Tallinna Vesi
Loome puhta veega parema elu!

AS Tallinna Vesi

Environmental Report 2019

Tallinna Vesi
Loome puhta veega parema elu!

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Chairman's Statement

Our most important task is to provide a reliable and secure service to our customers, and this is something we will never compromise. During 2020, we will continue to work closely with our various stakeholders and the wider community. Challenging objectives have been set for the year ahead, too ensure we continue to deliver an exceptional service to our water and wastewater customers. 2019 was a successful year for us and we will be making good efforts in 2020 as well.

We value water as one of the most important natural resources, which must not be wasted. Once again, we were very proud to achieve further reductions in leakage, setting another record for the Company that is comparable with the best performing water companies in Europe. Achieving such a result is not easy and is directly attributable to the continuous investments made into the network as well as to the effectiveness of our repair and maintenance regimes, especially when emergencies arise.

The quality of drinking water also remained very high in our service area during 2019. However, we did witness some minor changes in the sampling results. Whereas the quality of drinking water leaving the Water Treatment Plant continues to be excellent, the results of samples taken from the customers' taps were slightly lower in comparison with the results of 2018, resulting from the introduction of a new analytical water quality test, with much higher sensitivity. As a consequence of those tests, Tallinna Vesi has made further developments in the water network, and further enhanced the effectiveness of ongoing maintenance regimes to ensure a consistent supply of high-quality drinking water.

Environmental awareness is fundamental in everything we do, in ensuring the appropriate management and conservation of our wider catchment area as well as in operating our Wastewater Treatment Plant at Paljassaare. Throughout 2019, the final treated effluent leaving the plant at Paljassaare was fully compliant with all legal requirements. To further ensure the continued effectiveness of our wastewater treatment process, Tallinna Vesi signed a contract in December 2019 for the partial reconstruction of the mechanical treatment equipment at the Wastewater Treatment Plant.

In order to ensure the reliability of service for our consumers, we made several large targeted investments in the water and wastewater networks during 2019, the best examples of which are the reconstruction of water and wastewater network in Gonsiori and Reidi streets, in the vicinity of Tallinn Airport and in several other locations across the city.

As a provider of vital services to over one third of Estonia's population, it is crucial that we maintain very high standards in customer service. Each year, an extensive customer satisfaction survey is carried out by the independent research company Kantar Emor. The results of the survey map the current satisfaction level of both our contractual customers, and end consumers, who pay indirectly via housing associations and landlords. Once again, we are witnessing high levels of customer satisfaction – Tallinna Vesi is valued as a professional partner. We will continue to make further improvements in this area, and will adopt new and innovative technology where possible, to enhance and simplify customer interaction.

Finally, I would like to thank my colleagues in Tallinna Vesi, Watercom and United Utilities, and all our suppliers and business partners for their continued support and helping the company to deliver such exceptional performance during 2019.

Karl Heino Brookes

Chairman of the Management Board

TALLINNA VESI IN BRIEF

Tallinna Vesi is the largest water utility in Estonia, providing drinking water and wastewater disposal services to nearly one third of Estonian population. We serve over 23,600 private customers and businesses and 450,000 end consumers in Tallinn and its surrounding local governments: City of Maardu, City of Saue and small town of Harku. As of 31 December 2019, Tallinna Vesi employed 260 people.

The company has two treatment plants: Ülemiste water treatment plant and Paljassaare wastewater treatment plant. Tallinna Vesi also has an accredited water laboratory and an accredited wastewater laboratory.

Tallinna Vesi was privatised in 2001 and based on the Services Agreement signed with the City of Tallinn upon privatisation, the Company is required to fulfil 97 levels of services. The current Services Agreement is effective until 30 November 2025 as per the exclusive right to provide water supply and wastewater disposal services in Tallinn.

The public water supply system comprises more than 1,180 km of water pipes, 22 water pumping stations and 45 ground water pumping stations with 91 boreholes. The catchment area in Harju and Järva Counties covers around 1,800 km^2. The public sewer system comprises more than 1,170 km of wastewater network, 513 km of stormwater network and 180 wastewater and stormwater pumping stations across the service area.

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 in 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 constantly 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 environmentally 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. Our Company`s environmental activity complies with the requirements of the international environmental management standard ISO 14001 and the Regulation (EC) No 1221/2009 EMAS (Community eco-management and Audit Scheme) as well as the requirements of its amendments enforced by the Commission's Regulations (EU) 2017/1505 and (EU) 2018/2026.

The environmental management system covers all the activities of Tallinna Vesi: the extraction and treatment of ground water and surface water to become drinking water, drinking water supply to the service 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, significant environmental aspects and consequent potential environmental impacts, which form the basis for determining the Company`s environmental objectives and tasks for improving 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 relationship between the activity and legal acts, the frequency of occurrence, the impact on reputation and cooperation with stakeholders, the environmental impact and its extent.

Management of the environmental system has been established in accordance with the Company´s 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 employees. We measure, monitor and evaluate environmental performance indicators on a quarterly basis at least and based of those results we produce our annual environmental report, which is available to public.

ENVIRONMENTAL ASPECTS AND OBJECTIVES

Table 1: SIGNIFICANT ENVIRONMENTAL ASPECTS IN 2019

Activity	Environ-mental aspect	Direct/indirect impact	Environmental impact from the aspect	Direction of the impact*	Further actions
Maintaining sanitary protection areas	Land use favours biodiversity	Indirect	The sanitary protection area protects drinking water sources and the natural environment, supports the improvement of the biodiversity around and within Lake Ülemiste and helps to preserve green areas in the city	+	Maintenance of sanitary protection areas, co-operation with legislator and local governments to preserve the areas
Use of biogas to produce heat energy	Methane emissions	Direct	The use of heat energy produced from biogas, which is a by-product of the sludge digestion process reduces methane emissions and dependence on heat produced from non-renewable sources	+	Maximise the use of produced biogas
Construction waste	Waste from pipe construction and repairs	Direct	Construction waste has low potential of being reused and large quantities of waste damage the soil	-	Maximise the use of no-dig methods. Reduce the volume of excavation and increase the use of trench support.
Use of electricity	Exhaust gases from fossil fuel power production	Indirect	Power plants are the emitters of exhaust gases that cause air pollution and greenhouse effect	-	Analysis of electricity consumption, introduction of more energy efficient equipment and energy saving modes, construction of a separate sewer system
Water extraction	Use of water resources	Direct	Has an impact on the consumption of energy and chemicals as well as the resulting environment impacts	-	Reducing the water leakages and process water consumption, applying new technologies, information campaigns to influence the consumption patterns of people, developing the use of smart meters
Compliant drinking water supply to consumers	Avoiding the generation of waste	Indirect	Consumer can prefer tap water to bottled water, thus reducing the impact from the use of disposable plastic bottles. Impact on public health.	+	Constant work in all stages of water treatment and supply, publishing information about water quality, maintaining sanitary protection areas, awareness campaigns
Discharge of untreated wastewater into the environment	Pollutants from wastewater	Direct	Causes pollution, negative impact on marine life and marine environment. Impairment of living environment and smell problem.	-	Reconstruction of the treatment process, construction of separate sewer systems in cooperation with Tallinn Urban Environment and Public Works Department, system monitoring.

*Aspect with a positive or a negative impact

Table 2: ENVIRONMENTAL OBJECTIVES AND RESULTS FOR 2019

Objective	Indicator	Result at the end of 2019
Reduce the percentage of clean water losses	Level of leakages ≤ 14.0%	12.97%
Increase the efficiency of raw water treatment by choosing raw water based on its qualitative characteristics and thereby reducing the water consumption	Alternative water intake is designed, constructed and taken into use	Permit for special use of water is issued, building permit application has been submitted, construction procurement documents are being finalised
Operations comply with the terms set out in the water permits issued by the Environmental Board	0 non-compliances	1 non-compliance The estimated volume of undiluted wastewater released to the environment was 80 m^3
Stabilized sewage sludge recycling	0 tons of stabilized sewage sludge taken to landfill	0 tons of stabilized sludge taken to landfill
Minimize the evitable sudden discharge of untreated wastewater to the sea	Reconstruction works completed, amount of untreated wastewater discharged to the sea without dilution (at least 1:4) = 0 m^3	Construction works start in 2020, expected time of completion in December 2022
Reduce energy consumption in the sewage pumping stations by improving existing ventilation systems. Estimated heat and electricity savings are approximately 50 MWh/y	Ventilation systems have been improved and are in use in all 7 (Harku, Laagri, Raba, Linnahalli, Airport, Tartu mnt, Mõigu) sewage pumping stations	Construction works are in progress, ventilation system improvements will be completed in February 2020
Reduce the use of electricity and chemicals as well as the discharge of untreated wastewater into the environment	The separate sewers scheme for the city centre is completed	The scheme is completed and used as a reference for approving designs in the area
Reduce the amount of waste generated during construction and repairing of water pipes and sewers by extending the use of no-dig construction techniques	10% of all sewer-related reconstruction works have been carried out using no-dig construction techniques	57% of all sewer-related reconstruction works were done using no-dig construction techniques
Reducing the amount of waste generated and raise the awareness of our employees	Reusable dishes are available and employees are informed about the possibility to use them and where to get them. By the end on 2019, disposable plastic tableware is no longer used	Disposable dishes are no longer bought for using at joint events, old stack will be used up. Employees have been informed of the objective and the ways to achieve it. We advise people to bring along their own reusable dishes when coming to joint events
Improve the various stakeholders' environmental awareness regarding Company's activity to increase and maintain Company's good image (reputation)	≥ 2000 people/y have participated in classes/tours	2077 people attended the classes/tours
	≥ 2 open doors days	2 open doors days were organized
	≥ 2 water and environment related campaigns or participation in an outdoor event	3 water and environment-related campaigns or participating in outdoor events
Reduce the amount of paper used for printing by employing digital alternatives	Reduce the amount of paper purchased and used by 5%	30% less paper has been purchased
	At least 1 public computer available for use in each unit	At least 1 public computer is available for use in each unit
	All unnecessary printers have been identified and removed	Printing has decreased by 27.5%

Table 3: ENVIRONMENTAL OBJECTIVES FOR 2020

Objective	Task	Indicator	Due date
Reduce the percentage of clean water losses by reducing the number of leakages	Fast detection and repair of leakages, improving the efficiency of work processes	Level of leakages ≤ 13.75%	2020
Increase the efficiency of raw water treatment by choosing raw water based on its qualitative characteristics and thereby reducing the water consumption	To design alternative water intake, construct it and take it into use	Alternative water intake is designed, constructed and taken into use	2021
Operations comply with the terms set out in the water permits issued by the Environmental Board	The assigned specialists to comply with the obligations arising from the requirements and ensure that they are complied with by their activities	0 non-compliances	2020
Stabilized sewage sludge recycling	To recycle the sewage sludge by producing compost soil that can be used in planting green areas, in agriculture or re-cultivation. Find potential partners and customers	0 tons of stabilized sewage sludge landfilled	2020
Minimize the evitable sudden discharge of untreated wastewater to the sea	Reconstruction of mechanical treatment at the Wastewater Treatment Plant according to the detailed design	Reconstruction works completed, amount of untreated wastewater discharged to the sea without dilution (at least 1:4) = 0 m^3	2022
Reduce energy consumption at the pumping stations by installing ejectors for water aeration. Energy saving ca 24 MWh/a	Install ejectors in 10 pumping stations to replace compressors that have been used until now	Ejectors have been installed and are running in 10 pumping stations	2020
The implementation of the Green Office as a pilot project at the Wastewater Treatment Plant	Carry out initial inspections, propose improvements, set environmental objectives, draw up and implement an environmental action plan Apply for a Green Office certificate	The Wastewater Treatment Plant office obtains the Green Office certificate	2021
Improve the various stakeholders' environmental awareness reg. the company's activity to improve and keep the company's good image (reputation)	Organize environmental education classes for various age groups Organise activities (campaigns, open doors days, events, cooperation etc.) to raise the awareness of consumers and the community	≥ 1,000 people/y have participated in the classes ≥ 2 open doors days/y ≥ 2 water and environment related campaigns or participation in an outdoor event	2020
Reduce the amount of paper used for printing by employing digital alternatives	Assess the amount of paper used for printing and encourage employees to think twice before printing Create alternatives (e.g. UTG, digital protocols and acts) to reduce printing in different departments	Reduce the amount of paper purchased and used by 5%	2020

Compliance of the Activities 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, Ambient Air Protection Act, and subordinate acts based on these acts must be ensured. Pursuant to the Water Act, we must ensure that effluent discharged from the wastewater treatment plant complies with established limits, and in our service and connection process we act in accordance with the requirements of the Public Water Supply and Sewerage Act. In organising the recycling of sewage sludge, we rely on the Waste Act. According to the Chemicals Act we are a Category B major-accident company and are subject to specific requirements. The Atmospheric Air Protection Act establishes air emission limit values and reporting obligations.

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

We constantly monitor the amendments that are being made to the requirements and legislation. In case changes are made to the legislation that concerns the Company, those are communicated to the managers and specialists responsible for the relevant matters, allowing them to assess the impact of the amendments on the Company and amend our processes accordingly if necessary.

In cooperation with the Estonian Waterworks Association, we participate in the development of and rounds for comments on the draft legal acts pertaining to the water sector and environmental matters, by taking part in the work groups, presenting our opinions and making amendment proposals to the draft legal acts under discussion. We have also communicated our positions directly to the relevant ministries without doing it via Estonian Waterworks Association.

In 2019, it continued to be important for us to participate in the drafting of the new Public Water Supply and Sewerage Act, which is likely to be completed in 2020. Furthermore, we took part in the drafting of the new Drinking Water Directive via Estonian Waterworks Association in 2019.

The most important draft acts, in the drafting procedure of which Tallinna Vesi's specialists actively participated by proposing amendments in 2019, were the already mentioned new Public Water Supply and Sewerage Act, Tallinn City Regulation on the continuity of vital services, Minister of the Environment's Regulation on the limit values for priority substances and priority hazardous substances, Minister of the Environment's Regulation on the limit values for greening soil made of treated sewage sludge, Regulation on drinking water quality and testing requirements, and analysis methods and Minister of the Environment's Regulation on the requirements for wastewater treatment and discharge of treated effluent, stormwater, mining water, quarry water and cooling water into recipient, the methods for assessment of the compliance and the limit values for pollutant concentration. Work was also done on many other draft legal acts that are of importance to us.

Besides the draft Public Water Supply and Sewerage Act, the new commenting rounds continue in 2020 for amending the Waste Act and Packaging Act once again.

Environmental permits

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

- 5 permits for a special use of water (details on page 14);
- 2 waste permits (details on page 31);
- 2 ambient air pollution permits (details on page 35).

Requirements of the Services Agreement

On 12 January 2001, we concluded the tripartite Services Agreement with the City of Tallinn and investors which, among other things, obliges us to comply with 97 Levels of Service. This makes us the most regulated water undertaking in Estonia. Our activities and levels of services are assessed once a year by an impartial monitoring unit, Supervisory Foundation for the Water Companies in Tallinn, to whom the Company annually, i.e. by the end of the first quarter of the following year, submits the report on compliance with the levels of service.

In 2019, all but one of the contractual levels of service that the parties had agreed upon were delivered and in many cases outperformed. Due to a human error resulting in an incorrect date entered into the notice sent to the customers, a planned water interruption was carried out on 17/10/2019 at Valge Str 16 without the required 5-day advance notification. In terms of corrective actions, double controls have been implemented in the data system on interruptions in order to avoid such errors in the future.

Water quality at the customers' taps was 99.04% compliant with the standards in 2019, which exceeded the quality level specified in the Services Agreement by 4.04%. Also, the level of leakage continues to be below the 26% limit. In 2019, the leakage rate was 12.97%. This is the best result in the history of the Company which has been achieved through forward-looking efforts and consistent work. The best result ever in the Company was also achieved in reducing sewer blockages. Thanks to the preventive maintenance and upgrading the sewer network, we managed to reduce the number of blockages to 573 in 2019.

Requirements for contractual partners

As strict requirements apply to our activities, we consider it to be very important that our suppliers and contractors meet the environmental and occupational safety requirements as well. Among other things, the providers of construction services 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 which enable us to make sure that our partners meet our expectations. Our specialists monitor the safety and environmental performance in the activity of suppliers/contractors at the sites on a daily basis.

Management system control and audit

In 2019, the accredited certifier AS Metrosert carried out the ordinary surveillance audit of the management system and the audit to validate the EMAS environmental report. The ordinary audit evaluated the compliance of the quality management system with the requirements of ISO 9001, environmental management system with the requirements of ISO 14001, the compliance with the requirements of Regulation (EC) No 1221/2009 (EMAS) as well as the amendments thereof by the Commission's Regulation (EU) 2017/1505 (EMAS – Eco-management and audit scheme implemented based on a voluntary participation of organisations) and the compliance of the occupational health & safety system with the requirements of OHSAS 18001/EVS 18001.

As a result of the external audit, AS Metrosert confirmed the continued compliance of the Company's integrated management system with the standards ISO 9001, ISO 14001 and OHSAS 18001/EVS 18001 as well as EMAS regulation. In the course of the external audit, AS Metrosert also validated the Environmental Report for 2018.

Regarding the compliance with requirements the auditors identified 3 minor non-compliances, which were fixed within the given time limit. The audit report stated that the management system performed in line with the requirements established in the Company, was effective and contributed to the company's policy and objectives. The management system has been appropriately developed and improved, and it is able to meet the legislative, regulatory and contractual requirements.

Besides external audits, ordinary internal audits were carried out in the Company as per the internal audit plan to assess the performance of the management system. Internal auditors did not establish any non-conformities during the internal audits. As a result of the internal audits, our internal auditors put forward 19 improvement proposals, which have been analysed by the responsible managers and corrective actions have been performed.

In 2019, the Estonian Accreditation Centre carried out a surveillance visit in the Company's laboratories to verify the compliance with the requirements of ISO 17025. No non-conformities were established.

Environmental Education and Consumer Awareness

We keep on working hard to promote the environmental thinking amongst our population. We encourage people to drink tap water and explain how to prevent sewer blockages. We continue to point out the stable quality of tap water that meets high standards and encourage the consumers to drink tap water at home and ask for it whilst having a meal in a restaurant. We participated in several public events and opened two new public water taps in addition to the existing ones in order to improve the availability of tap water. The trust in tap water shows a constantly rising trend. If 86% of community members trusted tap water at the end of 2018, then 90.4% of them drank tap water by the end of 2019.

- We continue contributing to the environmental education of children whom we want to value the nature around us. Each year, we carry out water-themed conversations in kindergartens and schools, discussing matters relating to water cycle, sustainable consumption and sewer blockages. 969 children participated in such group conversations in 2019.
- In May 2019, we organised an environmental education month to improve the environmental awareness of our employees, when we focused on the more environmentally friendly choices. During the month our employees planted trees in the forest, had a tour at the AS Ragn-Sells waste station and hike on a nature track, which they also cleaned from trash during the trip. Care for the environment and behaviour that values nature are very important for us and we intend to further promote such awareness among our staff.
- 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, of which Tilgu play cards and a puzzle book „Puzzle with Tilgu" were the latest ones issued.
- In cooperation with Tallinn City Museum, a history book about water supply in Tallinn called "Pure Water in Tallinn's History" was published in 2019. The book is based on the materials of the exhibition, which opened in spring 2018 in Kiek in de Kök. Just like the exhibition, the book provides an overview of the history of water supply in Tallinn and developments in the use of water.

- In 2019, we participated in the information day for kindergartens and in several public events such as the Snow Day in Nõmme Snow Park and Estonia Theatre Fair. We discussed with the participants how to be environmentally friendly in our consumption of water and how to avoid sewer blockages.
- We were active in sharing the news related to the environmental education and tap water via social media and press, and made preparations for the launch of our awareness campaign addressing water treatment and wastewater treatment.
- Besides our main activities, the production of drinking water and treatment of wastewater, our treatment plants are also important for their role in improving environmental awareness. Each year we introduce the work going on in our plants to more and more people. 57 guided tours were held at our treatment plants in 2019. As it is our tradition, we held open house days at Ülemiste water treatment plant in spring 2019 and in Paljassaare wastewater treatment plant in autumn 2019.

Quality and Use of Water Resources

Permits for special use of water

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

All requirements established in the permits for a special use of water were met in 2018. Fee for a special use of water is paid for the quantity of water taken from Lake Ülemiste into the water treatment plant and for the ground water pumped from the aquifers. In 2019, the fee for a special use of water amounted to 4.1% of the costs of the sold products/services (2018: 4.1%).

In 2019, a new open-ended permit for a special use of water (KL-506050) was issued to Tallinn service area, covering Tallinn public water supply and sewerage main service area and the area of Tallinn water catchment facilities in Harju and Järva Counties.

Table 4: VALID PERMITS FOR SPECIAL USE OF WATER ISSUED TO AS TALLINNA VESI

Number of the permit for special use of water	Valid until	Description of special use of water
L.VV/331954	31/12/2030	**Saue City public water and sewerage service area.** Extraction of ground water from boreholes, over 5 m^3/day. Collection of wastewater and conducting wastewater to Paljassaare wastewater treatment plant owned by AS Tallinna Vesi.
KL-506050	termless	**Tallinn public water supply and sewerage system main service area, 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, water extraction from Lake Ülemiste, extracting ground water from Ordivician-Cambrian, Cambrian-Vendian and Quaternary aquifers through Tallinn public water supply system boreholes, for discharging biologically treated effluent through a deep-sea outlet pipe into Tallinn Bay and for discharging mechanically treated stormwater into the sea, Mustjõe Stream and Pääsküla Bog.
L.VV/328381	31/12/2042	**Harku Municipality.** Extraction of ground water from boreholes, over 5 m^3/day.
L.VV/328349	termless	**Maardu City public water supply and sewerage system operating area.** Extraction of industrial and drinking water from Cambrian-Vendian aquifers in order to supply water to Maardu City, Kallavere and Muuga area. Since November 2012, all wastewater from those connected to Kallavere and Maardu public sewer system is discharged to Tallinn public sewer system.
L.VV/333205	19/08/2024	**Building an alternative water intake for Lake Ülemiste.** Drowning of solid substances into Lake Ülemiste in order to ensure that water can be taken primarily from the waters of the surface water catchment system, where appropriate.

Water catchment

Nearly 90% of our consumers in Tallinn and Maardu get their drinking water from the 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 the 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 the 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 reserves for Lake Ülemiste and can also be used if there is the need to improve the raw water quality in Lake Ülemiste.

The volume of water resources in Tallinn surface water catchment system primarily depends on the annual amount of precipitation. Constant information on the flows enables us to use the water resource in the most efficient manner. To regulate the water resources in an optimum and accurate manner we have established water metering points at all hydropoints, which enable us to meter the flows conducted to the channels as well as the sanitary flows in the rivers. We perform metering regularly, as per the requirements of the permit for a special use of water.

The year 2019 is generally characterized by low water flows in the rivers of the catchment area and modest ice conditions. Water bodies remained covered with ice until the second half of March and had practically no ice in the autumn-winter period. The flows were lower than usual from January until mid-February and somewhat increased due to little snowmelt from mid-February until the end of April, however, there was no usual high water in the rivers. Since May, due to very little rainfall the flows started to drop and continued to be lower than usual until the end of September. The flows in the rivers of the catchment area started rising from mid-October and reached some balance in November-December. However, there was not as much rainfall as needed for Paunküla reservoir to achieve its normal damming level. For the fifth year in a row, the water regime during the year can be described in quite similar terms: the winter had an unstable temperature (specifically autumn-winter period, which was one of the warmest of the decades), snowless, ice short-termed or not at all. Water temperature in Lake Ülemiste was 10 °C already in April. The summer was had low levels of rainfall. The dry summer significantly affected the runoff of the rivers in the catchment system. Water regimes started improving due to more rainfall starting from mid-October and continued to do so until the end of 2019.

In order to protect the water resources and the water body used for the extraction of drinking water, a sanitary protection zone has been established around Lake Ülemiste. The sanitary protection zone, which comprises Lake Ülemiste, water catchment facilities, bank reinforcements and the land in the close vicinity of the lake, needs to be kept in its natural condition. Furthermore, 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 permits for special use of water No L.VV/322982 (effective until 30/09/2019) and No KL-506050 (effective since 1/10/2019), the Company is allowed to extract 47.60 million m^3 of surface water per year from Lake Ülemiste. The actual surface water extraction in 2019 was 25.00 million m^3.

Table 5: USE OF SURFACE WATER FROM LAKE ÜLEMISTE AND COMPLIANCE WITH THE PERMIT FOR A SPECIAL USE OF WATER No L.VV/322982 and No KL-506050, million m^3

	2015	2016	2017	2018	2019
Use of surface water from Lake Ülemiste	22.76	23.73	23.72	24.31	25.00

Maximum volume permitted 47,6 million m^3/year

The water quality in surface water sources is monitored in line with the program determined by the permit for a special use of water. In 2019, the quality of raw water extracted from the water catchment system was compliant with the Regulation No 1 issued by the Minister of Social Affairs. We take raw water samples from the intake of our water treatment plant on a daily basis to ensure the 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 line 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 6: WATER QUALITY IN LAKE ÜLEMISTE IN 2015-2019

Parameter	Unit	Average results				
		2015	2016	2017	2018	2019
Colour	mg/L Pt	36	34	38	39	31
Turbidity	NTU	12.0	10.5	10.5	9.6	6.9
pH	0	8.90	8.32	8.27	8.23	8.19
Permanganate index (COD_{Mn})	mg O2/l	11.2	9.9	11.1	11.8	9.8
Total organic carbon (TOC)	mg C/l	11.0	10.0	10.7	11.2	10.1
Total phosphorus	mg/l	0.030	0.028	0.038	0.047	0.048
Total nitrogen	mg/l	1.45	1.58	1.60	1.50	1.30
Ammonium, $NH4^+$	mg/l	0.038	0.085	0.112	0.085	0.074
Phytoplankton abundance	objects /ml	100004	5771	7168	7500	6300

In 2019, the water quality in Lake Ülemiste was good, similarly to the quality levels at the end of 2018. The oxidation of raw water was below the average and plankton levels were also relatively low.

Use and quality of ground water

Approximately 10% of consumers in Tallinn are supplied with water extracted from the Cambrian-Vendian and Cambrian-Ordovician aquifers. Ground water is supplied in the City of Saue, districts of Nõmme, Laagri, Merivälja, Pirita and Tiskre in Tallinn and was supplied in Tiskre village in Harku Rural Municipality until 30/06/2019. Since 01/07/2019, Strantum OÜ – the water undertaking of Harku Rural Municipality – has been operating Tiskre village. Therefore, according to the water permit issued to AS Tallinna Vesi for Harku, the use of ground water has significantly been reduced in comparison with the previous years. A total of 2,679,916 m^3 of ground water was extracted in 2019.

Table 7: USE OF GROUND WATER AND COMPARISON WITH THE MAXIMUM VOLUMES SET BY PERMITS FOR A SPECIAL USE OF WATER, Km^3

Parameter	Maximum volume permitted	Average results				
		2015	2016	2017	2018	2019
Tallinn (Permit no. KL-506050)	7749.8	2 146.1	2437.4	2384.2	2323.8	2349.1
Saue (Permit no. L.VV/331954)	395	265.5	278.7	283.9	290.5	309.4
Harku (Permit no. L.VV/328381)	40	58.6	46.7	42.3	41.1	21.1
Maardu (Permit no. L.VV/328349)	720	0.1	0.3	0.48	0.28	0.39

According to the EU Water Framework Directive (2000/60/EC), the qualitative or chemical condition of ground water is regarded to be good if the concentration of pollutants does not indicate an inflow of salty water or other water, nor exceed the respective quality standards. In 2019, the quality of drinking water at the borehole pumping stations complied with the requirements of the Regulation No 82 (was effective until 30/09/2019) and No 61 (currently effective), 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 Health Board.

We monitor the ground water quality parameters in accordance with the permits for a special use of water and the drinking water source quality monitoring programme, 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 ammonia) in 21 ground water pumping stations, which have filters installed and constantly provide water to the public network. All currently used 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 and the last years' 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 Geologgiakeskus OÜ as well as by Estonian Radiation Centre. To assess the health impacts of radioactivity, the Radiation Centre together with the Health Board carried out a health risk assessment in Tallinn ground water areas in 2010. Based on the results of the risk assessment, any random health damage resulting from the content of radionuclides in the water of Cambrian-Vendian borewells is unlikely. Repeated radiological analyses in all the borewells are carried out every ten years, in accordance with the requirements.

Drinking Water Production and Quality

Last year we supplied 26.65 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 Drinking Water Directive 98/83/EC. The water quality is monitored in accordance with the monitoring programmes approved by the Health Board's North Department. 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 Ülemiste water treatment plant as well as the drinking water supplied from ground water resources in 2019 are added at the end of the report.

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 the analyses is guaranteed by the certified samplers and laboratories accredited by the quality management system (EVS-EN ISO/EC 17025 standard), modern equipment and professionals. In 2019, our water and microbiology laboratory performed a total of 105,000 analyses.

Thanks to the high quality of water and improved awareness of consumers, the number of people drinking tap water has shown a steady growing trend over the last years.

Surface water treatment process

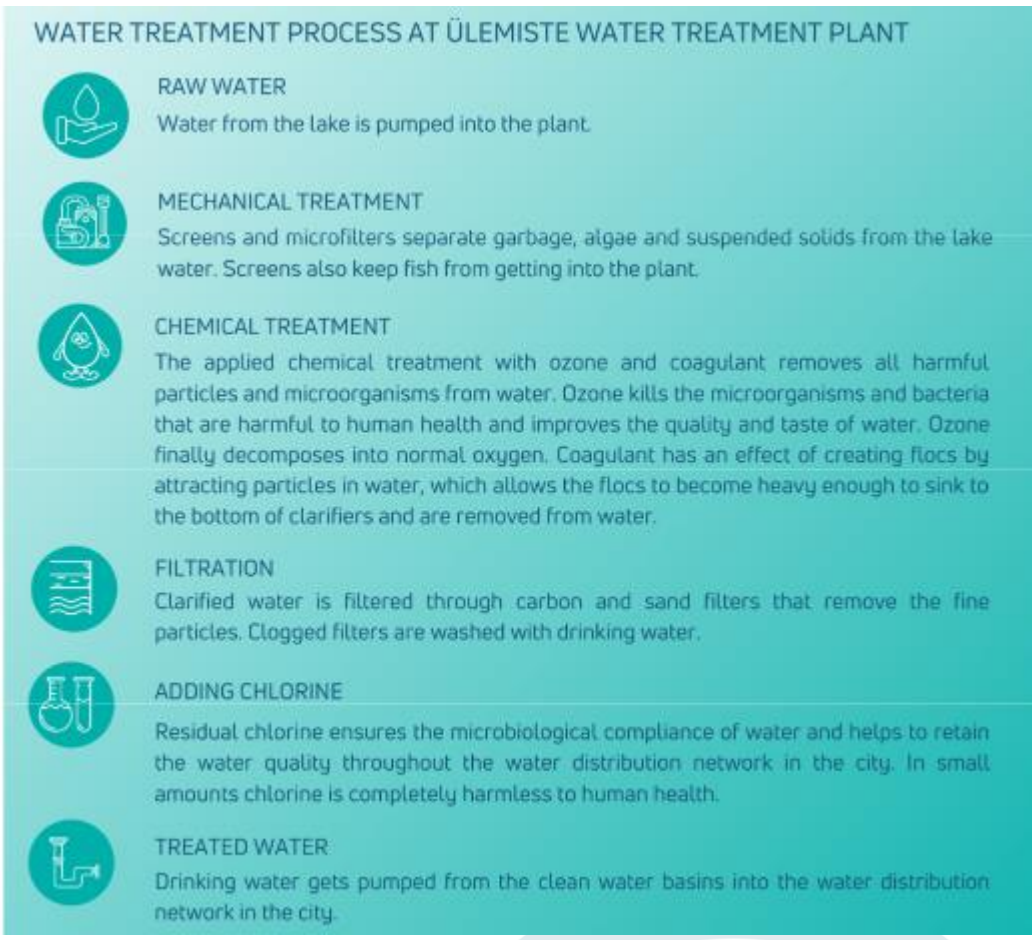


Figure 1: Water treatment process at Ülemiste water treatment plant

Ülemiste water treatment plant treats water extracted from the lake by applying a world-wide used treatment scheme. Due to the quality of surface water in Lake Ülemiste, the law stipulates that in order to ensure the drinking water quality, the surface water must undergo mechanical and chemical treatment – preliminary ozonation, coagulation, clarification, filtration, and disinfection.

In 2019, investments were made in several major projects at the water treatment plant.

In 2019, the Company reconstructed 6 clarifiers, which was an important investment for the sustainability of the treatment process. Also, the fabric of microfilters was replaced at the beginning of 2019. Micro-filtering through a fine fabric constitutes a mechanical treatment stage, which removes part of the plankton, rotifers and fine solid particles. Broken fabric causes the treatment effect to fail. In order to prevent possible leaks from the drinking water reservoir No 5 it underwent reconstruction as well.

Ground water treatment

Ground water used for producing drinking water usually falls into the quality classes I-III. Ground water from Ordovician-Cambrian aquifer usually falls into the quality class I and does not need any treatment. However, ground water from Cambrian-Vendian aquifer qualifies as class II or III and requires treatment as the main drinking water source. The main reason is mostly natural excess content of iron, manganese, or ammonium, resulting in higher turbidity of water than usual.

The Water Act requires ground water to be preserved as similar to its natural conditions as possible, therefore, no chemicals are used in treating ground water. In order to supply compliant drinking water, we treat ground water by filtration and aeration to remove excess iron, manganese and ammonium from the water. The samples taken after the ground water treatment process indicate a significant decrease in turbidity as well as in the content of iron, manganese and ammonium, improvement of colour and stability index, also higher oxygen content.

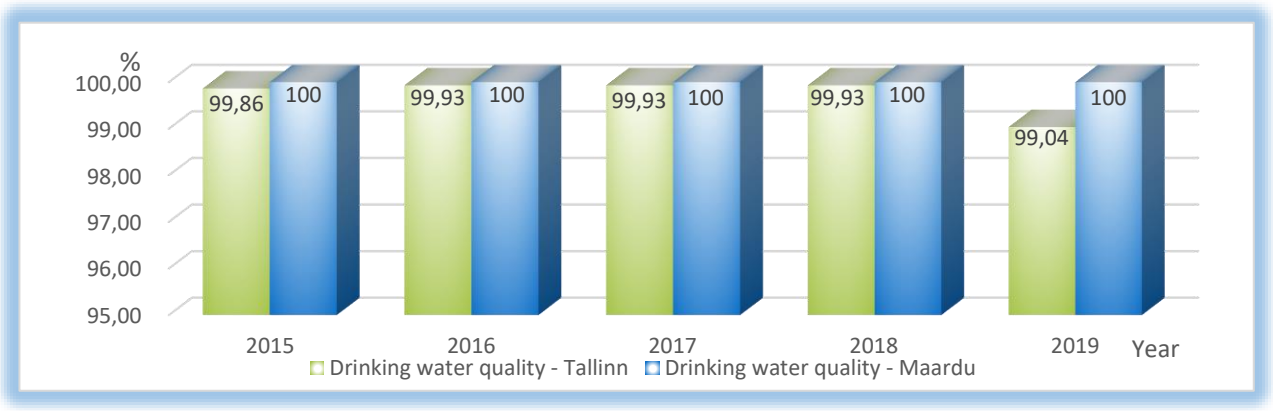
Drinking water quality in the network and at customer premises

The quality of drinking water in Tallinn and Maardu remains excellent. During the year, we took samples at the sampling points (at customer premises), which had been agreed with the Health Board, twice a month.

In 2019, we took a total of 3,006 samples across the Tallinn service area (besides Tallinn also in Saue and Harku small town). The quality of drinking water taken from the customers' taps was 99.04% compliant with the requirements, which was somewhat lower in comparison with the result of last year. Whereas the quality of drinking water leaving the water treatment plant continues to be excellent, the slight drop in the water quality at customers' taps is attributable to the changed analytical methods used in testing the water quality. The new analytical method is more sensitive, which provides the water company with much more accurate information than before. As a result of those tests, Tallinna Vesi has made further developments in the water network and improved the effectiveness of the ongoing maintenance activity in order to ensure consistent supply of high-quality drinking water.

100% of the 146 water samples taken in Maardu in 2019 complied with the requirements. Before connecting with Tallinn water network, the quality compliance of drinking water in Maardu was only 33%.

Chart 1: COMPLIANCE OF THE QUALITY OF DRINKING WATER WITH THE REQUIREMENTS SET OUT BY THE MINISTER OF SOCIAL AFFAIRS REGULATION NO 82 IN 2015-2019, %



Water Network maintenance and related investments

We are constantly performing maintenance and rehabilitation works on the network to retain and improve the drinking water quality. To guarantee the availability of high-quality drinking water for our consumers we regularly clean and flush the water network. During the cleaning process the sediment build-up is removed from the pipes, which is one of the key methods for improving water quality in distribution networks. In 2019, we performed air-scouring works on a total of 40.3 km of water network. The volume of those works reduced due to the significantly higher proportion of flushing performed in the network to reduce water retention time in the pipes. Since the end of 2019, our Water Services team is using a new more efficient compressor in carrying out the air-scouring works.

Table 8: CLEANED WATER NETWORK 2015-2019, km

	2015	2016	2017	2018	2019
Cleaned water network	141.0	137.0	137.0	135.0	40.3

Investments in replacing old water pipes have facilitated an improvement in water quality at customer premises and a more efficient use of water resources. Each year, we renovate at least 5 km of wastewater network and 5 km of water network, in line with the Services Agreement signed with the City of Tallinn. Due to the fact that several projects that are to be performed in collaboration with the City have been postponed, more than expected i.e. as much as 57% of the total amount of reconstruction works were performed using no-dig method!

Leakages and interruptions to water supply

One of our key objectives is to keep the losses of water in the water network at a minimum level. The Services Agreement covering the service area in Tallinn sets the obligation for the Company to reduce the level of leakages to 26%. We have managed to keep the leakage at a considerably lower level than that for several consecutive years already, achieving 12.97% in 2019. About ten years ago the level of leakages exceeded 32%, which means that we are currently saving over 27,000 m^3 of treated water a day compared to ten years ago. The reduction in the level of leakages has been facilitated by our consistent and targeted efforts to use the water resource sustainably and with lower losses.

Table 9: LEAKAGE LEVEL IN 2015-2019, %

	2015	2016	2017	2018	2019
Leakage level	14.68	15.07	13.82	13.71	12.97

Daily water loss monitoring helps to find leakages as fast as possible and to reduce the leakage level. Our specialists have specific equipment for finding leakages, which along with zoning the network and remote reading system allows us to detect the leakages in the network faster.

In order to mitigate the inconveniences resulting from an interruption to the service, we notify our customers in advance of unplanned interruptions. Last year we made prior notifications of unplanned water interruptions in approximately 96.2% of the events. 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 to water supply.

Water metering

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

We have installed a total of 24,328 water meters to customers' connection points. Verified water meters allow accurate measurement of water consumption.

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

In line with the previously prepared plan, we changed a total of 6,047 water meters in 2019. We will continue our work in 2020 to make sure that all our customers have water meters that are verified on time.

Wastewater Collection

Wastewater Network and collection of wastewater

Wastewater is directed to the wastewater treatment plant through the combined sewer system, which collects both sewage and stormwater. Some parts of our service area are also covered with a separate stormwater system with stormwater outlets. However, most of the stormwater is collected via the combined sewer system and is led to Paljassaare wastewater treatment plant.

The number of blockages is a good indicator for reflecting the condition of the wastewater network. Blockages are mainly caused by the sediments build-up in the wastewater network or the misuse of wastewater network by consumers. Initially, the pipes were dimensioned for larger flows, so today's lower water consumption has led to reductions in flows and flow speed, which in turn increases the risk of blockages. Continued extension of sewer network is also affecting the total number of blockages.

Table 10: NUMBER OF BLOKAGES IN 2015-2019, pcs

	2015	2016	2017	2018	2019
Number of blockages	759	706	699	650	573

We have been able to achieve the steadily good level of blockages in the recent years due to many 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 Paljassaare wastewater treatment plant.

Furthermore, the rehabilitation of at least 5 km of problematic sewer network by the Company each year also contributes to the effectiveness of wastewater disposal process.

Discharging

To serve the inhabitants whose properties have not been connected to the sewer system, the Company has provided two discharge places in Tallinn, where sewage suction trucks bring sewage from septic tanks. The availability of discharge places contributes to ensuring that the sewage from septic tanks finally ends up in the wastewater treatment plant and gets treated to the required degree. Consequently, it diminishes the risk of environmental pollution that would, in the absence of discharge place, be caused by discharging sewage in a manner and place not intended for the specific purpose.

The discharge services helping to make sure that sewage from septic tanks is delivered to Paljassaare wastewater treatment plant through the discharge places are provided by our partners in Tallinn. Although the number of inhabitants, whose properties are not connected to the sewer system, is below 1%, the volume of sewage transported from the septic tanks in Tallinn and neighbouring municipalities to our discharge places last year amounted to approximately 67,000 m^3. Therefore, we continue to cooperate with various local governments in Harju County to find the best solutions for discharge services also outside Tallinn.

Pollution load in wastewater and stormwater

In order to ensure a stable pollution load of the wastewater reaching the Paljassaare wastewater treatment plant we regularly monitor the wastewater discharged in Tallinn and Maardu and in the surrounding areas, and check the compliance of pollution parameters with regulatory requirements. In 2019, we performed at least 214 inspections to identify inspection wells, to check local treatment facilities and correctness of boundary drawings. We took a total of 1,147 wastewater samples to determine the wastewater pollution load at sites and 369 other samples for monitoring purposes. Over-pollution instances were identified and over-pollution fees were applied in 673 occasions.

In 2019, the level of precipitation in Tallinn was on average 658.3 mm per area unit, which was more than in 2018 (538.4 mm). Consequently, the amount of stormwater and pollutants discharged to the environment through stormwater outlets also increased in 2019.

Table 11: STORMWATER VOLUME 2015-2019, million m³

	2015	2016	2017	2018	2019
Stormwater volume	4.20	5.8	6.6	3.8	4.2

According to the requirements set by the permits for a special use of water we monitor 29 stormwater outlets, the largest of which are Lasnamäe, Rocca-al-Mare and Mustjõe outlets. In order to prevent any potential environmental pollution, we have equipped four stormwater outlets (in Olevi, Kaare, Raba and Vabaduse Streets) with regularly maintained sand and oil traps.

Table 12: POLLUTANTS FROM THE MAIN OUTLETS IN 2015-2019, t

	2015	2016	2017	2018	2019
Suspended solids	84	87	130	84.3	112.0
Oil products	0.2	0.4	0.6	0.2	0.6

Since 2015, we have been monitoring the content of hazardous substances in wastewater and treated effluent on the basis of the Regulation No 61 of the Minister of the Environment.

Wastewater Treatment

We treat the wastewater collected from Tallinn and nearest surrounding areas at Paljassaare wastewater treatment plant. We are committed to maintaining the high standards and achieving the results that would outperform the standards that have been set for the treated effluent discharged into the Baltic Sea. A total of 49.7 million m^3 of wastewater was treated at Paljassaare wastewater treatment plant in 2019.

Table 13: TREATED WASTEWATER VOLUME IN 2015-2019, million m^3

	2015	2016	2017	2018	2019
Treated wastewater volume	45.07	50.22	51.49	43.92	49.67

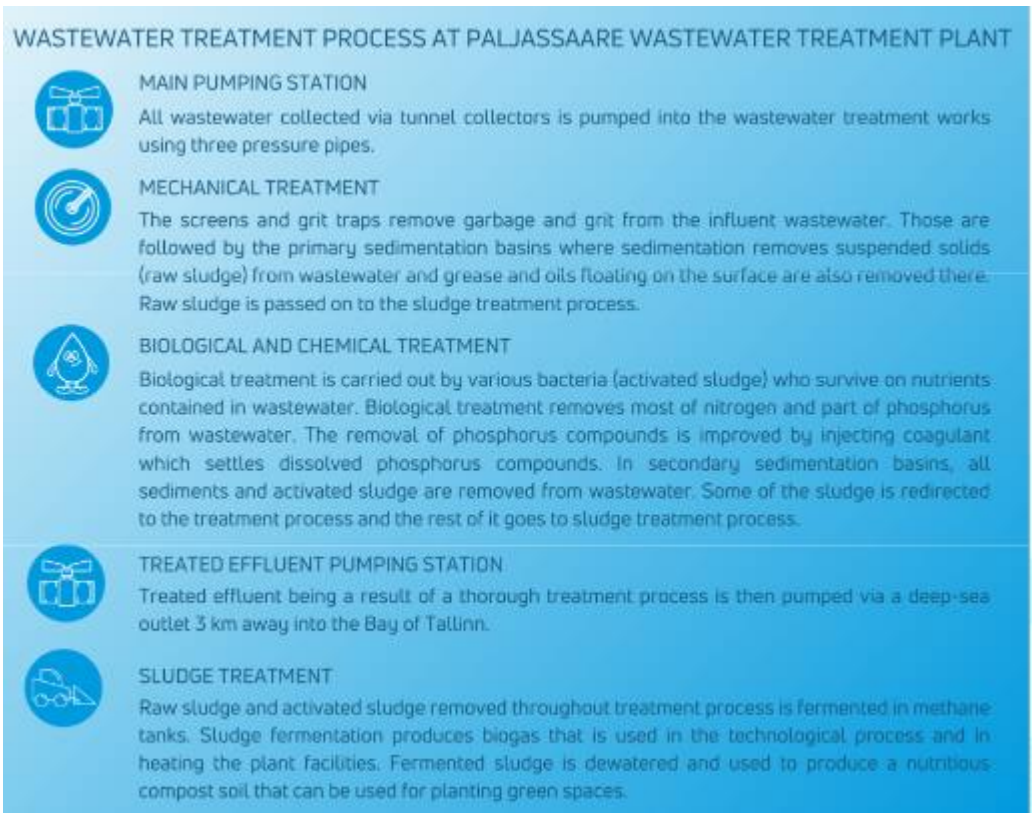
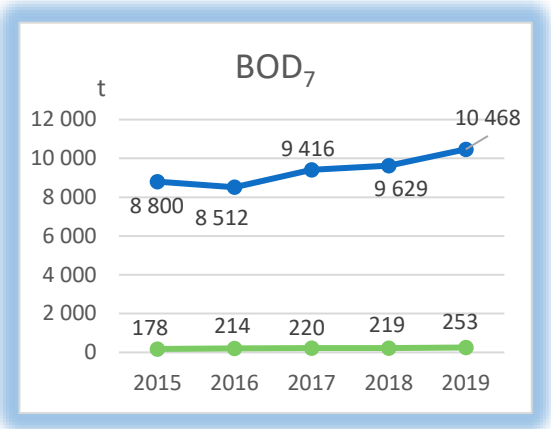


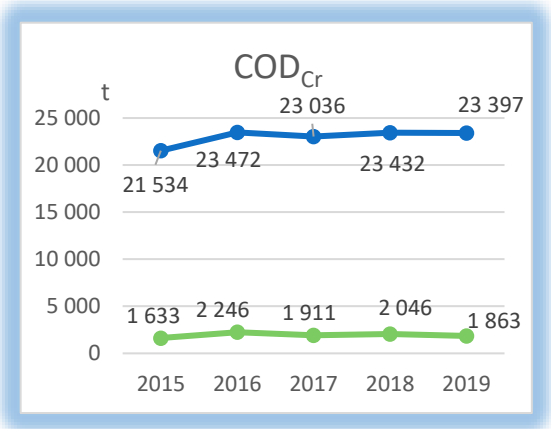
Figure 2: Wastewater treatment process at Paljassaare treatment plant

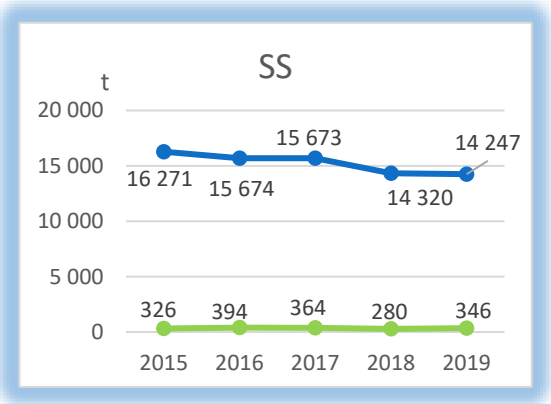
The important pollution parameters for us are as follows:

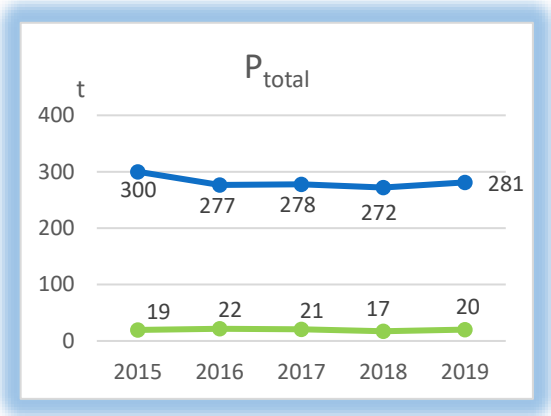
- BOD_7 - biological oxygen demand shows the amount of oxygen it takes to decompose the organic matter in the course of 7 days;
- COD_{Cr} - chemical oxygen demand is an indicator for the decomposition of organic matter, measured as the consumption of oxygen in chemical oxidation of the organic matter in water;
- SS - suspended solids shows the volume 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 compounds and phosphorus compounds serve as nutrients, which in high quantities lead to the eutrophication of water bodies;
- Oil products - shows the amount of non-volatile oil products in water.

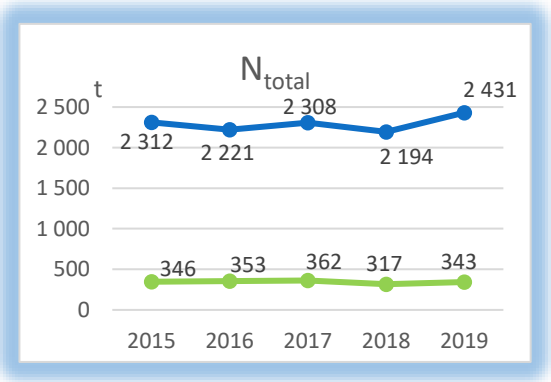
Chart 2: Amount of pollutants coming to the wastewater treatment plant and discharged into the sea in 2015-2019, t/y











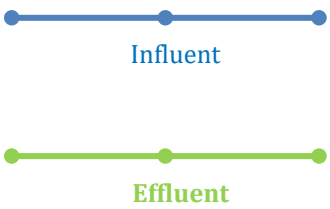
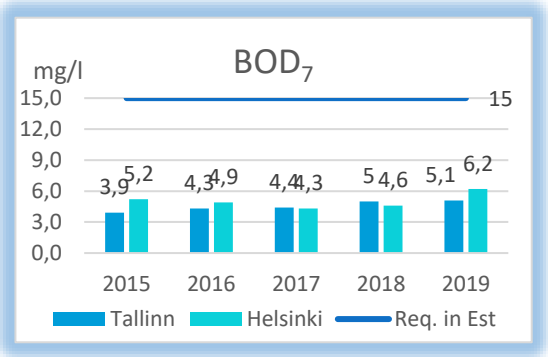
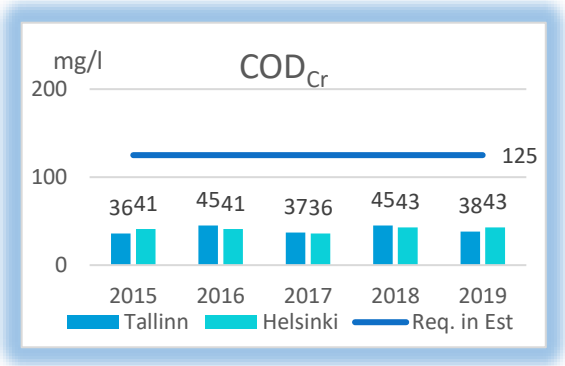
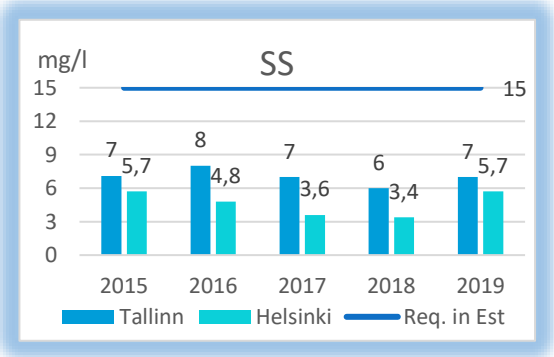
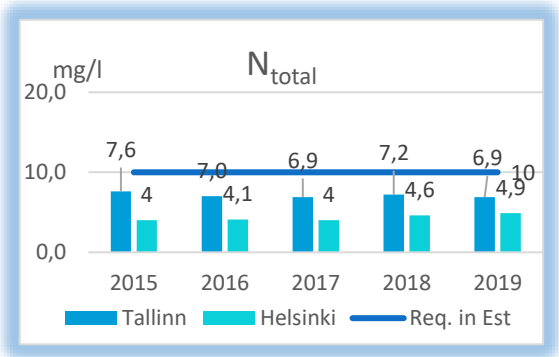


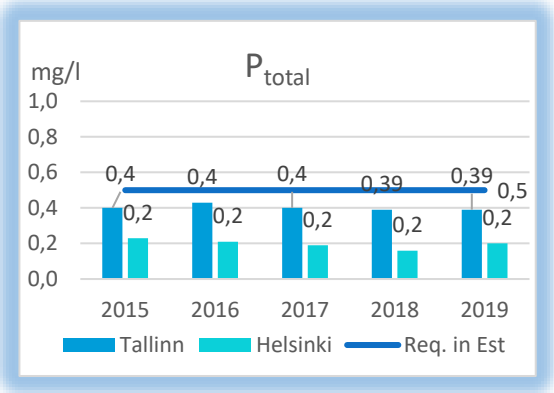
Chart 3: Average pollution concentration in treated effluent in 2015-2019, compared to regulatory maximum allowable limit and results of Helsinki HSY, mg/l











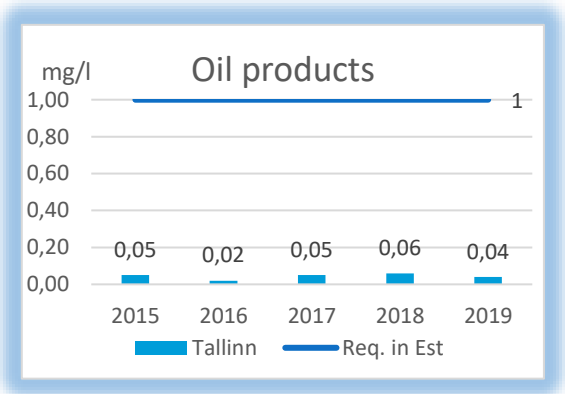
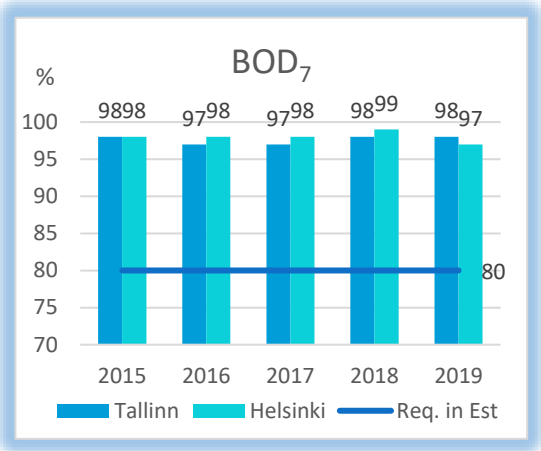
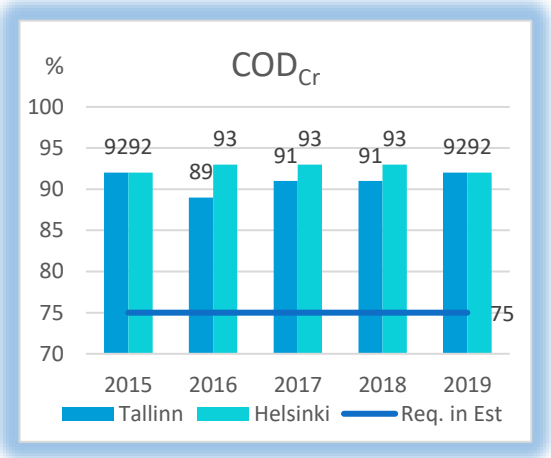
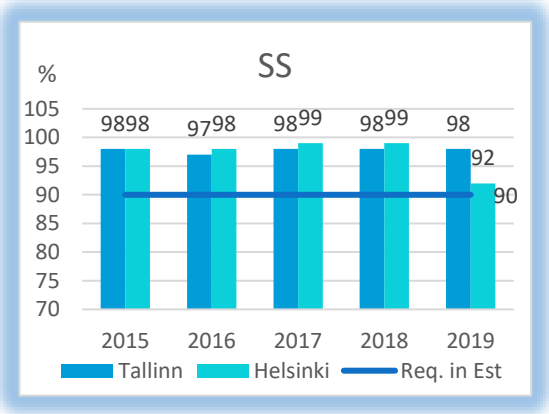
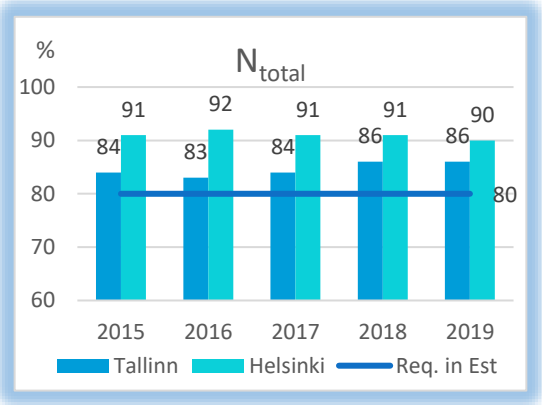


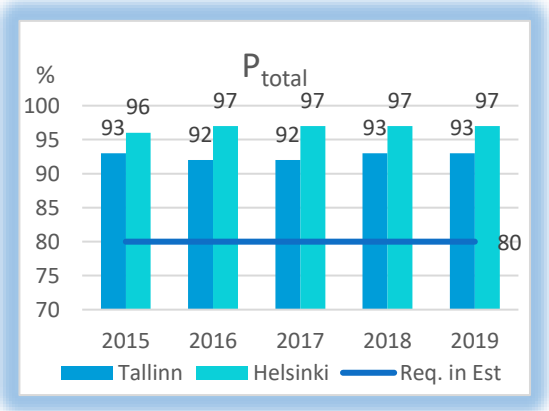
Chart 4: Wastewater treatment plant's treatment efficiency in 2015-2019, compared to regulatory minimum requirements and results of Helsinki HSY, %

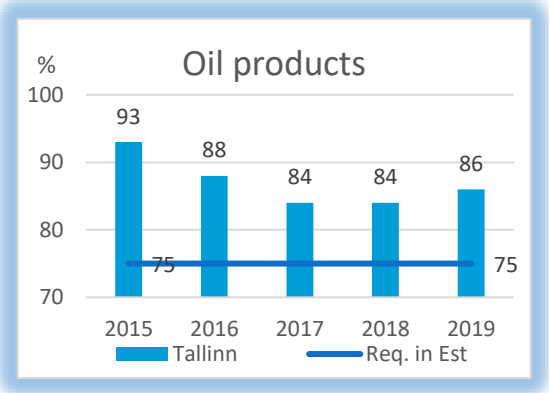












Wastewater outlets to the sea

During 2019, a total of 80,100 m^3 of wastewater diluted by stormwater (dilution ¼) was conducted directly to the sea. Due to the shock loads which exceeded the biological treatment capacity, we led a total of 928,000 m^3 of highly diluted wastewater that had undergone mechanical treatment was discharged into the sea through the deep-sea outlet in 2019.

On 27 October 2019, the overflow K5 at the wastewater treatment plant opened to lead an estimated flow of 5,940 m^3 of treated effluent into the pond. The currently effective permit for a special use of water allows using the said overflow outlet in case of a pumping station failure, when treated effluent cannot be conducted to the Tallinn wastewater treatment plant's deep sea outlet due to technical reasons and the effluent level in the treated effluent pumping station rises to a critical level.

Table 14: WASTEWATER TREATMENT PLANT OVERFLOWS IN 2015-2019, th m^3/year

	2015	2016	2017	2018	2019
Untreated wastewater discharged to the sea	45.0	122.7	111.3	154.7	80.1
Partly treated wastewater discharged to the sea	317	584	897	590	928

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 discharged to the environment.

The calculation of pollution charge is established in the permit for a special use of water and the Environmental Charges Act, which apply 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 pollutant limit values. In 2019, the pollution charge paid for discharging pollutants into receiving waters formed 3.8% of the cost of services sold (2018: 3.4%).

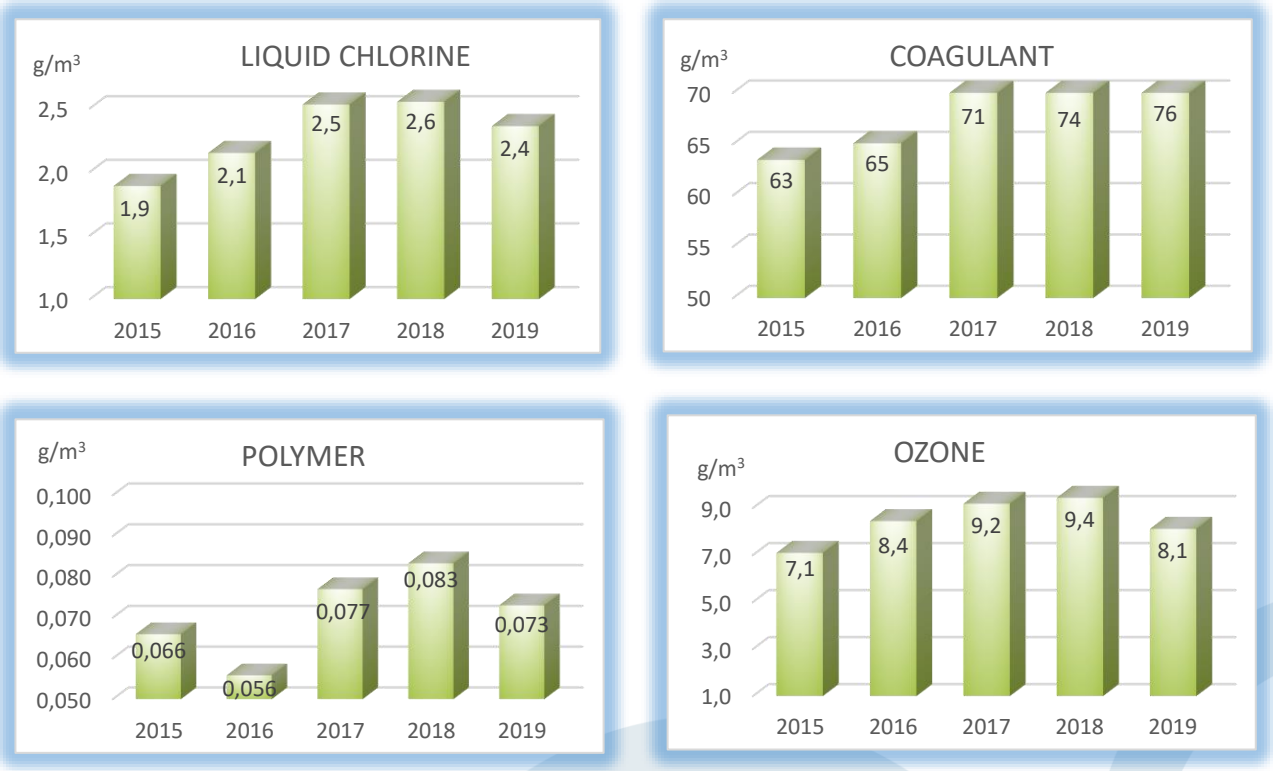
Use of Chemicals

With regard to the health and wellbeing of our employees, safe handling of chemicals at the work site is extremely important for us. Consequently, we have created the conditions necessary for safe storage and use of all chemicals. In 2019, we used a total of 5,911 tons of various chemicals (2019: 5,983 tons) in our operations, but no reported accidents with chemicals occurred, which could have caused harm to people or the environment.

Use of water treatment chemicals

- Chlorine is an effective disinfecting chemical with a long-term aftereffect. The Regulation No 61 issued by the Minister of Social Affairs ("Drinking Water Quality and Testing Requirements, and Analysis Methods" dated 24/09/2019) specifies that the content of free chlorine added to the drinking water produced out of surface water must be up to 1.0 mg/l leaving the plant and up to 0.5 mg/l at consumers' taps. We add chlorine in the final stage of the water treatment process to ensure the microbiological purity of water and to help to maintain the 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, Tallinna Vesi classifies as a company with the risk of category B major accident in Estonia. Applying the necessary safety measures, we have minimized the likelihood of chlorine accidents.
- Ozone is a good and quick oxidiser, which breaks down organic matter and microorganisms effectively in raw water and improves the colour of the water. Ozone is produced locally on site from ambient air and only in necessary quantities. Thanks to the 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 in the treatment to remove the smaller particles (e.g. suspended solids and organic substance) from water.

Chart 5: Average use of water treatment chemicals per unit of production in 2015-2019, g/m³



Water quality in Lake Ülemiste is strongly dependent on the weather. However, long-term observations have also indicated periodic changes in quality over the years. The quality of raw water was good throughout the year 2019. The use of chemicals was higher in the second half of the year due to the legislative changes, as a result of which we added more chlorine to the water leaving the water treatment plant.

Use of wastewater treatment chemicals

- Methanol is used methanol 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, Tallinna Vesi classifies as a hazardous company in Estonia.
- Coagulants and polymers are used in large amounts in the wastewater treatment process. Coagulants are used for the chemical processing of wastewater to remove phosphorus. Polymers are used to change the qualities of sludge by accelerating the dewatering process.

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 volume of chemicals used in the wastewater treatment process.

Chart 6: Average use of wastewater treatment chemicals per unit of production in 2015-2019, g/m³

The use of polymer depends on the quantities of dry matter and sludge to be treated. In 2019, a similar amount of polymer was used as in 2018 and roughly as much sludge (39,802 tons) was removed from wastewater as in 2018 (40,732 tons).

Waste Management

Waste generation

A total of 46,521 tons of waste was generated in the Company in 2019. Sludge being the by-product of the wastewater treatment process constitutes the largest part of waste.

Table 15: MAIN TYPES AND AMOUNTS OF WASTE IN 2015-2019, t

Type of waste	2015	2016	2017	2018	2019
Mixed municipal waste	67	90	110.0	72.0	45.1
Paper and cardboard *	5	5	3.3	5.7	4.7
Packages *	0.6	0,7	0.9	0.9	1.2
Biodegradable waste*	7	7	6.5	6.4	6.0
Waste from screens	615	651	960.5	904.4	893.8
Wastewater sludge*	31 974	31 741	35481.0	40732.0	38940.3
Sand traps grid	0	161	141.0	129.0	139.3
Excavated stones and soil*	11 235	11 354	10630.0	4767.0	6148.3
Asphalt waste	1 548	1 181	812.0	518.0	294.9
Mixed building waste	40	81	0.0	25.6	6.8
Concrete and bricks	274	77	35.2	6.5	1.8
Metal scrap*	68	34	60.6	55.3	29.9
Hazardous waste	2.4	3,6	4.5	9.3	2.9
Other waste	9	15	2.2	146.0	6.4
TOTAL	***45 844***	***45 401***	***48 248***	***47 378***	***46 521***

* - possible to reuse

Since the sludge generated in the wastewater treatment process forms large part of our waste, we continued to recycle it through our sludge treatment process in 2019. Sludge stabilization process (anaerobic fermentation of sludge in digesters) produces biogas used for heat generation for heating purposes and for the technological process. We analyse the samples of landscaping soil made from our sludge at least four times a year according to the requirements established in the Regulation No 29 dated 31/07/2019 of the Minister of the Environment. All the results of the treated sludge analyses were public and available on the Company's website during the period of issue of the landscaping soil.

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

Excavated soil, stones and asphalt waste account for the majority of waste resulting from the networks maintenance and repair works. The amounts of waste from construction and excavation works is again dependent on the volume of works. However, since 2013, we have been performing most of the network reconstruction works using the so-called no-dig method, which allows carrying the works out faster and reduces the inconveniences caused by traffic jams during the road works. 57% of the reconstruction works were performed using no-dig method in 2019.

We collect and sort the other types of waste, which have a smaller share in the total waste volume, and hand them over to the waste handlers. We separate paper and cardboard, biodegradable waste, hazardous waste, metal and mixed municipal waste.

Waste permits and sludge

The Company has two waste permits, issued to manage the sludge produced in the wastewater treatment process. The permits establish technical and environmental requirements for the waste handling process.

Table 16: VALID WASTE PERMITS ISSUED TO AS TALLINNA VESI

Number of waste permit	Valid until	Description
L.JÄ/325362	24/04/2020	Issued for recycling waste at Paljassaare composting fields, procedure code R12o - biological treatment preceding the recycling of waste
L.JÄ/325737	18/06/2020	Issued for recycling waste in Liikva, procedure code R12o – biological treatment preceding the recycling of waste

In 2019, 36,789 tons of stabilized sewage sludge was removed from the wastewater technological treatment process, which was taken to the composting field to produce the so-called landscaping soil (mixing with milling peat and aerobic fermentation in windrows). In 2019, we gave away 41,261 tons of sewage sludge that had been stabilized and had undergone aerobic fermentation in composting windrows (hereinafter referred to as „landscaping soil"). The main users of landscaping soil were agricultural companies OÜ Tubren Agro and OÜ Oru Agro.

In 2019, also 3,013 tons of unstable and dewatered sewage sludge was removed from the wastewater technological treatment process and it was handed over to Ragn-Sells AS.

Although a waste permit was issued also for Liikva composting field, no sludge has been recycled in Liikva since the end of 2014.

Table 17: AMOUNTS OF SEWAGE SLUDGE AND LANDSCAPING SOIL IN 2015-2019, t/y

Type of waste	Quantities				
	2015	2016	2017	2018	2019
Stabilised sewage sludge separated from the wastewater treatment process	31 974	31 741	35 481	40 732	36 789
Issued landscaping soil (reuse of sewage sludge)	38 285	39 073	32 645	26 944	41 261

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 decreasing 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 service areas, also definitely by the natural conditions.

Table 18: ELECTRICITY CONSUMPTION IN 2015-2019, MWh

Unit	2015	2016	2017	2018	2019
Water Treatment	9 746	10 721	10 755	11 782	10 599
Wastewater Treatment	21 617	22 516	23 000	21 949	22 539
Networks pumping stations, incl. Maardu	6 346	6 841	7 094	6 709	7 286
Other	757	710	693	962	839
TOTAL	***38 465***	***40 787***	***41 543***	***41 402***	***41 262***

Although the total consumption of electricity in 2019 was slightly lower than in 2018, it has been quite stable over the last few years. In 2019, the water quality in Lake Ülemiste was better than in previous years, which also led to the lower electricity consumption. At the same time, the producing of surface water was higher in 2019 causing us to use more electricity than in the years before and consequently there are no significant changes in water consumption in comparison with 2017 and 2018.

Chart 7: Electricity consumption per unit produced at the water treatment plant in 2015-2019, kWh/m³

A significant proportion of electricity consumed in the water treatment plant is used to produce ozone. Due to the good quality of surface water in 2019 we managed to operate with lower doses of ozone and therefore we used less electricity.

Chart 8: Electricity consumption per unit produced at wastewater treatment plant in 2015-2019, kWh/m³

Consumption of electricity in the wastewater treatment process depends largely on the weather, as it is mainly used to pump wastewater and to produce air i.e. to aerate the activated sludge in the biological treatment stage. During the years 2012-2015 the aeration tanks were reconstructed in stages, which resulted in the replacement of the membranes of aerators in all aeration tanks and installation of new dissolved oxygen sensors in the aeration tanks. This allows saving electricity in producing the air.

Consumption of heat energy

In addition to heating the premises we need heat energy to run the core processes. The water treatment plant produces heat out of outsourced natural gas in its boiler house. Ädala site uses central heating also produced out of natural gas in our area. The majority of wastewater treatment plant's needs for heat energy is covered by biogas.

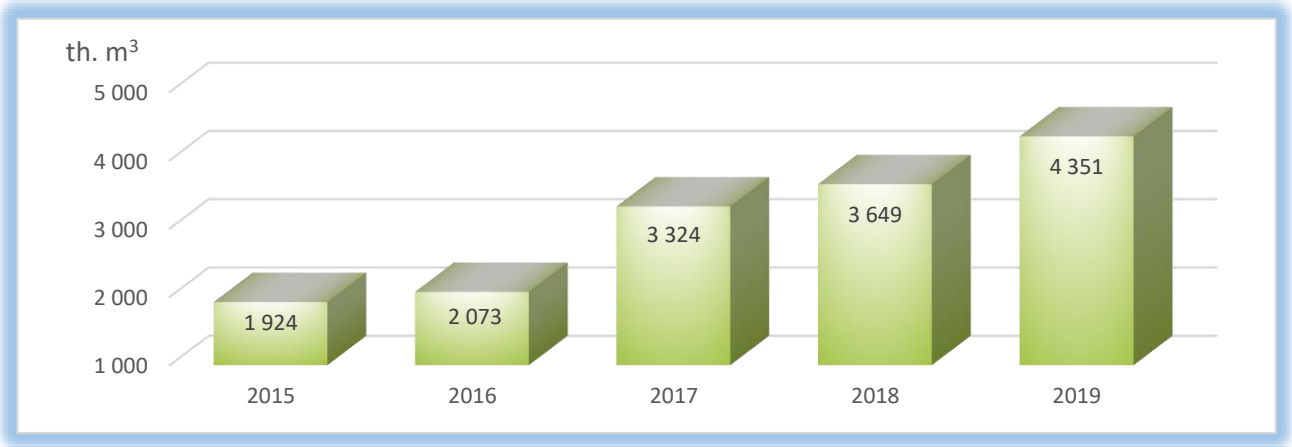
Biogas is a by-product from the fermentation of sewage sludge in digesters. From the generated biogas we produce on-site thermal energy, which we use to heat the premises at the wastewater treatment plant and to keep the processes in operation. Due to the nature of biogas production, we are sometimes forced to burn some of the biogas or to use some natural gas to a small extent. In 2019, we used 71% of the total biogas generated (75% in 2018) to produce heat.

Table 19: CONSUMPTION OF HEAT ENERGY IN 2015-2019, MWh

Unit	2015	2016	2017	2018	2019
Water Treatment	3 540	3 224	3 022	2 922	2 877
Wastewater Treatment	9 446	9 281	7 299	12 421	13 886
incl. heat energy from biogas	9 446	9 272	7 225	12 400	13 885
Ädala office	920	1 100	1 044	1 148	1 189
TOTAL	***13 906***	***13 605***	***11 365***	***16 491***	***17 952***

As of January 2018, the calculation methodology for calculating the amount of heat from biogas was changed. In order to calculate the historical amount of thermal energy from biogas used for wastewater treatment according the updated methodology, the previous amount consumed shall be divided by the coefficient of 0.61.

Chart 9: Biogas production in 2015-2019, th m³



The amount of biogas measured has increased since 2017, as a new biogas meter was installed at the wastewater treatment plant in 2017 with more accurate measurement results.

Transportation and fuel consumption

Road transport accounts for the largest part of our need for transportation. The Company has 93 vehicles for carrying out different operating tasks as well as for driving between the company sites and numerous service sites. The biggest group of vehicles is cars and operating vehicles, including minivans and team vans. We have a total of 78 cars and operating vehicles and a total of 15 special purpose vehicles (such as tractors, loaders, excavators etc).

Table 20: NUMBER OF VEHICLES AND FUEL CONSUMPTION IN 2015-2019

	2015	2016	2017	2018	2019
Total number of vehicles, pcs.	94	95	88	92	93
Petrol, l	65 962	63 289	56 759	41 265	37 775
Diesel, l	115 485	113 622	104 719	101 377	108 179
Total fuel, l	**181 447**	**176 911**	**161 478**	**142 642**	**145 954**

We continue to try and keep the fuel consumption under control through the fuel limits set for the car users and via GPS-tracking devices. Some of the cars are being shared between employees, which means that all authorised employees are allowed to use the cars to deliver their work duties. This enables the Company to cut down the costs and save natural resources.

The number of business trips made by our staff in and outside Estonia is relatively low. In planning the travel routes, we follow the principle of always choosing the option that has the best price. The most frequent destinations of business trips outside Estonia are the United Kingdom and Finland, to where our staff usually travels by plane and by boat respectively. Other means of transport (e.g. bus and train) are used very little.

Air Emission

Tallinna Vesi has been issued two ambient air pollution permits. In order to reduce any potential air pollution, the Company focuses on limiting the amount of pollutants emitted from Ülemiste and Paljassaare boiler houses, particularly the pollutants of primary importance, such as nitrogen dioxide, carbon monoxide and volatile organic compounds, as well as CO_2 greenhouse gas emissions. Also, the emissions of ozone produced for drinking water treatment are regulated. The Company pays a pollution charge for pollutants emitted into ambient air.

Table 21: VALID AMBIENT AIR POLLUTION PERMITS ISSUED TO AS TALLINNA VESI

Number of ambient air pollution permit	Valid until	Description of ambient air pollution permit
L.ÕV.HA 48701	termless	Valid for Paljassaare wastewater treatment plant pollution sources - the chimney of the boiler house, exhaust pipes, the chimney of the combined heat plant. Establishes the list of pollutants emitted into ambient air and the annual permitted emission amounts thereof.
L.ÕV/319438	termless	Valid for Ülemiste water treatment plant pollution sources - the chimney of the boiler house, ozonisation, diesel generator. Establishes the list of pollutants emitted into ambient air and the annual permitted emission amounts thereof.

Table 22: AMBIENT AIR POLLUTION FROM WATER TREATMENT PLANT POLLUTION SOURCES IN 2015-2019, t

Pollutant	Limit	2015	2016	2017	2018	2019
Nitrogen dioxide	1.954	1.01	0.829	0.78	0.713	0.763
Carbon monoxide	1.846	0.88	0.761	0.712	0.686	0.688
Volatile organic compounds	0.125	0.06	0.052	0.049	0.046	0.047
Carbon dioxide	1688	787	692	647	634	623
Sulphur dioxide	0	0.001*	0.001*	0.001	0.001	0
Total solid particles	0.004	0.004	0.003	0.003	0.001	0.003

* Sulphur dioxide pollution below the threshold limit

Table 23: AMBIENT AIR POLLUTION FROM WASTEWATER TREATMENT PLANT POLLUTION SOURCES IN 2015-2019, t

Pollutant	Limit	2015	2016	2017	2018	2019
Nitrogen dioxide	29.8	2.6	2.80	4.7	5.23	6.37
Carbon monoxide	210	2.6	2.80	4.7	5.23	6.37
Volatile organic compounds	14	0.2	0.20	0.3	0.33	0.39
Carbon dioxide	4440	2341	2523	4045	3186	5293
Sulphur dioxide	17.8	17.2	17.5	17.5	16.9	17.3

Emissions from both Ülemiste water treatment plant and Paljassaare wastewater treatment plant have been relatively low and have remained stable throughout the years. The amounts of biogas have significantly grown since the meter was changed in 2017.

Environmental Performance

In line with the EMAS (Regulation (EU) 2018/2026) requirements, we outline below our main indicators of environmental performance regarding energy efficiency, material efficiency, water, waste, biological diversity and emissions. At least three elements have been presented for each main indicator:

- Figure A stands for the total annual input/impact in the respective field of activity.

- Figure B represents the total volume of pure water sold and wastewater and stormwater treated at the wastewater treatment plant throughout the year (million m^3).

Since 2018, we have been presenting the figure B as the total annual volume of pure water sold and wastewater and stormwater treated at the wastewater treatment plant. The benchmark (figure B) standing for the volume of water is a better representative of the company's environmental effectiveness, because the volume of pure water sold and wastewater and stormwater treated reflects the company's total full-year output better than the gross revenue from sales.

- Figure R stands for the ratio A/B.

Table 24: ENVIRONMENTAL PERFORMANCE IN 2017-2019

Main indicators of environmental performance	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	2019	82 558	67.8	1217
	2018	82 805	62.2	1331
	2017	83 085	69.4	1198
Heat				
Heat produced from natural gas, MWh	2019	4 034	67.8	59
	2018	3 942	62.2	63
	2017	3 989	69.4	58
Thermal energy produced from biogas, MWh	2019	13 885	67.8	205
	2018	12 401	62.2	199
	2017	7 223	69.4	104
Handling of chemicals				
Liquid chlorine, t	2019	59	67.8	0.9
	2018	62	62.2	1.0
	2017	60	69.4	0.9
Coagulant, t	2019	4 147	67.8	61.1
	2018	4 060	62.2	65
	2017	3 905	69.4	56
Polymer, t	2019	82	67.8	1.2
	2018	79	62.2	1.3
	2017	68	69.4	1.0
Ozone, t	2019	203	67.8	3.0
	2018	229	62.2	3.7
	2017	218	69.4	3.1
Methanol, t	2019	1 389	67.8	20
	2018	1 528	62.2	25
	2017	1 369	69.4	20
Water				
Water for own consumption, th m^3	2019	1 958	67.8	29
	2018	1 590	62.2	26

	2017	1 858	69.4	27
Surface water, th m³	2019	25 000	67.8	369
	2018	24 306	62.2	391
	2017	23 716	69.4	342
Ground water, th m³	2019	2 680	67.8	40
	2018	2 656	62.2	43
	2017	2 711	69.4	39
Waste				
Mixed municipal waste, t	2019	45,1	67.8	0.7
	2 018	72,1	62.2	1.2
	2 017	110,2	69.4	1.6
Recycled paper and cardboard, t	2019	5,7	67.8	0.1
	2 018	5,7	62.2	0.1
	2 017	3,3	69.4	0.0
Recycled packages, t	2019	0,9	67.8	0.01
	2 018	0,9	62.2	0.01
	2 017	0,9	69.4	0.01
Recycled biodegradable waste, t	2019	5,2	67.8	0.1
	2 018	6,4	62.2	0.1
	2 017	6,5	69.4	0.1
Waste from screens, t	2019	894	67.8	13
	2 018	904	62.2	15
	2 017	961	69.4	14
Recycled sludge, t	2019	38 940	67.8	574
	2 018	40 732	62.2	655
	2 017	35 481	69.4	511
Sand traps grid, t	2019	139	67.8	2.1
	2 018	129	62.2	2.1
	2 017	141	69.4	2.0
Recycled excavated stones and soil, t	2019	6 148	67.8	91
	2 018	4 767	62.2	77
	2 017	10 630	69.4	153
Asphalt waste, t	2019	295	67.8	4
	2 018	518	62.2	8
	2 017	812	69.4	12
Mixed building waste, t	2019	6,8	67.8	0.1
	2 018	25,6	62.2	0.4
	2 017	0,0	69.4	0.0
Concrete and bricks, t	2019	1,8	67.8	0.0
	2 018	6,5	62.2	0.1
	2 017	35,2	69.4	0.5
Recycled metal, t	2019	29,9	67.8	0.4
	2 018	55,3	62.2	0.9
	2 017	60,6	69.4	0.9
Hazardous waste, t	2019	2,9	67.8	0.0
	2 018	9,3	62.2	0.1
	2 017	5,0	69.4	0.1
Other, t	2019	6,4	67.8	0.1
	2 018	146,0	62.2	2.3
	2 017	2,0	69.4	0.0

Biological diversity*				
Land use, total size of land owned by the company, ha	2019	350,0	67.8	5
	2 018	350,0	62.2	6
	2 017	350,0	69.4	5
Non-permeable surface area, ha	2 019	117,9	67.8	2
	2 018	117,9	62.2	2
	2 017	117,8	69.4	2
Emissions				
Nitrogen dioxide, t	2019	7,1	67.8	0.1
	2 018	5,9	62.2	0.1
	2 017	5,5	69.4	0.1
Carbon monoxide, t	2019	7,1	67.8	0.1
	2 018	5,9	62.2	0.1
	2 017	5,4	69.4	0.1
Volatile organic compounds, t	2019	0,4	67.8	0.006
	2 018	0,4	62.2	0.006
	2 017	0,4	69.4	0.006
Carbon dioxide, t	2019	5 916	67.8	87
	2 018	3 820	62.2	61
	2 017	4 692	69.4	68
Sulphur dioxide, t	2019	0,000	67.8	0.00000
	2 018	0,001	62.2	0.00002
	2 017	0,001	69.4	0.00001
Total solid particles, t	2019	0,003	67.8	0.0000
	2 018	0,001	62.2	0.0000
	2 017	0,003	69.4	0.0000
Hydrogen sulphide, t	2019	17	67.8	0.3
	2 018	17	62.2	0.3
	2 017	18	69.4	0.3
Environmental education				
Number of children in the discussions	2019	969	67.8	14.3
	2 018	1 243	62.2	20.0
	2 017	1 371	69.4	19.8

*The size of the land is estimated by Tallinna Vesi's real estate expert

Best Environmental Management Practices and Environmental Performance Indicators

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

Deploying water metering

Water meters shall be installed for all consumers who have signed a relevant contract. The water supply network is constantly monitored to allow quick reaction to the changes in the network. Consumers are invoiced on the basis of water meter readings.

Table 25: ENVIRONMENTAL PERFORMANCE INDICATORS IN DEPLOYING WATER METERING

Environmental performance indicators[a]	Benchmarks of excellence[b]	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 with a valid contract have water meters installed
Reduction in water use by final users after installation of water meters and/or smart meters (l/user)	All new buildings are equipped with water meters (smart meters in water-scarce areas)	All buildings have water meters

Minimising water leakages

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

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

2) analysing the water distribution network and dividing it into adequate district metering areas to detect water leakages: sensors for water zones are being used, which measure pressure, flows and noise;

3) responding promptly and adequately to the identified faults and leakages of the network: after detecting and locating a leakage the information is immediately provided to the repairs planning unit;

4) establishing 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, which collects that data, is being used.

Table 26: ENVIRONMENTAL PERFORMANCE INDICATORS IN MINIMISING WATER LEAKAGES

Environmental performance indicators[c]	AS Tallinna Vesi's environmental performance indicators
Percentage of water loss out of the system input volume (%)	Water loss in the network was 12.97% in 2019

[a] Commission Decision (EU) 2019/61, published ELT L 17, 18.1.2019, page 35, i97); i99)
[b] Commission Decision (EU) 2019/61, published ELT L 17, 18.1.2019, page 35, b31); b33)
[c] Commission Decision (EU) 2019/61, published ELT L 17, 18.1.2019, page 35, i100)

Energy efficient wastewater treatment

According to the best environmental management practices:

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

2) the biological treatment is performed with nitrification and denitrification processes, chemical phosphorus removal is also used;

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

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

7) the anaerobically stabilised sludge is dried;

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

Table 27: ENVIRONMENTAL PERFORMANCE INDICATORS IN WASTEWATER TREATMENT

Environmental performance indicators[d]	Benchmarks of excellence[e]	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 2019: BOD_7 – 97%, COD – 91%, Total nitrogen – 85% Total phosphorus – 92%
Electricity use of the wastewater treatment plant per mass of BOD_5 removed (kWh/kg of BOD_5 removed)	-	2.26 kWh/kg
Electricity use of the wastewater treatment plant per volume treated (kWh/m^3 of wastewater treated)	-	0.46 kWh/m^3
Annual electricity use of the wastewater treatment plant per population equivalents (kWh/population equivalents/year)	Electricity use of the wastewater treatment plant is: 1) lower than 18 kWh/population equivalents/year for large municipal wastewater treatment plants (with a size of more than 10,000 population equivalents) 2) lower than 25 kWh/population equivalents/year for small municipal wastewater treatment plants (with a size of less than 10,000 population equivalents)	41,5 kWh/population equivalent

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

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

Anaerobic digestion of sludge and optimal energy recovery

The primary and excess sludge are stabilised in anaerobic digesters and the biogas produced from sludge is used for heating the buildings and the process.

In the future, we plan to further increase the efficiency of energy recovery by producing electricity from biogas or valorising the biogas.

Table 28: ENVIRONMENTAL PERFORMANCE INDICATORS IN ENERGY RECOVERY

Environmental performance indicators[f]	Benchmarks of excellence[g]	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 use for 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%
Electrical efficiency of the generator fuelled with biogas (%)	-	No generator
Specific biogas production (Nℓ (1)/kg organic dry matter input)	-	No biogas valorisation

f Commission Decision (EL) 2019/61, published ELT L 17, 18.1.2019, page 37, i108); i109); i110)

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

Significant Changes in the Environmental Report

This chapter outlines the major substantive changes made to the 2019 Environmental Report in comparison with the 2018 Environmental Report.

In the Environmental Report for 2019, we have taken into account the EMAS Regulation (EU) 2018/2026 amending the annex IV of the Regulation (EU) 1221/2009 and 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 the recovery of energy from wastewater treatment.

Appendix 1: Drinking Water Quality at Ülemiste Water Treatment Plant in 2019

Parameter	Unit	Min	Max	Average	Minister of Social Affairs' Regulation no. 61, 24/09/2019	EU Directive, 98/83/EC
Temperature	°C	1.5	22	10		
Odour	points	1	1	1	Acceptable to consumer	Acceptable to consumer
Taste	points	1	1	1	Acceptable to consumer	Acceptable to consumer
Turbidity	NTU	<0.10	0.22	0.12	1	1
Colour	mg/l Pt	<3	3	<3	Acceptable to consumer	Acceptable to consumer
Dry residue	mg/l	253	294	273		
pH		7.08	7.40	7.25	≥6.5 and ≤9.5	≥6.5 and ≤9.5
Conductivity, 20 °C	µS/cm	366	431	392	2,500	2,500
Alkalinity	mg-ekv/l	2.5	3.23	2.81		
Total hardness	mg-ekv/l	1.84	2.23	2.02		
Permanganate index	mg O_2/l	2.3	3.92	3.05	5	5
Total organic carbon, TOC	mg/l	5	6.1	5.5	Without unusual changes	Without unusual changes
Dissolved Oxygen	O_2 mg/l	5.7	14.8	10.1		
Dissolved Oxygen	saturation %	66	110	89		
FreeCO_2	mg/l	12	26	17		
Carbonates, CO_3^{2-}	mg/l	0	0	0		
Bicarbonates, HCO_3^-	mg/l	156	193	172		
Chlorides, Cl^-	mg/l	29	35	32	250	250
Sulphates, SO_4^{2-}	mg/l	22	32	28	250	250
Orthophosphates, PO_4^{3-}	mg/l	<0.02	<0.02	<0.02		
Fluoride, F^-	mg/l	0.07	0.12	0.10	1.5	1.5
Nitrates, NO_3^-	mg/l	<1	6.3	2.3	50	50
Nitrites, NO_2^-	mg/l	<0.003	<0.003	<0.003	0.5	0.5
Ammonium, NH_4^+	mg/l	<0.006	<0.006	<0.006	0.5	0.5
Cyanide, CN^-	µg/l	<2	<2	<2	50	50
Calcium, Ca^{2+}	mg/l	61	75	68		
Magnesium, Mg^{2+}	mg/l	7	9	8		
Aluminium, Al	µg/l	23	125	65	200	200
Boron, B	µg/l	11	16.5	13.5	1,000	1,000
Beryllium, Be	µg/l	< 0.2	< 0.2	< 0.2		
Sodium, Na	mg/l	7.55	9.39	8.15	200	200
Potassium, K	mg/l	2.31	2.66	2.46		
Vanadium, V	µg/l	0.18	0.38	0.27		
Chromium, Cr	µg/l	<0.1	<0.1	<0.1	50	50

Iron, Fe	µg/l	<10	<10	<10	200	200
Manganese, Mn	µg/l	1.5	14.7	4.6	50	50
Cobalt, Co	µg/l	0.02	0.04	0.03		
Nickel, Ni	µg/l	<0.2	0.35	<0.2	20	20
Copper, Cu	µg/l	<0.5	3.2	1.5	2,000	2,000
Zinc, Zn	µg/l	0.82	3.4	1.28		
Arsenic, As	µg/l	0.28	0.57	0.40	10	10
Selenium, Se	µg/l	<0.4	<0.4	<0.4	10	10
Strontium, Sr	µg/l	81.3	93.3	87.4		
Molybdenum, Mo	µg/l	0.3	0.48	0.39		
Cadmium, Cd	µg/l	<0.02	<0.02	<0.02	5	5
Antimony, Sb	µg/l	0.06	0.08	0.07	5	5
Barium, Ba	µg/l	34.6	49.8	42.3		
Mercury, Hg	µg/l	<0.1	0.63	<0.1	1	1
Thallium, Tl	µg/l	<0.01	<0.01	<0.01		
Lead, Pb	µg/l	<0.05	0.17	0.06		
Uranium, U	µg/l	0.28	0.57	0.43		
Acrylamide	µg/l	0.012	0.020	0.014	0.1	0.1
Chloroform	µg/l	9	36	19		
Bromodichloromethane	µg/l	1.7	6.0	3.4		
Dibromochloromethane	µg/l	0.38	1.2	0.67		
Bromoform	µg/l	<0.2	<0.2	<0.2		
THM	µg/l	12	38	22	100	100
1,2-dichloroetane	µg/l	<0.2	<0.2	<0.2	3	3
Trichloroethene	µg/l	<0.3	<0.3	<0.3		
Tetrachloroethene	µg/l	<0.2	<0.2	<0.2		
Tetrachloroethene and Trichloroethene sum	µg/l	0	0	0	10	10
Benzene	µg/l	<0.2	<0.2	<0.2	1	1
Benzo(a)pyrene	µg/l	<0.00017	<0.00034	<0.00017	0.01	0.01
PAH (polycyclic aromatic hydrocarbons) sum	µg/l	0	0	0	0.1	0.1
Pesticides (sum)	µg/l	0	0	0	0.5	0.5
Enterococci	CFU/100ml	0	0	0	0	0
No of colony forming units at 22 °C	CFU/ml	0	0	0	Without unusual changes	Without unusual changes
Coliform bacteria	CFU/100ml	0	1	0	0	0
Escherichia coli	CFU/100ml	0	0	0	0	0
Clostridium perfringens	CFU/100ml	0	0	0	0	0
Residual chlorine (free chlorine)	mg/l	0.28	0.97	0.59	≤ 1.0	
Bromate	µg/l	<2	<10	<5	10	10
UV-abs	AU/cm	0.041	0.08	0.06		

Tallinna Vesi
Loome puhta veega parema elu!

Appendix 2: Drinking Water Produced from Ground water Quality in 2019

Parameter	Unit	Average results					Minister of Social Affairs' Regulation no 61 and EU Directive 98/83/EC
		Nõmme	Merivälja	Tiskre	Saue	Pillado	
Odour	Points	1	1	1	1	1	Acceptable to consumer
Taste	Points	1	1	1	1	1	Acceptable to consumer
Colour	mg/l Pt	<3	10.5	<3	<3	<3	Acceptable to consumer
Turbidity	NTU	0.23	0.34	0.37	0.50	1.60	Acceptable to consumer
Dissolved O_2	mg/l	5.81	7	4.63	6.11	3.80	
pH	pH unit	8.01	7.93	7.88	8.01	8.17	≥6.5 and ≤9.5
Conductivity	µS/cm	489	504	748	506	366	2500
Alkalinity	mg-ekv/l	2.47	3.91	2.01	2.25	1.94	
Total hardness	mmol/l	1.59	3.44	2.27	1.41	1.21	
Transient hardness	mmol/l	2.43	3.37	2.01	2.02	1.94	
Overall hardness	mmol/l	0.38	0.57	1.27	0.40	0.24	
Permanganate index (COD_{mn})	mgO_2/l	<0.5	2.05	<0.5	<0.5*	0.71**	5
Free Carbon dioxide, CO_2	mg/l	3	7	4	2	2	
Total iron, Fe	µg/l	<20	80	42	53	155	200
Fluoride, F^-	mg/l	0.63	0.39	0.83	0.69*	0.71**	1.50
Chloride, Cl^-	mg/l	79	59	168	87*	45**	250
Manganese, Mn	µg/l	<8	20	<8	9	44	50
Ammonium, NH_4^+	mg/l	0.08	0.18	0.01	0.13	0.18	0.5
Nitrite, NO_2^-	mg/l	0.01	0.02	<0.003	0.01	<0.003	0.5
Nitrate, NO_3^-	mg/l	<1	1.5	<1	<1	<1	50
Stability index		0.15	0.36	0.07	0.06	0.05	
Total organic carbon, TOC	mg/l	0.55	3.00	0.30	0.25*	0.23**	Without unusual changes
Sulphide, S^{2-}	mg/l	<0.004	<0.004	<0.004	<0.004*	<0.004	
Sulphate, SO_4^{2-}	mg/l	21	4.8	27	0.3*	31**	250
Hydrogen carbonate, HCO_3^-	mg/l	150	238	123	137	118	
Calcium, Ca^{2+}	mg/l	43	68	68	40	30	
Magnesium, Mg^{2+}	mg/l	13	16	14	11*	11**	
Dry residue	mg/l	301	319	468	300*	218**	

Sodium, Na^+	mg/l	42.8	22.2	66.8	52.9*	29.8**	200
Potassium, K^+	mg/l	6.58	4.86	8.44	7.6*	7.68**	
Boron	µg/l	146	69.9	98.1	278*	215**	1,000
Aluminium	µg/l	2.4	2.05	<1	0.7*	<0.5**	200
Arsenic	µg/l	<0.1	<0.1	<0.1	<0.1*	<0.1**	10
Cadmium	µg/l	<0.02	<0.02	<0.02	<0.02*	<0.02**	5
Chromium	µg/l	<0.1	<0.1	<0.1	0.25*	0.44**	50
Copper	µg/l	0.63	0.44	0.58	0.59*	0.80**	2,000
Mercury	µg/l	<0.1	<0.1	<0.1	<0.1*	<0.1**	1
Nickel	µg/l	<0.2	<0.2	<0.2	<0.2*	0.31**	20
Lead	µg/l	0.06	0.09	0.27	0.07*	0.16**	10
Antimony	µg/l	<0.02	<0.02	<0.02	<0.02*	<0.02**	5
Selenium	µg/l	<0.4	<0.4	<0.4	<0.4*	<0.7**	10
Beryllium	µg/l	<0.02	<0.02	<0.02	<0.02*	<0.02**	
Barium	µg/l	204	83.80	172	195*	44.2**	
Coliform bacteria	CFU/100ml	0	0	0	0	0	0
Escherichia coli	CFU/100ml	0	0	0	0	0	0
Enterococci	CFU/100ml	0	0	0	0	0	0
Number of colony forming units at 22°C	CFU/ml	1	1	0	0	7	Without unusual changes
Effective dose	mSv per year	0.23	0.27*	0.32*	0.25*	0.04**	0.1

*The parameter was analysed in 2018
**The parameter was analysed in 2017