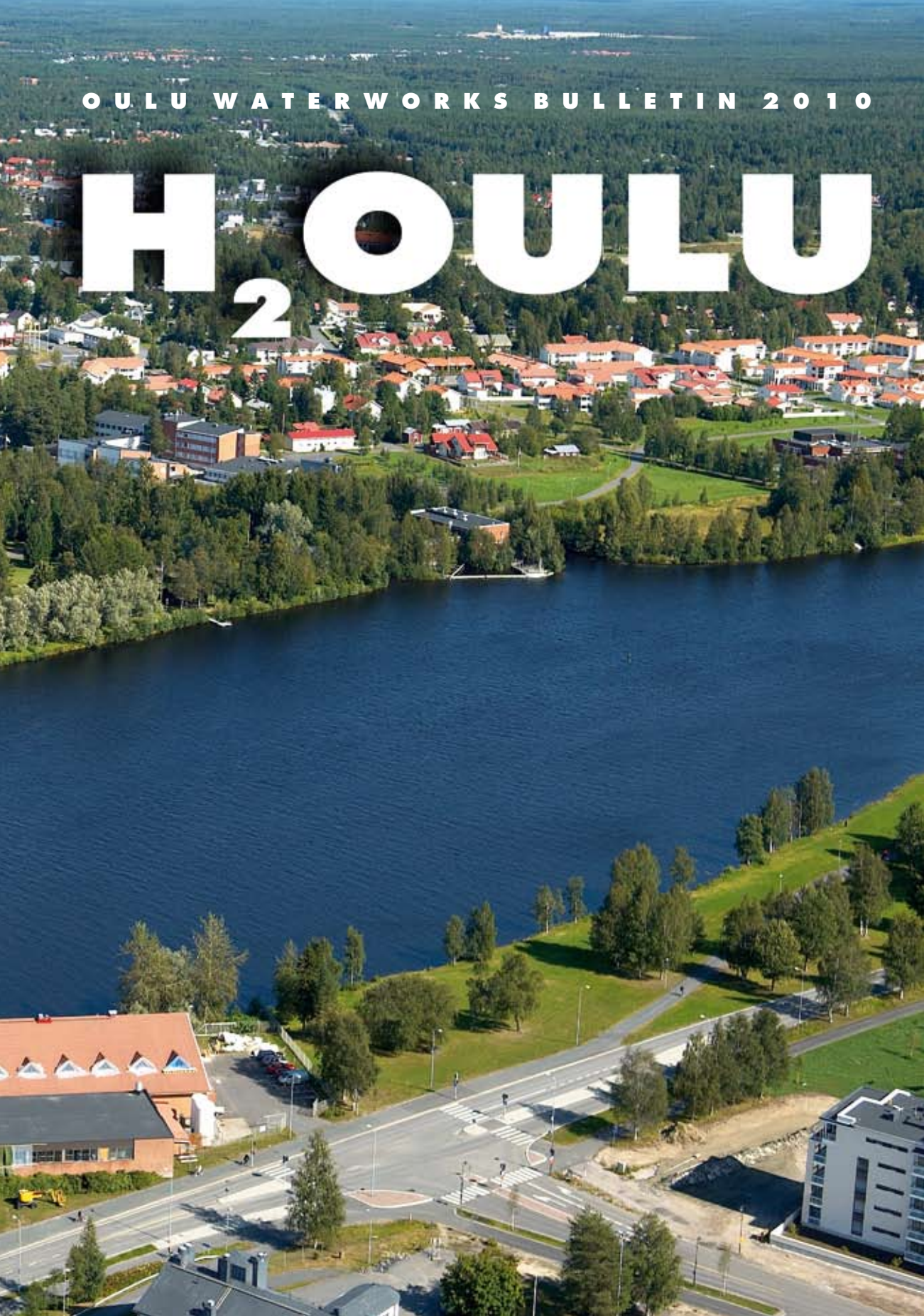


OULU WATERWORKS BULLETIN 2010

H₂O OULU





WHAT IS WATER SUPPLY?

Water purchase i.e. water purification and transfer for household consumption

Sewerage i.e. transfer and treatment of sewage, rainwater, and drainage sewer piping

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- 15** Only sewage to sewers

WATER SUPPLY SERVICES AT YOUR DISPOSAL

Dear Customer of Oulu Waterworks!

This bulletin contains information on your water supply services. The bulletin contains useful information on how water supply services are produced and what kind of development projects are being planned.

Oulu Waterworks is a company operating as a water supply plant as intended in the Finnish Act on Water Services. Oulu Waterworks is responsible for the distribution of water, sewerage and sewage treatment in the area of the city of Oulu. Almost all of the 138,000 people living in Oulu use the services of Oulu Waterworks, and over 17,000 properties have a direct contract with us.

We are used to having impeccable 24/7 water supply: clean, fresh water directly from the tap and sewerage and sewage treatment in an environmentally sound way. Oulu Waterworks have met the operational and financial goals set well. Nevertheless, our operating principle is that of continuous improvement, and our objective is to be able to provide you with the best water supply service in Finland in 2015.

Water supply networks have mainly been built in the 1960's and 1970's, and the current replacement rate is not sufficient. Therefore, more investments must be made in maintenance and renovation in the future. The poor condition of networks will create environmental and health risks when they break, which means that renovation must be made in time.

The household water purified from the water taken from the Oulujoki River has met

all requirements and recommendations set for household water well. The amount of chemicals used in the purification process has nevertheless increased significantly due to the deteriorating condition of the water quality in the Oulujoki River.

Our future goal thus is to start using groundwater taken from the Viinivaara area. The City Council resolved, on 8 December 2008, on more closely defining the permit application to the Water Rights Court. The environmental permission for the ground water project is being processed by the Regional State Administrative Agency, and the decision is expected during 2010. The objective of the project is to improve the security of water purchase of the City of Oulu and to offer high-quality groundwater to its inhabitants.

A total of over 15 million euros have been invested in the extensions of the sewage treatment plant during the last five years. The latest extension was that of the nitrogen removal unit which was completed last year. Thanks to the extension, nitrogen removal became significantly more efficient, which decreased pollution to waters.

The further treatment of sewage sludge is intensive windrow composting in Vitakangas, Haukipudas, and sludge has been used as soil conditioner in cultivated fields in the Oulu region on the basis of the fertilising permit granted for hygienised sludge. Other alternative sludge treatment methods are being investigated.

Jouni Lähdemäki
Managing Director



CHARGES 2010

Connection charge

The connection charge is used for covering the construction costs of networks and plants that are created when new properties are connected to the network or when the network is extended.

The connection charge is mainly determined on the basis of the permitted building volume of the plot and it depends on the intended use of the property. The price is calculated on the basis of a price per floor square metre, which is 0.84 euros per square metre both for household water and sewerage.

If an old property is demolished and a new is built on the same site, the existing contract is terminated and the customer must make a new contract. The connection charge must be paid.

The connection charge for a detached house (under 500 m²) is defined on the basis of three charge classes. The location of the building depends on the building right allocated to a specific plot in the city plan. The connection fees for each class can be found in the table on the next page.

Connection charges are free of value-added tax. Connection fees are also transferable and refundable. The value of a water and sewerage connection in transfer tax is usually equal to the connection charge.

Act on Water Services § 19:
A water supply plant must collect charges for the use of water supply services. Charges are collected on the basis of the amount of water used by the property and the amount and quality of the wastewater to be disposed of.

A plant may also collect a connection charge and a basic charge and other charges for the services supplied by the plant. The amounts of these charges may vary in different areas if this is necessary in terms of appropriate cost allocation or implementation of the polluter pays principle or other similar cause. The use of the property may also be taken into account when establishing the connection charge.

Charge for the use of water

The City Council resolved on the increase of on average 5 percent in the use charge for both household water and sewage as well as the basic charge based on the water meter size as of the beginning of 2010. The use charge, tax included, was raised by 5 cents/m³ and the use charge for sewage by 6 cents/m³. Some increases were also applied to service prices

The charge for the use of water and sewage is based on the measured consumption of water. Invoicing is usually carried out four times a year in such a way that three of the invoices are estimates and the last invoice is an adjustment invoice based on the water meter reading given by the customer.

Basic charge

The water meter specific basic charge covers the fixed costs of the water supply service that do not depend on consumption e.g. regular replacement and calibration of the water meter.

CONNECTION CHARGE

Type of property	Building volume right allocated in city plan m ²	Connection charge euros
Small houses, detached houses and semi-detached houses	≤ 150	1 513.69
	> 150, ≤ 250	2 522.82
Detached houses, semi-detached houses, terraced houses and linked houses	> 250, ≤ 500	4 204.70

CHARGE FOR THE USE OF WATER

euros / m ³ (incl. VAT 22%):	
Water charge	1.29
Sewage charge	1.77
Total	3.06

BASIC CHARGE ACCORDING TO THE WATER METER SIZE

Water meter size mm	Basic charge euros / year (incl. VAT 22%):
≤ 20	48.00
25 - 32	88.00
40	114.00
50	150.00
80	280.00
≥ 100	390.00

A contract on connecting a property to the network of a water supply plant or supply and use of the services of a plant must be made in writing or electronically so that the contents cannot be altered unilaterally and the contract remains available to both parties.

A contract is made with the owners of detached houses, housing companies and other property. In compliance with the current legislation, the customer is a contracting party of the water supply plant and consumer refers to an individual person as a customer.

Connection contract

The contract between the customer and Oulu Waterworks is made in writing. The owner of the property or a holder equivalent to owner closes a connection contract and contract for the use of water. The contract for the use of water can also be made – with the consent of the water supply plant and the property owner – between the water supply plant and the tenant, in which case the contract for the use of water made with the owner remains dormant until the contract closed with the tenant is terminated.

Terms and conditions of the contract

According to the Finnish Act on Water Services, the customer and the water supply plant comply with the terms and conditions of the contract, contract terms and conditions and general supply conditions. The Finnish Act on Water Services also provides that if the charges change, customers must be notified of the new pricelists, charges and fees at the latest one month before the change enters into force.

Limits of liability are defined in the supply conditions

The general supply conditions specify the limits of liability of the customer and the water supply plant in a detailed manner. In case of new residential areas and renovation sites, separate connection points. The water supply plant builds the connections to the boundary of common area, after which the property owners are liable for connections. The building and maintenance limit of networks is the border of the plot in question.



Special expert Reijo Saarela replacing water meters.

WATER INVOICES

The owners of detached houses can do business directly with Oulu Waterworks. The residents of terraced houses, apartment buildings and other properties communicate with the house manager or other person taking care of the housing company.

ONLINE SERVICE

Online service is for customers who have made a contract with Oulu Waterworks. The flat-specific water meters of terraced houses or apartment buildings are so-called backup meters, and the related invoicing is carried out by the house manager, who is also responsible for contacts with Oulu Waterworks.

The customers can use the online service for stating their water meter readings, monitor the user data of their specific location and water invoices as soon as the relevant data is entered in the system. The water meter reading can also be stated without registration. The online service is free of charge and available 24/7.

The online service can be accessed from the homepages of Oulu Waterworks at www.oulunvesi.fi.

A total of about 9.9 million cubic metres of water was pumped into the water supply network of the City of Oulu in 2009. A total of 8.6 million cubic metres were charged. The difference, 13%, went for common use such as leakages, flushing of pipes, fire hydrant water and other unmeasured use.

The consumption of sold water is divided between different property types as follows:

ELECTRONIC INVOICING

e-invoice for consumers

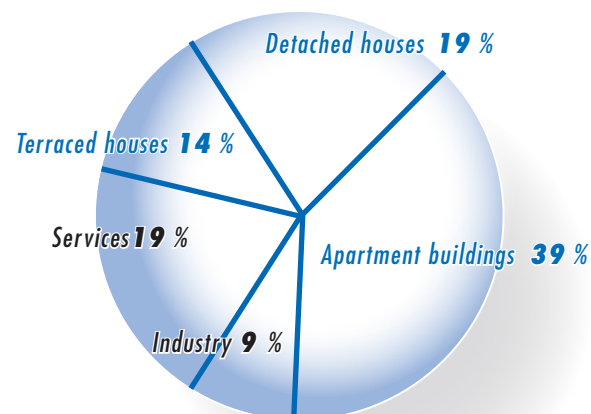
The City of Oulu offers its residents an opportunity to receive e-invoices. Oulu Waterworks is also included in the system. E-invoice is an electronic invoice that is directly transmitted to the customer's internet bank. The customer's can make e-invoicing agreements using their own internet bank, which also contains more detailed information on the use of e-invoices.

Corporate customers

Oulu Waterworks can provide its corporate customers with an e-invoice. Instructions on the data and measures needed for the service can be found in the homepages of Oulu Waterworks. E-invoicing can be commenced as soon as the required e-invoice identification codes have been submitted to Oulu Waterworks.

The City ledger is responsible for payment registration, tel. +358 (0)44 703 071.

Inquiries on the bases for invoicing can be addressed to Oulu Waterworks.



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FREQUENTLY ASKED QUESTIONS

Although water is a self-evident part of our everyday life, water supply services still raise some questions. Answers to the most frequently asked questions made to Oulu Waterworks Customer Service can be found below.

What is the hardness of water in Oulu? How about acidity? Is it necessary to add salt in the dishwasher?

The household water in Oulu is classified as soft. The total hardness is, on average, 0.83 mmol/l (=millimoles in a litre) or 4.6°dH (=German hardness grade = deutsche Härtegrad). There is no need to add salt in dishwasher water.

Why is there water under the water meter glass?

The meter is a so-called wet dial meter, and there is supposed to be water under the glass. The meter is resistant to moisture.

What if the water from the tap is green?

The average water consumption of residential property in Oulu is 130 litres/person/day. Water consumption depends, however, greatly from the individual. The total water consumption of the city of Oulu (including companies, industry and services) divided by the number of residents connected to the network is 200 litres/person/day.

What if the water from the tap is green?

If the water from the tap of a property is green, there is usually a leak in the heat exchanger of warm household water. It means that water from the district heating network mixes with household water in the heat exchanger. Green colourant is used in district heating networks to detect possible leaks. The colourant is not dangerous, but it means that water has been standing in the pipe for a while and it should not be used. The leak must be fixed immediately. To fix the heat exchanger, contact Oulun Energia or the house manager of the property.

What if the water is brown or otherwise dirty?

If the water is brown, otherwise dirty or smells, please inform Oulu Waterworks Customer Service, tel. +358 (0)8 5584 3800 or the network manager on call, tel. +358 (0)44 703 3800. In case of apartment buildings and terraced houses, please contact the house manager, because the problem may be in the piping of the house in question.

What causes bubbling or muddiness in water?

Milky muddiness in water is usually just oversaturation of air, which can be seen in small bubbles. After the water is allowed to stand for a couple of minutes, it usually clears. Bubbling does not affect the use of water. The phenomenon is common in hot water.

Other FAQ

Other frequently asked questions and their answers are available on the homepages of Oulu Waterworks at www.oulunvesi.fi.

If you are not sure of something, please contact Oulu Waterworks Customer Service

tel. +358 (0)8 5584 3800

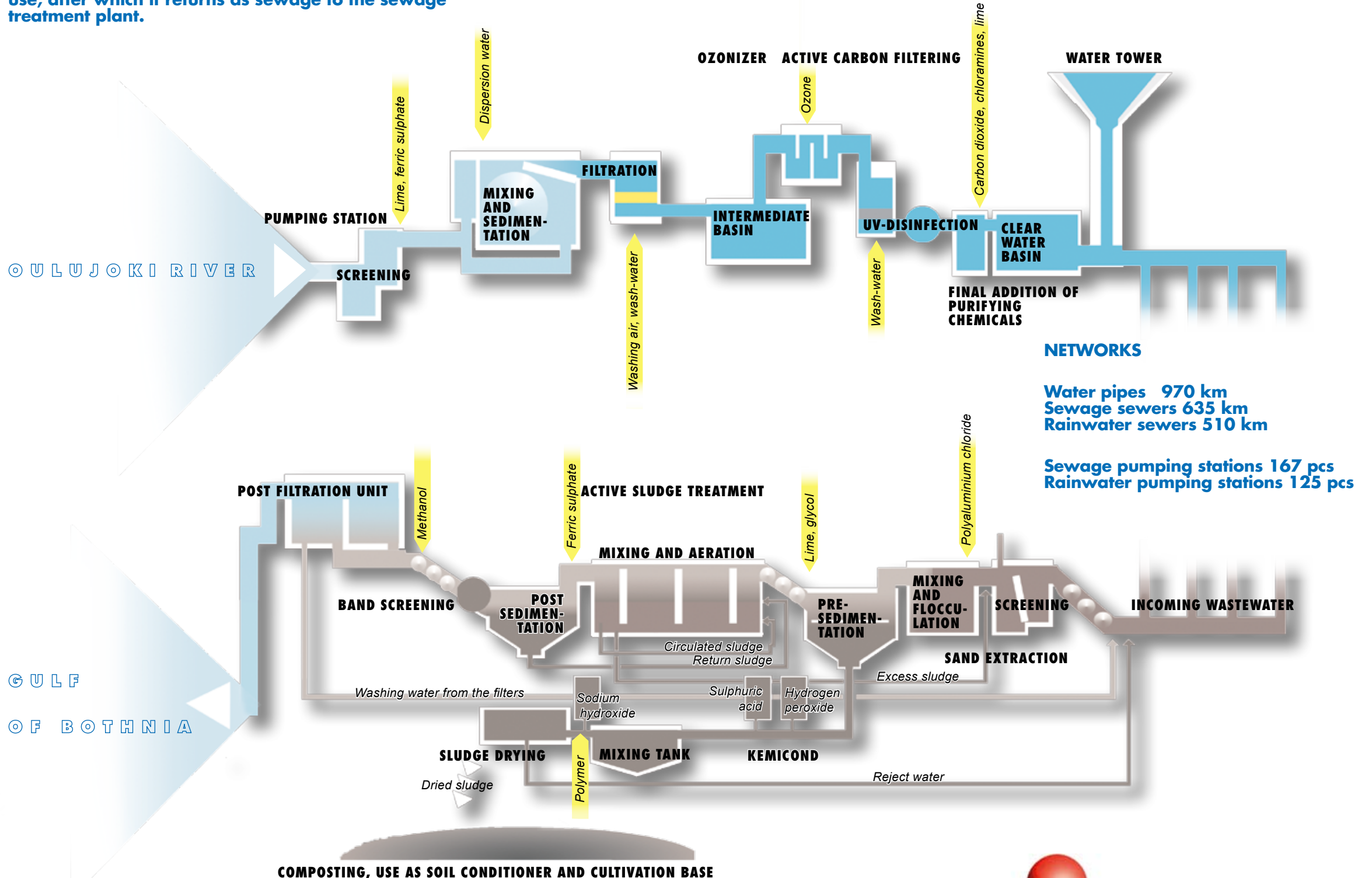
**or the person on call
tel. +358 (0)44 703 071.**



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CIRCULATION OF WATER

Raw water is purified and transferred to household use, after which it returns as sewage to the sewage treatment plant.



DRINKING WATER

The quality of drinking water in Oulu is among the best in Finland compared with other locations where household water is purified from surface water. The results of analyses are available on the homepages of Oulu Waterworks under "talousveden laatu".

Monitored by the authorities

Drinking water used in Oulu is purified from surface waters, and it is transferred in the network to households and other properties. Oulu Waterworks is responsible for the quality of water up to the connection point between the plant and a property.

The Environment Office of the Oulu Region is the authority monitoring the quality of drinking water. The Hintta laboratory of Oulu Waterworks performs analysis related to the operational monitoring of the water purification plants.

Distribution reliability

The number of leaks has steadily decreased and the current distribution reliability is rather good. In recent years, there have been, on average, 30–40 leaks in the piping per year. Distribution reliability has been improved by means of continuous investments in the network and an automated monitoring system. Leaks are repaired as soon as possible in order to minimise the duration of interruptions in water supply.

The uniform pressure in the water supply network is maintained using the Maikkula and Puolivälänkangas water towers. The top reservoir is used for balancing peaks in consumption, and they also function as reserves in case of disturbances.

Water purification

The drinking water in Oulu is purified from the waters of the Oulujoki River in the water purification plants of Hintta and Kurkelanranta. The main stages of the water purification process are the chemical separation of impurities by means of flotation, sand filtration, ozonation, active carbon filtering, disinfection and increasing hardness, alkalinity and pH.

Despite the changes in the water quality of the River of Oulu, the quality of drinking water is good, thanks to efficient purification methods and the ability to react to changes in raw water quality in a matter of a couple of minutes. Automation and continuous monitoring devices ensure an even more efficient purification process and the good quality of drinking water transferred in the piping system.

Water quality

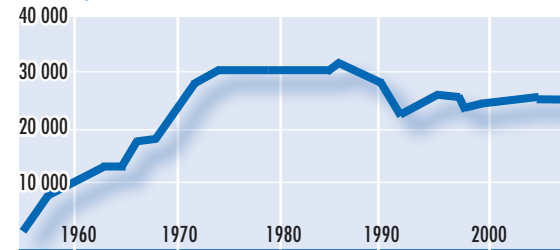
Water quality is most commonly presented with the so-called permanganate number (KMnO_4 number), which illustrates the amount of organic matter e.g. humus in water.

The quality objective for drinking water measured by the KMnO_4 number is, according to legislation, less than 20 mg/l. After the modernisation of the purification process in the 1990s, drinking water has met all statutory quality requirements and goals set well. Iron-based chemical coagulant has been used in the water purification plants since 2001 which, together with efficient process management, has further improved the quality of water by continuously decreasing the amount of organic matter (TOC=total organic carbon).

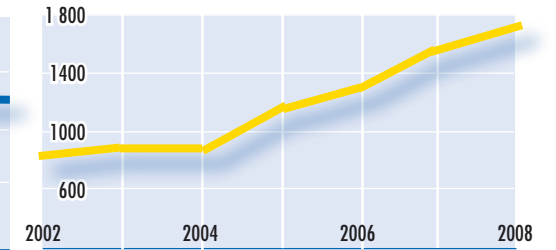
Residual chlorine content

The purification process of Hintta and Kurkelanranta water purification plants were modernised in 1993 and 1996 by ozonation and active carbon filtering. Then, we were able to significantly decrease the amount of residual chlorine content in drinking water led to the network. Chlorine is used for disinfecting.

DAILY CONSUMPTION OF WATER
 m^3/day



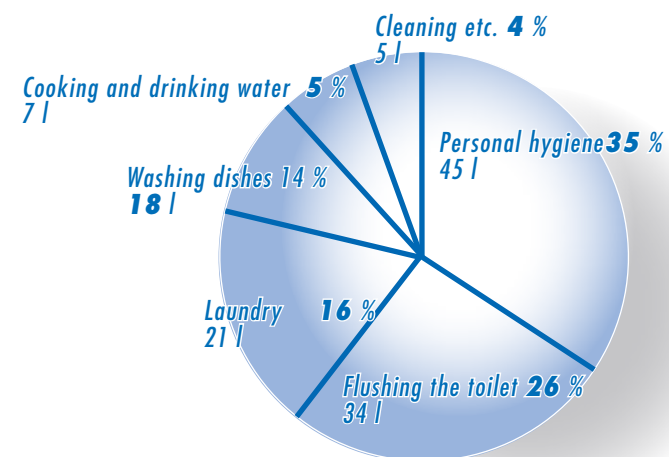
USE OF CHEMICAL COAGULANTS
tonnes/year



The amount of chemical coagulants has increased due to the decrease in the quality of raw water and in order to improve the purity of water.

Households are responsible for a total of 70% of total water consumption. Household consumption is, on average, 130 litres per person per day. Consumption has been on a steady decrease until recently but has settled at the current level in recent years.

According to data retrieved from different sources, household consumption can be divided into the following categories:



SEWERAGE



Sewerage

There are two kinds of sewerage systems: foul sewers and storm sewers. Foul sewers are intended for carrying household or industrial wastewaters created inside buildings, whereas storm sewers are intended for rain and drainage water mostly created outside buildings. Some combined sewers can be found in Oulu city centre, which are used for both sewage and rainwater.

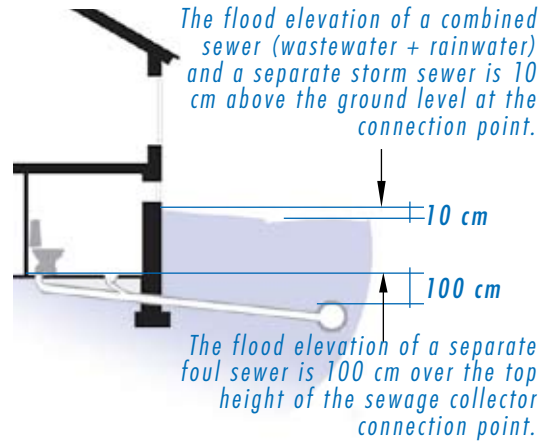
Sewers are either gravity sewers or pressurised sewers. In the case of gravity sewers, water runs downhill due to gravity, whereas in pressurised sewers water is pumped forward. The good condition of the sewerage network is being maintained by continuous investment in building new sewerage systems and repairing existing systems. The total investment in 2009 was approximately 5 million euros.

Storm water = rainwater

Rainwater is carried in separate sewers or open ditches, currently after settling, to water systems. Certain limits have been set for water discharged to storm sewers: for example, oil and other household contaminants are forbidden. Sewage may not be discharged to storm sewers and rainwater may not be discharged to separate foul sewers.

Real estates must not discharge rainwater and basement drain waters into foul sewers

Open ditches are usually replaced by storm sewer piping when repairing street pavements and sewerage networks. In this case, real estates must lead rainwater from roofs and pavements to separate storm sewers. It is practical to build surface water sewers in conjunction with other street and sewerage network construction work.



Flood elevation

Flood elevation means the level up to which sewer water level may occasionally rise. The lowest floor level of a building connected to the sewer must be above flood elevation. Otherwise, basement facilities must be protected against flooding sewers by equipping the sewer system with e.g. a pumping station.

Flood elevation means that a foul sewer may flood one metre above the pipe and combined or storm sewer 10 cm above ground level. The property owner is responsible for protecting sewerage points below the flood elevation level against flooding.

Premises below the flood elevation level must be protected

According to the general conditions of water supply, the plant is not liable for damage caused by flooding sewers if the property owner has sewers in premises that are below the flood elevation level. The customer is responsible for protecting premises with sewer connections that are below the flood elevation level against flooding in order to avoid sewer flooding in the building.

In particular, the owners of properties with a basement should check the flood elevation of their sewers and take possible precautions.

Further information

**Oulu Waterworks,
engineering services,
Kasarmintie 29,
Tel. +358 (0)8 5584 3800,
e-mail: oulunvesi@ouka.fi**

SEWAGE TREATMENT

Sewage treatment plant

Wastewater from the households of Oulu, Muhos and Utajärvi, and from small and medium sized industrial enterprises are treated in the Taskila sewage treatment plant, which amounts to about 14–15 million cubic metres every year.

The methods used are chemical direct precipitation, active sludge plant and post-filtration unit.

The treatment requirements set in the environmental permit have been clearly met: the efficiency of the treatment process for organic matter and total phosphorus was 98 percent in 2008. The requirement set in the environmental permit for both contaminants is a minimum of 90 percent.

The efficiency requirement set in the environmental permit for denitrification is a minimum of 70 percent for wastewater at the temperature of over 12 °C. Denitrification was carried out, in compliance with the environmental permit conditions, in June and November 2009. Treatment results show that the denitrification process works as required by the permit.

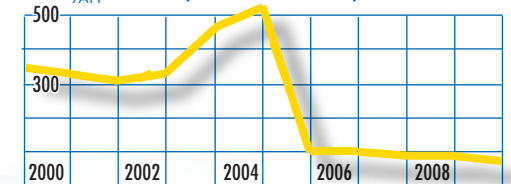
Sludge treatment

As a result of the tendering process in 2006, Oulu Waterworks chose the Kemicond method developed by Kemira as its sludge treatment method, and made a 15 year (+5 year option) service agreement with Kemira Plc on sludge treatment. The method is based on the acid treatment of sludge, after which pH is increased using strongly oxidizing hydrogen peroxide.

As the environmental permit entered into force in summer 2009, the sludge treated with the Kemicond method has been transported for composting in Vittakangas, in the municipality of Haukipudas, west from Jääli, Kiiminki. The composting of new sludge in Taskila sewage treatment plant has been terminated.

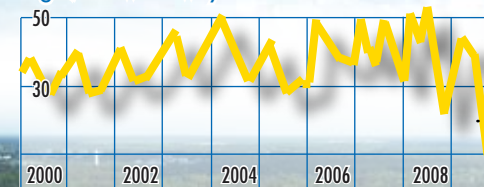
The Finnish Food Safety Authority Evira has approved Kemicond-treated sludge as soil conditioner in compliance with legislation on fertilisers, and it can therefore be used in cultivated fields as such.

BIOCHEMICAL OXYGEN DEMAND BOD_{7ATY} tonnes/year to waterways

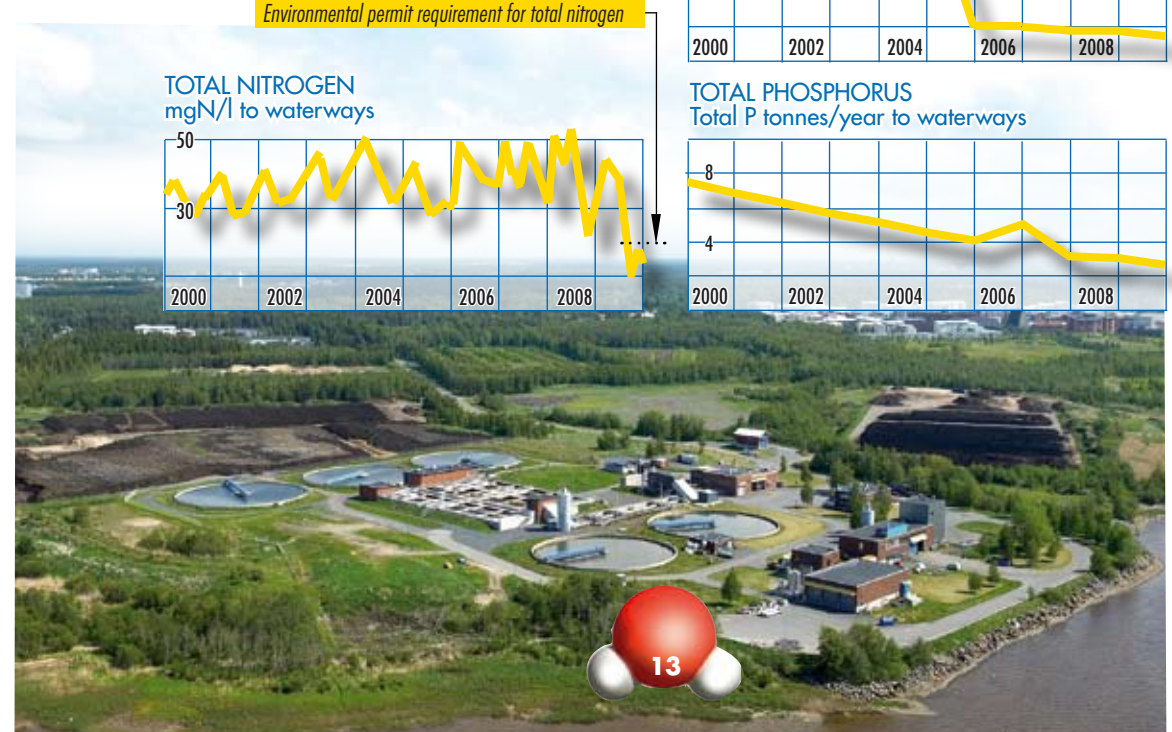
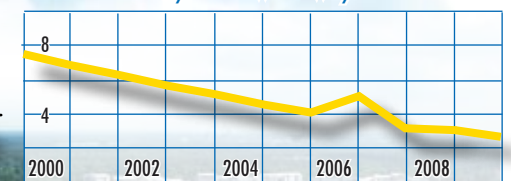


Environmental permit requirement for total nitrogen

TOTAL NITROGEN mgN/l to waterways



TOTAL PHOSPHORUS Total P tonnes/year to waterways



THE WATER PURCHASE OF OULU MUST BE SECURED



Viinivaara in figures: water intake 32,500 m³/day, 32 water pumping plants, water reservoirs 2,850 m³, water piping 209.4 km, investments 69.2 million euros.

The Finnish act on preparedness (Valmiuslaki) obliges municipalities to ensure that water supply will remain as undisturbed as possible also under exceptional conditions. In Oulu, the greatest risks are related to water purchase. The use of the Oulujoki River as a source of raw water may be compromised under normal conditions as a result of an accident or under exceptional conditions due to pollution or other damage. The national objective is that major water supply plants ensure their water purchase by 2012.

The water used in Oulu is currently taken from the Oulujoki River and it is treated in chemical processes in the water purification plants of Hintta and Kurkelanranta. The water supplied for consumers is, according to all measurement and analyses results, good drinking water. The only feedback on water quality is attributed to muddiness and chlorine odour due to network repair and construction work.

Alternatives have been explored

Oulu has been exploring different alternatives to secure its water purchase for a long time. The work has included the water supply from neighbouring municipalities, moving the water pumping location upstream on the Oulujoki River and all groundwater areas within a 100 km radius from Oulu.

Thorough research has shown that the Viinivaara groundwater project is both an extensive and feasible solution for ensuring the water purchase of the city of Oulu. The Viinivaara groundwater area is located in the municipalities of Pudasjärvi and Utajärvi about 70 km from Oulu. In addition, water intake has been planned for Ylikiminki, from the areas of Vepsänkylä and Yli-Vuotto.

The starting point is water purchase

from a completely separate source of water. In the project, household water supplied to the consumers would be groundwater, and the current surface water treatment system would be used as a backup system.

Inexpensive groundwater

The current drinking water purification process consumes large amounts of energy and purification chemicals; increasingly so, due to the decreased water quality of the Oulujoki River. A total of 1,300 tonnes of water purification chemicals are used in Oulu every year, which corresponds to 130 truck loads, in addition to 4 gigawatt hours of energy, which corresponds to the consumption of about 250 detached houses.

When using groundwater, energy is mainly used for pumping, which amounts to only about one third of the energy used in the surface water purification process. Thanks to the difference in altitudes, groundwater can be feasibly pumped from Viinivaara to Oulu.

The taste of groundwater is appreciated

The uniform temperature of groundwater (4–5 °C) and mineral salts give groundwater the fresh taste highly appreciated by consumers. The temperature of surface water distributed can be as high as from 10 °C to 15 °C in the summer which, together with chlorine, may compromise the taste experienced by consumers.

Good groundwater does not need to be treated but, due to the extensive piping network, it must be disinfected prior to pumping. However, due to smaller amounts of organic matter compared to surface water, less chlorine is needed and therefore the formation of organic chlorine compounds in drinking water can be avoided.

ONLY SEWAGE INTO SEWERS

Only common wastewater, such as wastewater from kitchen, washbasins, showers and toilets must be discharged to sewers!

Discharging solid waste and different chemicals to sewage is strictly forbidden. Solid waste blocks sewers and causes problems in pumping stations and sewage treatment plants.

In the worst case, unsuitable waste or material discharged to sewers may block the pipes and cause flooding.

Malfunction of sewers may affect several households and opening blockages may be very expensive.



The following materials and substances, among others, must not be discharged to sewers:

- Oil, petrol, solvents
- Inflammable fluids and disinfectants
- Acids and alkali
- Heavy metals and mercury
- Paints, glues, solvents, varnish, adhesives
- Matches, cigarette butts,
- Cotton sticks
- Condoms
- Ice-cream sticks
- Textiles, such as tights
- Napkins and sanitary towels
- Towel paper, newspapers
- Plastic bags and other objects
- Leftovers
- Sand and compost
- Coffee grounds
- Fat e.g. frying fat
- Hazardous waste



OULUN VESI

OULU WATERWORKS

**Customer service
+358 (0)8 5584 3800**

**On-call network services,
outside working hours +358 (0)44 703 3800**

Invoicing +358 0(8) 5584 3815, +358 (0)8 5584 3913

**Registration of payments
+358 (0)44 703 0731 Fax +358 (0)8 5584 3819**

**Mailing address:
P.O. Box 35, FI-90015 CITY OF OULU**

**Street address:
Kurkelanranta, Kasarmintie 29**

www.oulunvesi.fi

oulunvesi@ouka.fi

firstname.lastname@ouka.fi



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