees and we encouraged people to leave their cars at home when they come to work on Fridays. To make cycling even more enjoyable, everyone had the chance to take part in a small bike workshop, learning useful tips on how to take care of one's bike at home to make it last as long as possible. In addition, a seminar on the effects of climate change in Estonia was held within the framework of the environmental awareness month, conducted by a specialist from the Environmental Board. We also organised an eco-friendly bingo challenge among our employees, aimed at creating easy-to-remember eco-friendly habits in everyday life. As part of the environmental awareness month, we asked all employees to undergo online training on waste sorting. In addition to the activities during the environmental awareness month, in September we also participated in the World Cleanup Day, cleaning up the Paljassaare special conservation area, and the World Car Free Day.
- 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%).

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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	20/03/2023	**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.

The year 2023 was generally characterized by unstable and inconsistent weather. Average air temperatures were above normal and very unstable across months. The same can be said for precipitation, which was unevenly distributed throughout the year. The winter was warm. Precipitation in January was above normal, with both snow and rain. March saw more rain, but was followed by dry spring and highly variable temperatures. Significant precipitation did not arrive until July. September was warmer than usual. October saw a significant amount of rainfall. November had a warm start, with frosts arriving in the second half of the month. All autumn months were rainier than normal. December was moody, both in terms of temperatures and precipitation.

In 2023, the rivers in the catchment had unstable average flows. The winter was very unstable in terms of precipitation, while rivers and reservoirs (including Lake Ülemiste) remained ice-covered from January to the first half of April, despite some melting. Reservoirs and rivers formed a permanent ice cover in January, depending on the flow rates in them. In February, the ice conditions changed somewhat, but the reservoirs still maintained ice cover with some ice-free pools. At the beginning of March, the reservoirs and Lake Ülemiste still had ice cover, while in the last decade of the month the last pieces of ice were melting everywhere. The peak of the spring high water in the catchment rivers was around 25 and 28 March, after which the pool levels in the reservoirs began to recede. By 12 April, Lake Ülemiste as well as all reservoirs were completely free of ice.

With the onset of frosts in mid-November, permanent ice cover developed in reservoirs and, in the last decade of the month, in Lake Ülemiste. The ice cover stayed until the end of the year, while ice conditions in reservoirs were at times more unstable in the last decade of December due to increased flows in the reservoirs.

The level of water in Lake Ülemiste was maintained at the required level throughout the year, even during the dry season, by using accumulated resource in the catchment reservoirs. The level of reservoirs was maintained at the required levels throughout the year. The replenishment of the water stock in Lake Ülemiste from the Soodla reservoir started from the last decade of June and lasted until 20 August. On 15 August, the water intake from the Paunküla reservoir started and ended at the end of the month — due to the continued lack of precipitation, the natural flows in the rivers were very low. In September, the natural flows in the rivers increased due to the rainfall, and the need to divert water from the reservoirs to Lake Ülemiste ceased. The replenishment of the Paunküla reservoir started on 18 October by pumping water from the

Jägala river through the Jägala-Paunküla canal into the reservoir which was completed on 27 November. The Soodla reservoir reached its normal pool level by 8 November from gravity flows coming from the catchment.

The water regimes in Lake Ülemiste in 2023 were kept at the level necessary for the supply of raw water. During the dry season, water was taken from the catchment to replenish the water stock in Lake Ülemiste, and by the end of the year, the reservoirs were restored to their maximum capacity to cover the needs for the following year.

Investments made in the catchment area included repairs on the dam of the Soodla reservoir and the Raudoja-Aavoja canal, neither of which had any direct or significant impact on water regimes. At the Vaskjala dam, the fish pass renovation was completed in September-October. From October 2023, the fish can freely swim through the cascade fish pass and we have fulfilled our promise to the Environmental Board.

In 2023, the staff of the Chair of Hydrobiology and Fisheries at the Estonian University of Life Sciences, Institute of Agriculture and Environment, assessed the ecological status of five water bodies of the Tallinn water catchment (Soodla, Raudoja, Aavoja, Kaunissaare and Vaskjala). The surveys were carried out four times during the vegetation period (in the months of May, July, August and September). The ecological status of all the water bodies concerned was assessed as good.

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 2023 was 26.34 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

	2019	2020	2021	2022	2023
Surface water abstracted from lake Ülemiste	25.00	25.24	25.85	26.60	26.34

Maximum amount permitted is 47.6 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 2019–2023

Parameter	Unit	Average results				
		2019	2020	2021	2022	2023
Colour	mg/L Pt	31	39	37	33	32
Turbidity	NTU	6.9	6.9	6.2	7.0	6.7
pH	0	8.19	8.43	8.22	8.12	8.16
Permanganate index (COD_{Mn})	mg O_2/l	9.8	11.1	10.1	9.7	9.7

Total organic carbon (TOC)	mg C/l	10.1	11.0	10.4	10.2	10.0
Total phosphorus	mg/l	0.048	0.048	0.029	0.029	0.026
Total nitrogen	mg/l	1.30	1.43	1.20	1.27	1.39
Ammonium	mg/l	0.074	0.019	0.085	0.071	0.063
Phytoplankton abundance	objects/ml	6,300	16,804	21,975	164,000	6,974

The abundance of phytoplankton depends on their species composition. The abundance of phytoplankton can also be affected by extreme weather conditions during the summer period, causing their abundance to vary from year to year.

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 2,655,8 m^3 of ground water was abstracted in 2023.

Table 8: USE OF GROUND WATER AND COMPARISON WITH THE MAXIMUM VOLUMES SET BY PERMITS FOR A SPECIAL USE OF WATER, thousand m^3

Parameter	Maximum volume permitted	Average results				
		2019	2020	2021	2022	2023
Tallinn (Permit no KL-506050)	7,800.9	2,349.1	2,400.4	2,603.6	2,367.5	2,294.7
Saue (Permit no L.VV/331954)	445	30.4	331.2	350.0	364.4	359.3
Harku (Permit no L.VV/328381)	40	21.1	0.11	0.4	0	0
Maardu (Permit no L.VV/328349)	720	0.39	3.1	0.1	0.2	1.8

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 2023, 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 2023, we supplied 28 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 2023 are available on the website of AS Tallinna Vesi and in the information system of the Health Board.

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 2023, our water and microbiology laboratory performed a total of 106,000 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 2023, the reconstruction of the sand filter walls continued and the reconstruction of the clarifiers was started.

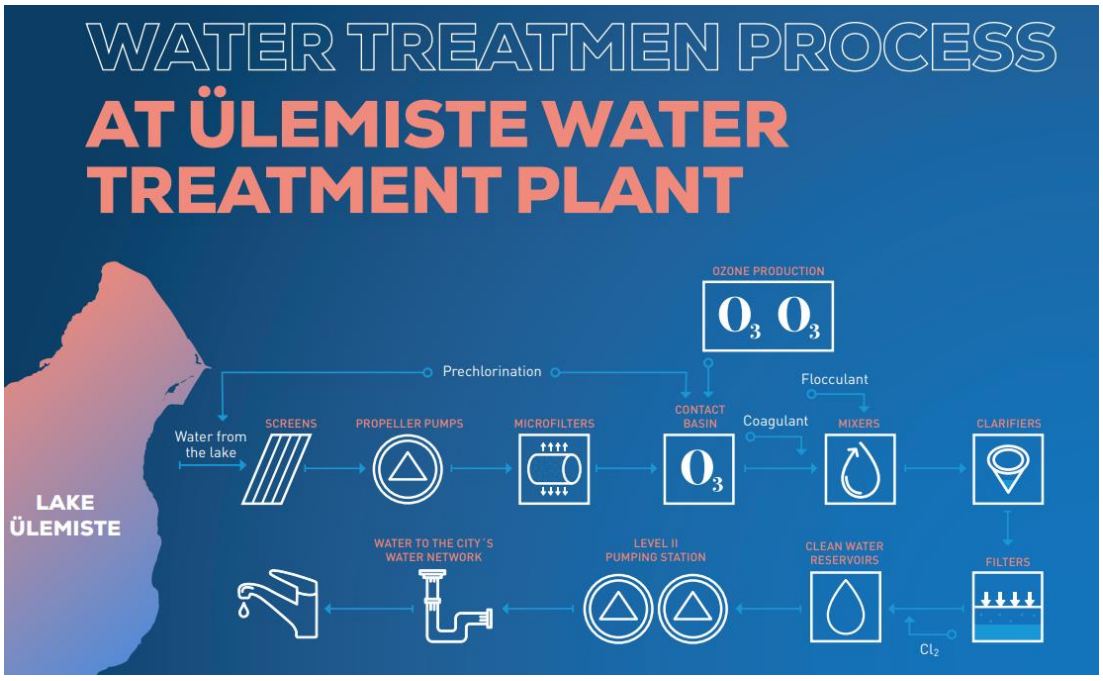


Figure 2: Water treatment process at the Ülemiste Water Treatment Plant

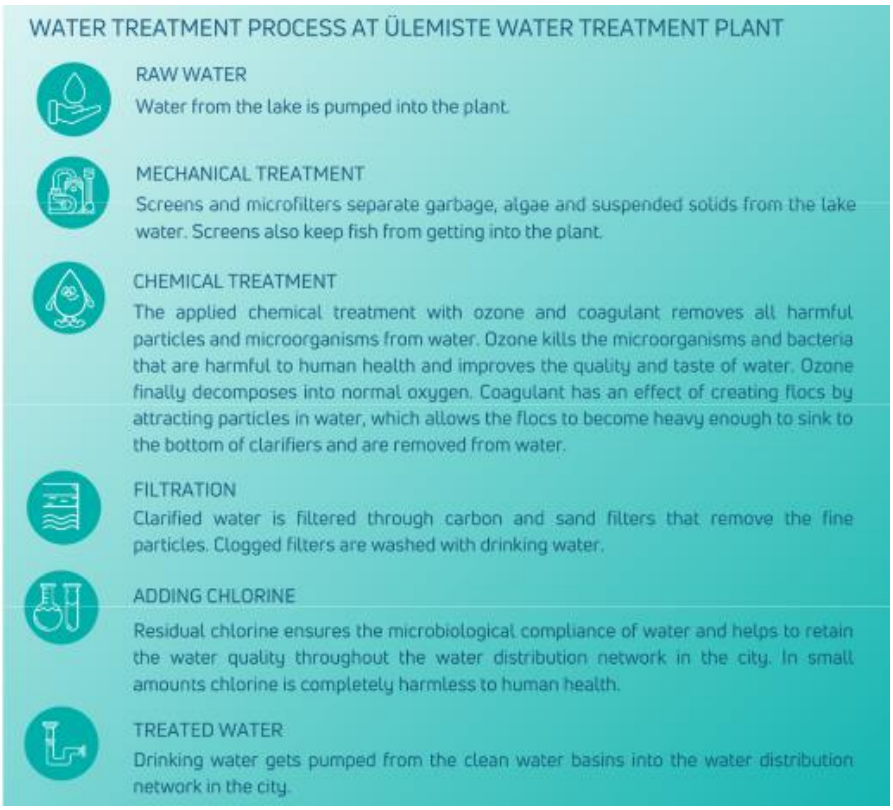


Figure 3: Description of water treatment process at the Ülemiste Water Treatment Plant

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.

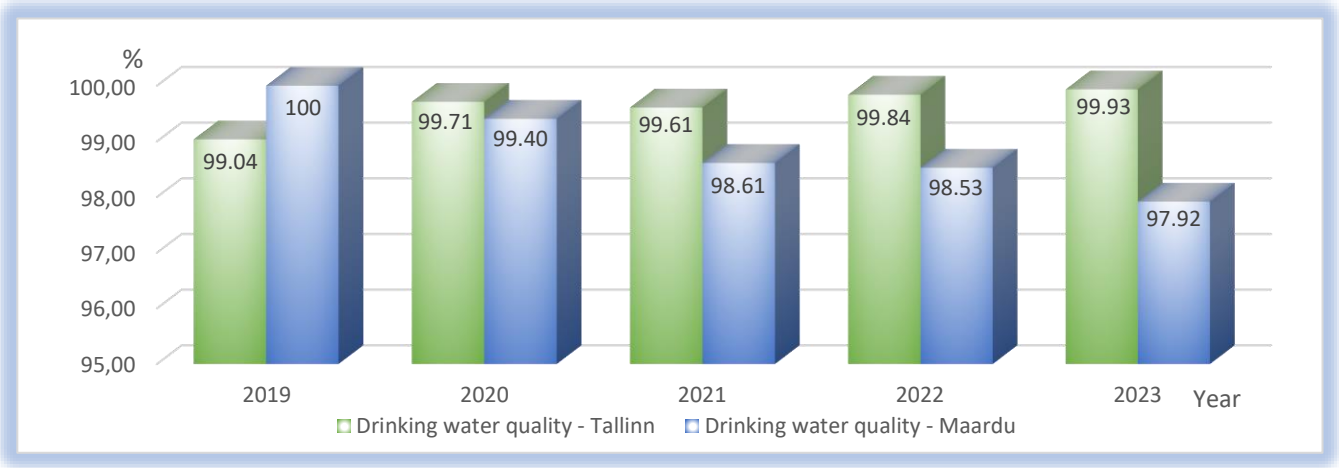
DRINKING WATER QUALITY IN THE NETWORK AND AT CUSTOMER PREMISES

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 2023, we took a total of 3,006 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 99.9% 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.

98.78% of the 168 water samples taken in Maardu in 2023 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 2019–2023, %



WATER NETWORK MAINTENANCE AND RELATED INVESTMENTS

To maintain and improve the quality of drinking water, we carry out ongoing maintenance and rehabilitation work on the networks. For maintenance, the company has introduced a new ice-pigging technology, whereby water pipes are washed with ice slurry, which effectively removes sludge and biofilm from the water pipes. Also, to ensure high quality drinking water for consumers, we regularly clean and flush the water network. In 2023, we cleaned a total of 198 km of water mains using ice-pigging and air-scouring methods, of which 141 km were cleaned by ice-pigging. We also continued to carry out a significant amount of flushing work, in particular to ensure the proper flow of water in the network.

Table 9: CLEANED WATER NETWORK 2019–2023, km

	2019	2020	2021	2022	2023
Cleaned water network	40	137	136	137	198

Every year, we rehabilitate a significant part of our pipelines where necessary and in close cooperation with the City of Tallinn and other utilities, in order to perform the works simultaneously and also to minimize the inconvenience to the residents (dust, noise) and the impact on the environment (reduced use of materials). Under the terms of the Services Agreement, which was in place until the end of 2022, we were required to rehabilitate at least 5 km of water and 5 km of sewer pipes every year. The Administrative Contract which entered into force in 2023 no longer provides for precise kilometres of water and wastewater networks to be rehabilitated. The pipelines will be rehabilitated in line with the public water supply and sewerage development plans.

The volume of pipeline rehabilitation work has tripled since a few years ago and will continue to grow in the coming years. In 2023, 27 km of water and wastewater networks were rehabilitated, 46% of the rehabilitation work was carried out 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 Administrative Contract 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 rate at a considerably lower level than required for several consecutive years already, achieving 12.93% in 2023.

Table 10: LEAKAGE LEVEL IN 2019–2023, %

	2019	2020	2021	2022	2023
Leakage level	12.98	12.42	15.00	16.02	12.93

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 2023, we gave prior notifications of unplanned water interruptions in 99.9% 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 25,224 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 8,802 water meters in 2023. We will continue our work in 2024 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 2023. These meters work on an ultrasound principle and in a Narrowband Internet of Things network. In addition to consumption data, the smart meters also provide information on faults and water leaks in an operational manner, thereby speeding up the response to leaks. At the end of 2023, smart water meters had been installed for 9,022 customers. 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 2019–2023, pcs

	2019	2020	2021	2022	2023
Number of blockages	573	485	553	628	533

The number of blockages in 2023 was significantly lower compared to 2022. 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. There has also been significant rehabilitation of pipelines, largely based on the analysis of blockages.

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 69,949 m^3 in 2023.

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 2023, we took a total of 1,013 wastewater samples to identify the wastewater pollution load at various sites and 332 stormwater and other samples for monitoring purposes.

In 2023, the level of precipitation in Tallinn was 824 mm per area unit on average, which is nearly twice as much as the year before in 2022 (447 mm). As a result, the amount of stormwater and pollutants discharged to nature through stormwater outlets increased in 2023.

This year's increased volumes of stormwater are described by a pattern of changing extremes brought about by climate change – dry periods alternating with intense downpours. This presents us with a challenge in terms of storm water drainage, as densely populated areas dominated by paved surfaces can easily become flooded during heavy downpours. This is why we are continuously developing existing infrastructure, including gravity sewers, combined with technical and near-natural solutions to make the urban environment more resilient to extreme weather conditions caused by climate change.

In 2023, we built 0.9 km of stormwater pipes. We also worked on a project to divert some of the stormwater collected from the streets to an artificial wetland in Tondi Park, with a clearing area and a cascade, through a controlled water intake to prevent flooding and improve the quality of the water discharged to the Baltic Sea. Increasing the water's residence time will reduce the amounts of suspended solids and thus the levels of macronutrients and other pollutants in the stormwater before it is discharged to the outlet. To assess the effectiveness of the wetland, it is planned to install on-line monitoring systems to measure water quality parameters at the inlet and outlet.

Table 12: AMOUNTS OF STORMWATER IN 2019–2023, mln m^3

	2019	2020	2021	2022	2023
Amount of stormwater	4.2	4.9	3.9	2.6	5.3

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 2020–2023, mg/l

	Unit	2020	2021	2022	2023	Limit value
BOD_7	mg/l	5.4	3.5	2.5	3.6	15.0
COD	mg/l	37.5	23.5	18.3	23.0	125.0
Oil products	mg/l	0.1	0.1	0.1	0.1	5.0
N_{Total}	mg/l	5.2	3.4	3.5	3.5	45.0
P_{Total}	mg/l	0.5	0.3	0.2	0.3	1.0
pH	-	8.0	7.9	7.9	7.8	6–9
Suspended solids	mg/l	30.1	14.8	10.5	16.1	40.0

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 53.10 million m^3 of wastewater was treated at the Wastewater Treatment Plant at Paljassaare in 2023.

Table 14: AMOUNTS OF WASTEWATER TREATED IN 2019–2023, mln m^3

	2019	2020	2021	2022	2023
Treated wastewater amount	49.66	52.34	48.20	46.54	52.89

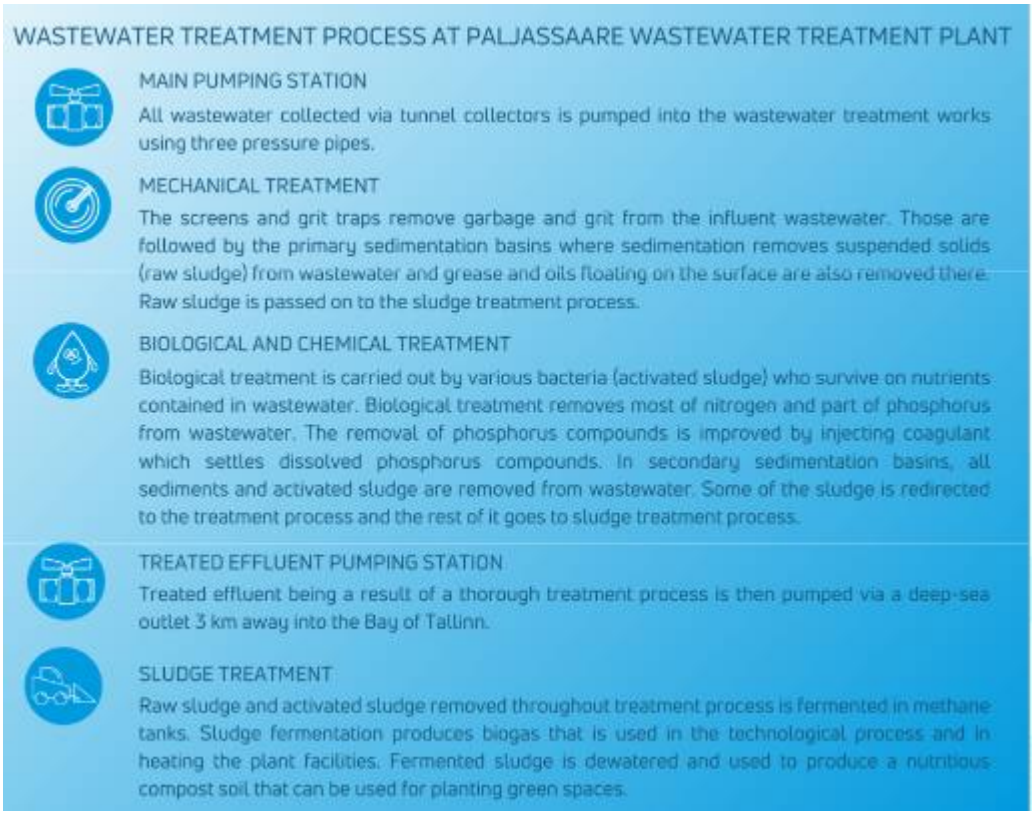


Figure 4: Description of wastewater treatment process at the Paljassaare Water Treatment Plant

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.

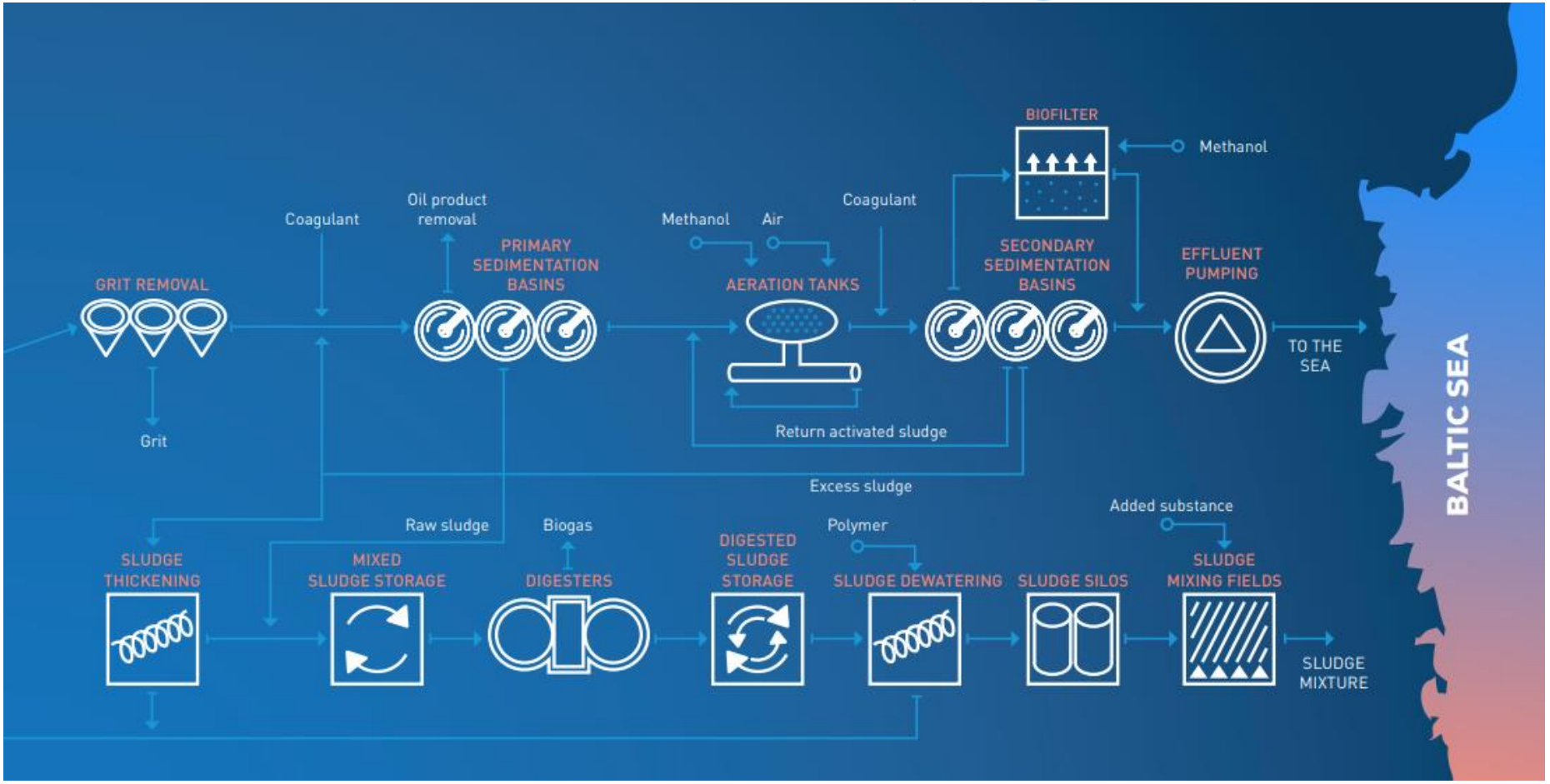
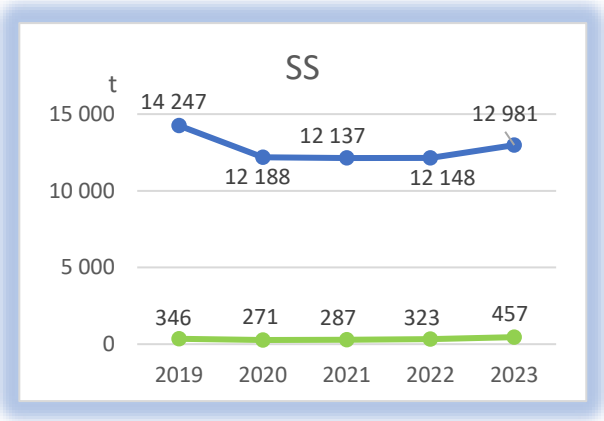
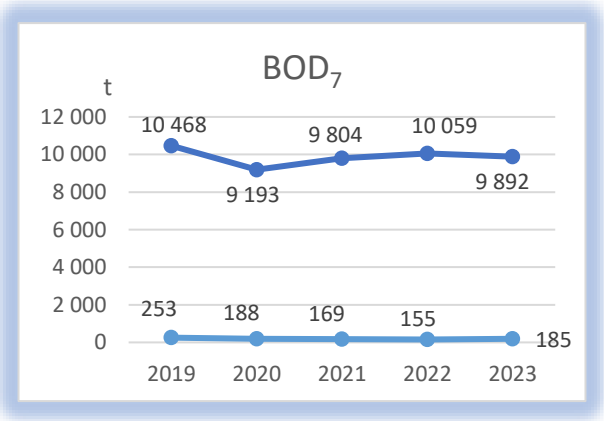


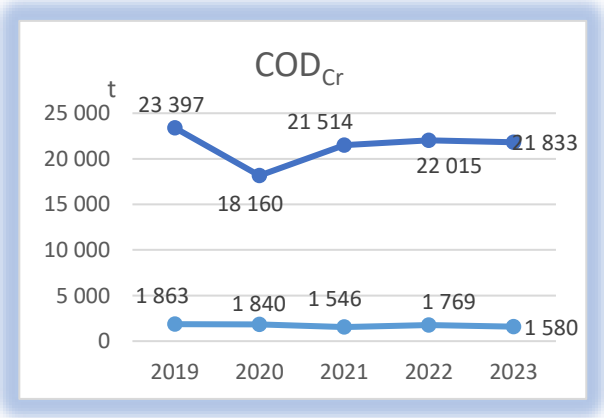
Figure 5. Wastewater treatment process at the Paljassaare Wastewater Treatment Plant

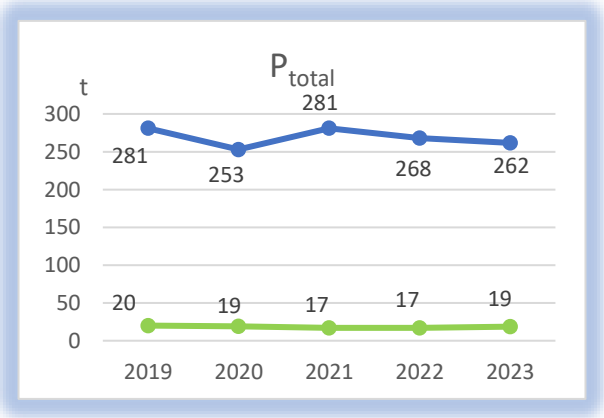
Heavy rain/floods increased the amount of wastewater received at the wastewater treatment plant in 2023. Compared to 2022, 6.35 million m^3 more wastewater entered the treatment plant in 2023. Due to momentary peak flows, situations may arise where the capacity of the treatment plant is temporarily exceeded. Exceeding the capacity of the wastewater treatment plant can in turn affect the efficiency of the treatment processes and the quality of the effluent, which is why the graphs below show an increase in the quantities/concentrations of some pollutants compared to the previous year. Excessive rainfall, for example, affects the overflow capacity of tanks. Rain separates sediment from the water, making it finer and the water dirtier. In addition, hydraulic overloads disrupt biological processes because micro-organisms need a normal residence time for effective treatment. This is also the reason why the treatment efficiency of the wastewater treatment plant for suspended solids and total nitrogen decreased last year compared to 2022.

Chart 3: AMOUNTS OF POLLUTANTS RECEIVED AT THE WASTEWATER TREATMENT PLANT AND DISCHARGED FROM THE PLANT INTO THE SEA IN 2019–2023, t/y









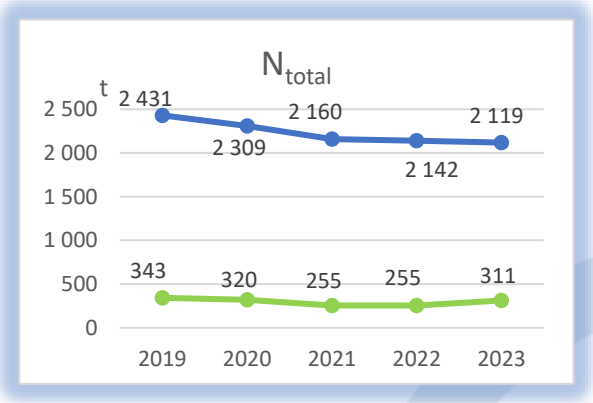


Chart 4: AVERAGE POLLUTION CONCENTRATIONS IN TREATED EFFLUENT IN 2019–2023, COMPARED TO MAXIMUM REGULATORY LIMITS AND PERFORMANCE OF HELSINKI HSY, mg/l

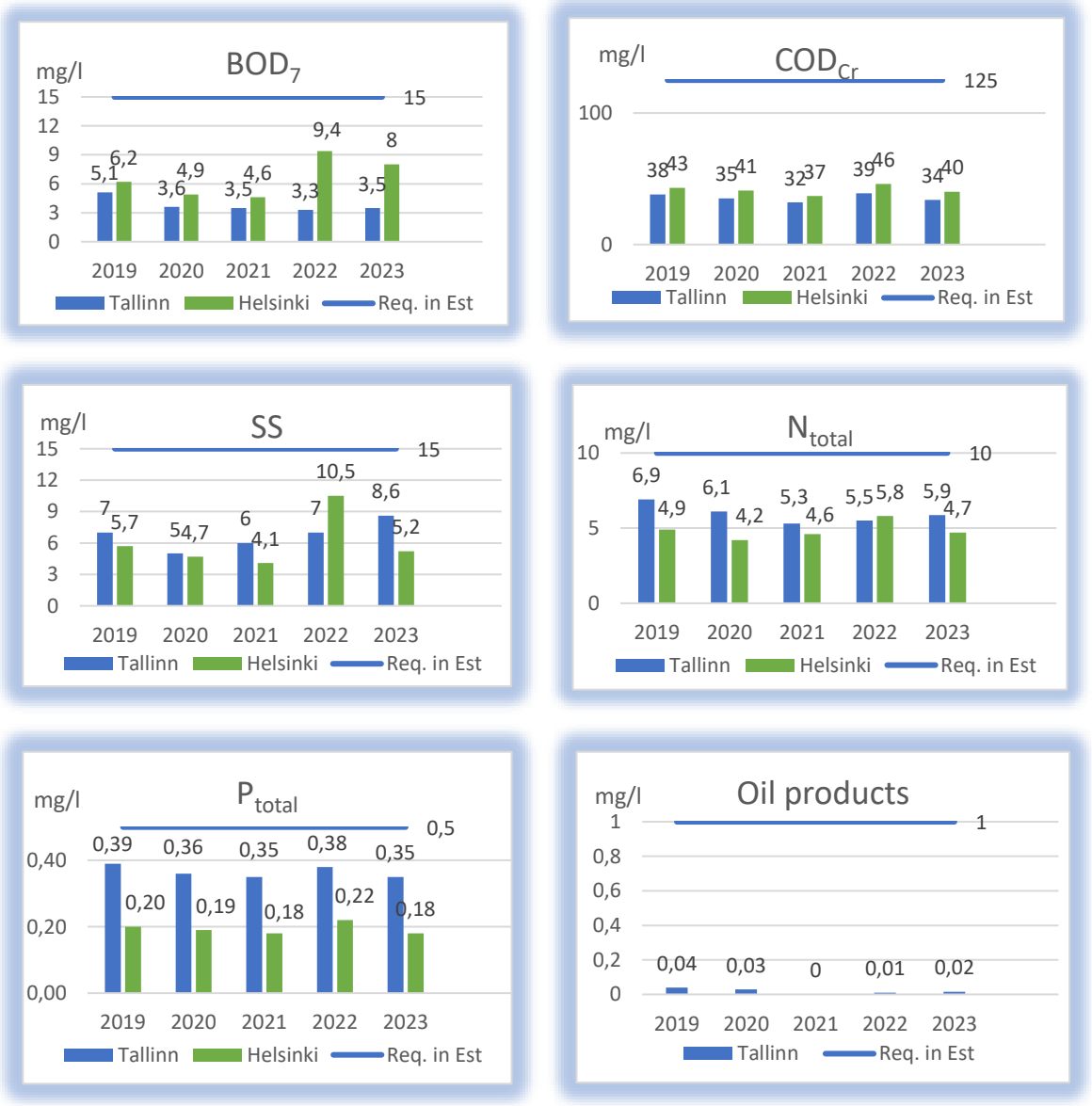
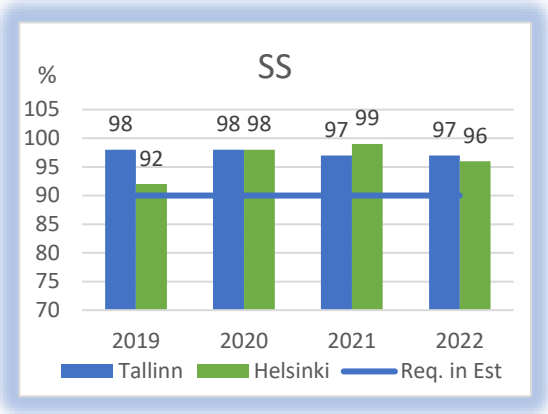
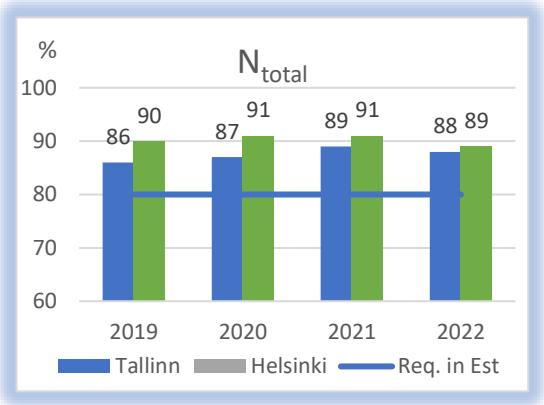
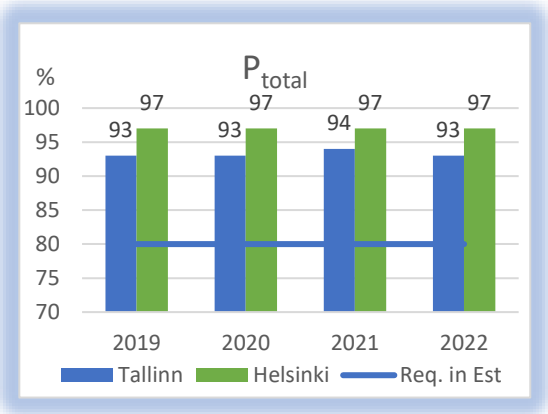
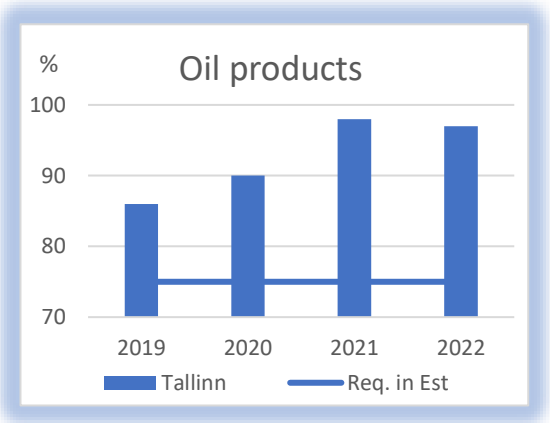


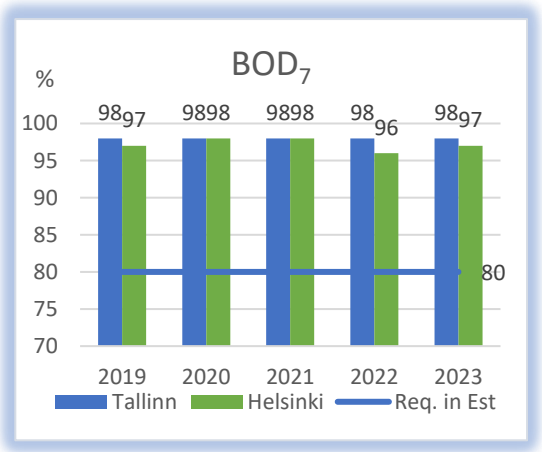
Chart 5: WASTEWATER TREATMENT PLANT'S TREATMENT EFFICIENCY IN 2019–2023, COMPARED TO MINIMUM REGULATORY REQUIREMENTS AND PERFORMANCE OF HELSINKI HSY, %

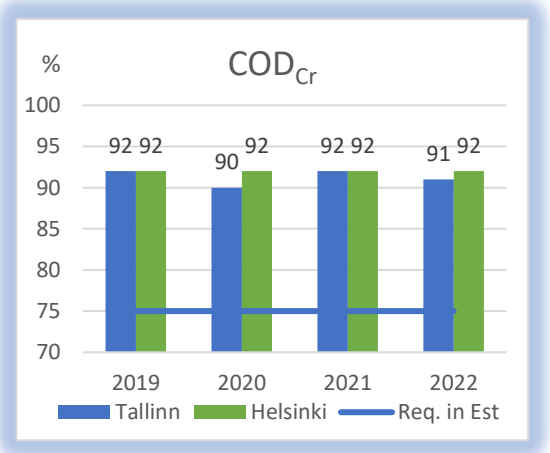












WASTEWATER DISCHARGED TO THE SEA

During 2023, a total of 211,127 m³ of wastewater diluted with stormwater was discharged directly into the sea due to exceptional weather conditions (at a ratio of at least 1:4). Due to shock loads exceeding the capacity of the biological treatment, a total of 888,667 m^3 of highly diluted and only mechanically treated wastewater was discharged into the sea through a deep-sea outlet in 2023.

Tabel 15: WASTEWATER TREATMENT PLANT OVERFLOWS IN 2019–2022, thousand m^3/year

	2019	2020	2021	2022	2023
Untreated wastewater discharged to the sea	80.1	234.1	288.2	0.0	211.1
Partially treated wastewater discharged to the sea	928	1 236	934	712	889

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 2023, the pollution charge paid for discharging pollutants into the receiving waters accounted for 2.7% of the cost of services sold (2022: 2.2%).

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 2023, we used a total of 5,989 tons of various chemicals (2022: 6,000 tons) in our operations, whereas no reported accidents with chemicals occurred which could have caused harm to people or the environment.

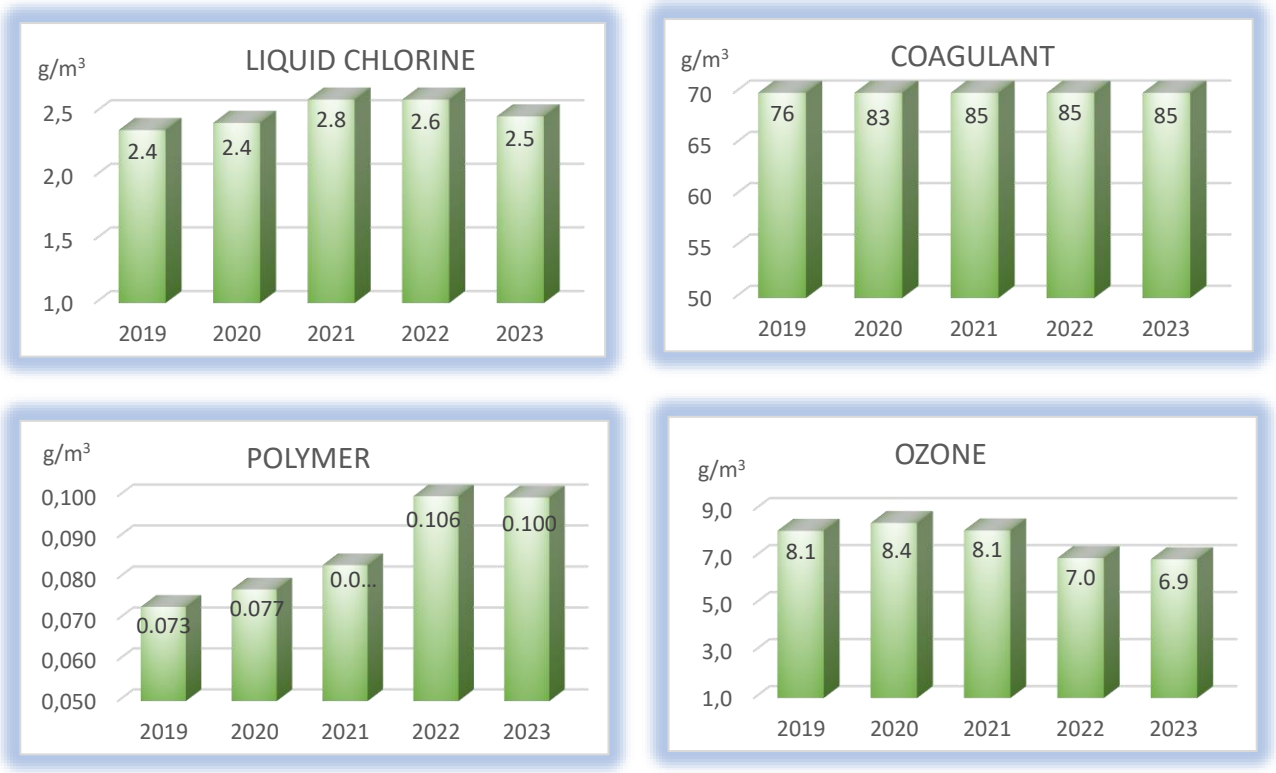
WATER TREATMENT CHEMICALS AND THEIR USE

- **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. The 2023 drought was mainly concentrated in June, preceded by dry and warm weather.

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 2019–2023, g/m³

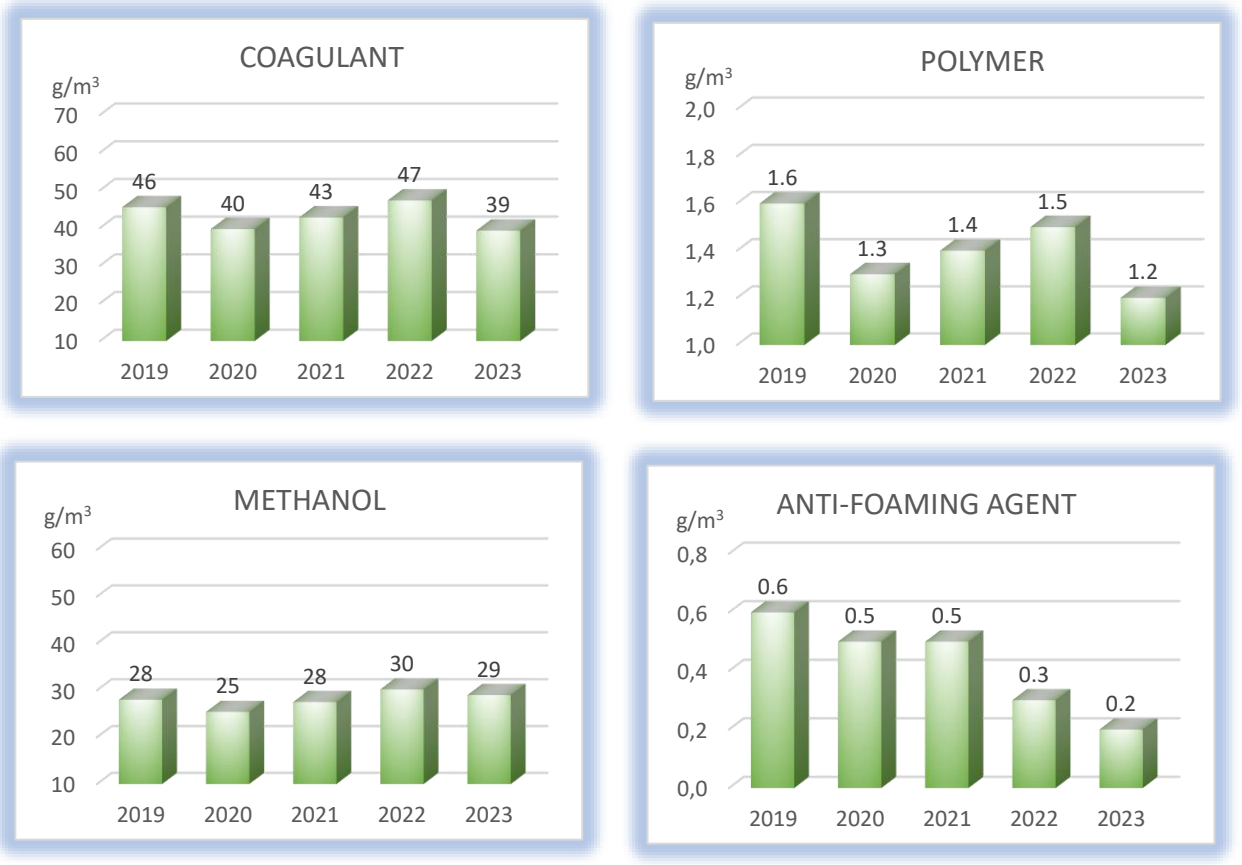


WASTEWATER TREATMENT CHEMICALS AND THEIR USE

- **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 2019–2023, g/m³



Waste Management

WASTE GENERATION

A total of 49,280 tons of waste was generated in the company in 2023. 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 2018–2023, t

Type of waste	2019	2020	2021	2022	2023
Mixed municipal waste	45.1	62.0	81.5	65.5	76.6
Paper and cardboard *	5.7	5.6	6.1	7.0	4.1
Packages *	0.9	1.5	1.5	1.5	1.5
Biodegradable waste*	5.2	7.8	7.1	6.8	8.5
Waste from screens	893.8	882.2	900.7	905.6	788.0
Wastewater sludge*	38,940.3	37,883.8	39,600.5	37,869.9	38,895.1
Sediments from grit traps	139.3	178.7	471.0	243.3	286.6
Excavated stones and soil	6,148.3	8,012.9	9,366.7	12,503.8	9,084.8
Asphalt waste	294.9	179.9	130.8	137.8	68.1
Mixed building waste	6.8	2.3	7.0	47.5	13.8
Concrete and bricks	1.8	0.0	11.7	1.5	0.0
Metal scrap*	29.9	32.7	97.0	41.0	38.8
Hazardous waste	2.9	3.9	5.8	4.0	2.6
Other waste	6.4	6.3	17.0	17.8	10.9
TOTAL	***46,521***	***47,259***	***50,704***	***51,853***	***49,280***

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 2023. 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. The volume of excavation work decreased in 2023, largely due to the fact that 46% of all sewer rehabilitation work was carried out using no-dig methods.

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 2023, a total of 38,895 tons of stabilised sewage 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 2023, the company handed out 37,888 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 Põllutehnika OÜ, OÜ Kohatus Farm and Kasti Teravili OÜ.

Table 18: AMOUNTS OF SEWAGE SLUDGE AND GREENING SOIL IN 2019–2023, t/y

Type of sludge	Quantities				
	2019	2020	2021	2022	2023
Stabilised and dewatered sewage sludge taken out from the wastewater treatment process	36,789	35,200	39,395	37,870	38,895
Greening soil handed out (recovery of sewage sludge)	41,261	45,796	42,402	39,242	37,888

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.

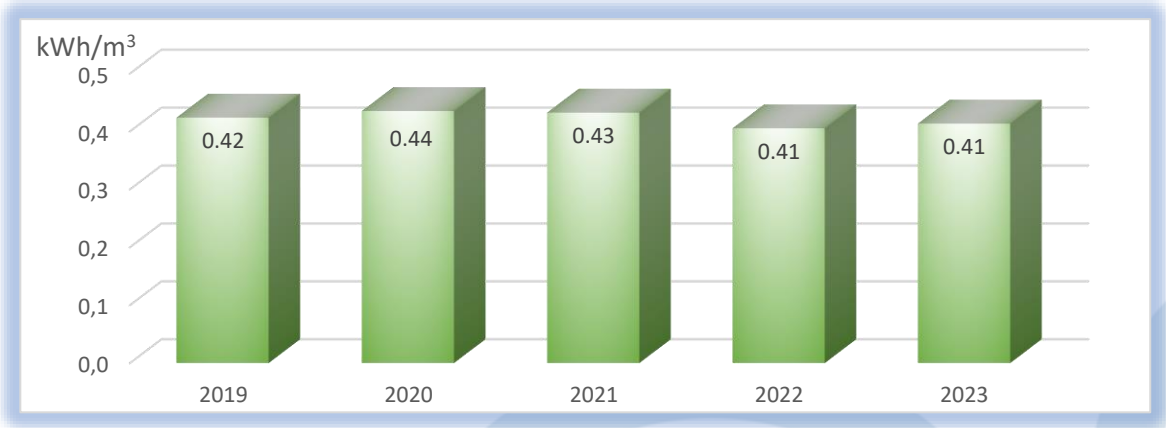
From the second half of 2021, we only use electricity produced from renewable sources at our facilities and in the treatment process. At the end of 2023, a combined heat and power (CHP) plant installed at the wastewater treatment plant was commissioned, which will enable to produce heat from biogas as well as most of the electricity used in the wastewater treatment process. In addition to using the energy generated from the wastewater to power the treatment plant, the energy will be also used to power all of the company's electric cars. The CHP plant has the capacity to produce up to 2,248 kW of heat and 2,134 kW of electricity. The CHP plant will become fully operational from 2024.

Table 19: ELECTRICITY CONSUMPTION IN 2019–2023, MWh

Unit	2019	2020	2021	2022	2023
Water Treatment	10,399	10,988	11,181	10,787	10,895
Wastewater Treatment	22,539	22,224	21,865	21,635	23,055
Networks pumping stations, incl. Maardu	7,286	7,554	7,602	7,159	7,622
Other	855	622	716	721	889
TOTAL	***41,279***	***41,388***	***41,363***	***40,301***	***42,461***

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 2019–2023, kWh/m³



Electricity consumption in the water treatment process remained unchanged in 2023 compared to the previous year.

Chart 9: ELECTRICITY CONSUMPTION PER UNIT OF WATER PRODUCTED AT THE WASTEWATER TREATMENT PLANT IN 2019–2023, 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. In 2023, one of the two digesters was reconstructed and the second digester will be reconstructed in 2024. The reconstruction of the methane tanks will allow us to produce more biogas from the sewage sludge generated during the treatment process. The biogas produced will be used to generate not only electricity but also heat energy on site, which will be used to heat the wastewater treatment plant's premises and keep the processes running. Before the CHP plant was installed, we had to combust part of the biogas or use small amounts of natural gas in addition due to the specifics of biogas production. Once the cogeneration plant is fully operational, there will be no need for biogas combustion. In 2023, we used up 58% of all biogas generated to produce heat (2022: 62%).

Table 20: HEAT ENERGY CONSUMPTION IN 2019–2023, MWh

Unit	2019	2020	2021	2022	2023
Water Treatment	2,877	2,685	3,206	3,215	3,202
Wastewater Treatment	13,887	14,311	12,092	11,776	10,765
incl. heat energy from biogas	13,886	14,217	11,991	11,688	10,655
Offices in Ädala Street	1,189	1,215	1,398	1,334	1,272
TOTAL	***17,953***	***18,211***	***16,696***	***16,325***	***15,239***

Chart 10: BIOGAS PRODUCTION IN 2019–2023, thousand m³

TRANSPORTATION AND FUEL CONSUMPTION

Road transport accounts for the largest part of our need for transportation. We have a total of 111 vehicles (as at the end of 2023) to carry out a wide range of work and to travel between company locations and service sites. The largest group of vehicles are passenger cars and commercial vehicles, which also include minivans and team vehicles. In 2023, the company used 94 commercial vehicles and passenger cars (of which 6 were sold by the end of the year) and 17 other special vehicles (tractors, loaders, heavy-duty vehicles, etc.). In 2023, the company had 13 electric vehicles in use, of which 9 were purchased in 2023. We will continue to purchase electric vehicles to reduce our carbon footprint, especially now that we generate our own electricity from wastewater. Electric cars will gradually replace older and more polluting cars.

Table 21: NUMBERS OF VEHICLES AND FUEL CONSUMPTION IN 2020–2023

	2020	2021	2022	2023
Total number of vehicles, pcs	96	100	99	111
Petrol for vehicles, l	32,153	32,099	37,844	31,826
Diesel for vehicles, l	59,226	61,298	56,452	51,563
Fuel used by vehicles in total, l	**91,379**	**93,397**	**94,296**	**83,389**
Other petrol, l	4,015	3,306	3,237	2,652
Other diesel, l	96,430	96,095	119,266	86,456
Fuel used in total, l	**191,824**	**192,798**	**216,799**	**172,497**

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. 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.

Other petrol and diesel fuels include fuel used by special vehicles.

Emissions to Air

The air pollution permit issued to AS Tallinna Vesi (valid until 11/05/2023) was merged with the environmental protection permit for 2023 (KL-506050). The limit values set in the previously issued air pollution permit for the sources of pollution at the Ülemiste Water Treatment Plant and the emissions of ozone produced for the treatment of drinking water were included in the merged environmental protection permit. 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	11.05.2023	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 their annual emission limit values.
Environmental protection permit No KL-506050	indefinite term	Applies to the sources of pollution at the Ülemiste Water Treatment Plant – boiler house chimney, ozonation, diesel generator. Establishes the list of pollutants emitted into the ambient air and their annual emission limit values.
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 their annual emission limit values.

Table 23: AMBIENT AIR POLLUTION FROM THE POLLUTION SOURCES AT WATER TREATMENT PLANT IN 2019–2023, t

Pollutant	Limit value, t/y	2019	2020	2021	2022	2023
Nitrogen dioxide	1.954	0.763	0.656	0.855	0.894	0.698
Carbon monoxide	1.846	0.688	0.602	0.801	0.812	0.624
Volatile organic compounds	0.125	0.047	0.041	0.054	0.056	0.042
Carbon dioxide	1688	623.00	548.31	736.28	736.34	737.87
Sulphur dioxide	0.62	0	0*	0	0	0.0047
Nickel	0.002604	-	-	-	-	0
Fine particulate matter (PM10)	0.078	-	-	-	-	0.0028
Very fine particulate matter (PM2.5)	0.078	-	-	-	-	0.0028
Total solid particles	0.521	0.003	0.006	0.002	0.003	0.0042

* Sulphur dioxide pollution remained below the threshold limit

Table 24: AMBIENT AIR POLLUTION FROM THE POLLUTION SOURCES AT WASTEWATER TREATMENT PLANT IN 2019–2023, t

Pollutant	Limit value, t/y	2019	2020	2021	2022	2023
Nitrogen dioxide	4.49	6.37	6.57	4.02	3.95	3.6
Carbon monoxide	3.15	6.37	6.21	2.82	2.76	2.52
Volatile organic compounds	14.50	0.39	3.96	14.45	14.41	14.35
Carbon dioxide	5789.49	5,293	5,715	5,262	5,167	4,710
Hydrogen sulphide	3.82	17.3	14.1	3.7	3.7	3.7
Ammonia	79.34		19.9	79.3	79.3	78.5
Sulphur dioxide	11.98		3.3	11.2	10.9	10
Total solid particles	4.35		0.87	4.0	3.8	3.9

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 2021–2023

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				
Electric power produced from oil shale, MWh	2023	42,034	71.0	592
	2022	40,301	64.1	628
	2021	41,363	65.7	630
Heat				
Heat produced from natural gas, MWh	2023	4,585	71.0	65
	2022	3,303	64.1	51
	2021	3,292	65.7	50
Thermal energy produced from biogas, MWh	2023	10,249	71.0	144
	2022	11,688	64.1	182
	2021	12,006	65.7	182
Handling of chemicals				
Liquid chlorine, t	2023	65	71.0	0.9
	2022	70	64.1	1.1
	2021	73	65.7	1.1
Coagulant, t	2023	4,316	71.0	61
	2022	4,463	64.1	70
	2021	4,259	65.7	65
Polymer, t	2023	178	71.0	2.5
	2022	144	64.1	2.2
	2021	70	65.7	1.1
Ozone, t	2023	182	71.0	2.6
	2022	185	64.1	2.9
	2021	210	65.7	3.2
Methanol, t	2023	1,535	71.0	22
	2022	1,404	64.1	22
	2021	1,326	65.7	20
Anti-foaming agent, t	2023	12	71.0	0.2
	2022	13	64.1	0.2
	2021	23	65.7	0.4
Water				

Water for own use, thousand m³	2023	2,601	71.0	37
	2022	2,318	64.1	36
	2021	2,400	65.7	37
Surface water, thousand m³	2023	26,337	71.0	371
	2022	26,603	64.1	415
	2021	25,850	65.7	394
Ground water, thousand m³	2023	2,656	71.0	37
	2022	2,732	64.1	43
	2021	2,954	65.7	45
Waste				
Mixed municipal waste, t	2023	76.6	71.0	1.1
	2022	65.5	64.1	1.0
	2021	81.5	65.7	1.2
Recycled paper and cardboard, t	2023	4.1	71.0	0.1
	2022	7.0	64.1	0.1
	2021	6.1	65.7	0.1
Recycled packages, t	2023	1.5	71.0	0.02
	2022	1.5	64.1	0.02
	2021	1.5	65.7	0.02
Recycled biodegradable waste, t	2023	8.5	71.0	0.1
	2022	6.8	64.1	0.1
	2021	7.1	65.7	0.1
Waste from screens, t	2023	788	71.0	11
	2022	906	64.1	14
	2021	901	65.7	14
Recycled sludge, t	2023	38,895	71.0	548
	2022	37,870	64.1	590
	2021	39,601	65.7	603
Sediments from grit traps, t	2023	287	71.0	4.0
	2022	243	64.1	3.8
	2021	471	65.7	7.2
Recycled excavated stones and soil, t	2023	9,085	71.0	128
	2022	12,504	64.1	195
	2021	9,367	65.7	143
Asphalt waste, t	2023	68	71.0	1
	2022	138	64.1	2
	2021	131	65.7	2
Mixed building waste, t	2023	13.8	71.0	0.2
	2022	47.5	64.1	0.7
	2021	7.0	65.7	0.1
Concrete and bricks, t	2023	0.0	71.0	0.0
	2022	1.5	64.1	0.0
	2021	11.7	65.7	0.2
Recycled metal, t	2023	38.8	71.0	0.5
	2022	41.0	64.1	0.6
	2021	97.0	65.7	1.5
Hazardous waste, t	2023	2.4	71.0	0.0
	2022	4.0	64.1	0.1
	2021	5.8	65.7	0.1
Other, t	2023	10.9	71.0	0.2

	2022	17.8	64.1	0.3
	2021	17.0	65.7	0.3
Biological diversity				
	2023	355.4	71.0	5.0
Land use, land carrying buildings*, ha	2022	355.4	64.1	5.5
	2021	355.3	65.7	5.4
	2023	118.1	71.0	1.7
Size of paved areas, ha	2022	118.1	64.1	1.8
	2021	118.0	65.7	1.8
Emissions				
	2023	4.3	71.0	0.1
Nitrogen dioxide, t	2022	4.8	64.1	0.1
	2021	4.9	65.7	0.1
	2023	3.4	71.0	0.0
Carbon monoxide, t	2022	3.6	64.1	0.1
	2021	3.6	65.7	0.1
	2023	14.5	71.0	0.20
Volatile organic compounds, t	2022	14.5	64.1	0.23
	2021	14.5	65.7	0.22
	2023	5,905	71.0	83
Carbon dioxide, t	2022	5,903	64.1	92
	2021	5,998	65.7	91
	2023	10.9	71.0	0.15
Sulphur dioxide, t	2022	10.9	64.1	0.17
	2021	11.2	65.7	0.17
	2023	3.8	71.0	0.05
Total solid particles, t	2022	3.8	64.1	0.06
	2021	4.0	65.7	0.06
	2023	4	71.0	0.1
Hydrogen sulphide, t	2022	4	64.1	0.1
	2021	4	65.7	0.1
	2023	79	71.0	1.1
Ammonia, t	2022	79	64.1	1.2
	2021	79	65.7	1.2
Environmental education				
	2023	1,035	71.0	14.6
Number of children in the discussion groups	2022	960	64.1	15.0
	2021	0	65.7	0.0

Best Environmental Management Practices and Environmental Performance Indicators

The Environmental Report for 2023 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
Percentage of smart meters among all water meters in use (%)	In areas of water scarcity (at least part of the year) (1), water meters at household/end-user level are smart meters	By the end of 2023, 40% of customers had smart meters installed. The target is to cover the entire service area with smart meters by the end of 2026
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 12.93% in 2023

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 2023: BOD_5* – 98%, COD – 92%, N_{Total} – 85% P_{Total} – 93%
Electricity use of the wastewater treatment plant per mass of BOD_5 removed (kWh/kg of BOD_5 removed)	-	2.55 kWh/kg*
Electricity use of the wastewater treatment plant per volume treated (kWh/m^3 of wastewater treated)	-	0.43 kWh/m^3
Annual electricity use of the wastewater treatment plant per	The electricity use of the wastewater treatment plant is:	41.7 kWh/ population equivalent

[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)

population equivalents (kWh/population equivalents/year)	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)

* 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.

At the end of 2023, a combined heat and power plant was completed at the wastewater treatment plant. The CHP plant will use the biogas produced as a fuel and, under the best conditions, it will be able to cover the entire heat demand of the plant and at least one third of its electricity demand. Future plans include the installation of solar panels to further increase power generation capacity.

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

In the 2023 assessment of environmental aspects, we reassessed one aspect with significant negative impacts – water abstraction. In the 2024 assessment of environmental aspects, we further divided water abstraction into three aspects: surface water abstraction from Lake Ülemiste, groundwater abstraction and surface water abstraction from catchments/reservoirs. All three aspects were assessed as having negative impacts. We have added two new aspects with significant negative impacts for 2024: water for own use and wastewater treatment. The environmental aspect “discharge of effluent into the sea” has been renamed "discharge of treated effluent into the sea".

Table 9, showing the number of kilometres of cleaned water network, now (from 2023) includes the number of kilometres cleaned using the ice-pigging method.

Table 23: The merger of the air permit No L.ÕV/319438 with the environmental permit No KL-506050 added the obligation to measure nickel, fine particulate matter (PM10) and very fine particulate matter (PM2.5) from the sources of pollution at the water treatment plant in addition to the existing pollutants.

Table 26 now includes the percentage of smart meters among all water meters in use (%).

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 07/05/2024

Janno Semidor

EMAS Verifier

Bureau Veritas Eesti OÜ

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