

A man wearing a blue cap and a high-visibility yellow and black jacket is kneeling outdoors. He is working with a portable water filtration unit that has a white top and a black frame. The unit is connected to a red hose. In the background, there is a blurred natural setting with a body of water and some greenery.

**Fresh  
good water!**

# KYMENLAAKSON VESI OY

We ensure that the water acquisition in our area is of high quality, safe and cost-effective.

We sell the domestic water we produce to our shareholder municipalities, which are responsible for the distribution of domestic water in their operating areas. Our water acquisition system consists of the water extraction from Lake Haukkajärvi, the formation and treatment of artificial groundwater at the Kuivala artificial groundwater plant, and the transfer of domestic water to the shareholder municipalities' distribution systems.

**Our system serves approximately 100,000 residents in Kymenlaakso.** Kymenlaakson Vesi's permitted water extraction amount is 33,700 m<sup>3</sup>/day. The shareholder municipalities' water reserve of the artificial groundwater plant's and main water line's capacity is the same as their holding share.

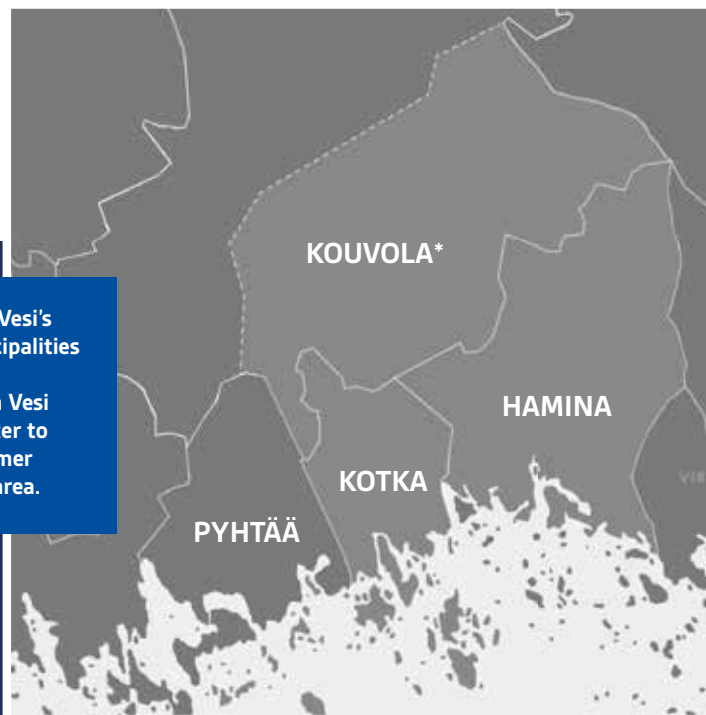
**The company's ownership is divided as follows:**

	Holding share	Water reserve
Kotka	70%	23 590 m <sup>3</sup> /day
Kouvola	9%	3 033 m <sup>3</sup> /day
Hamina	21%	7 077 m <sup>3</sup> /day
Total	100%	33 700 m <sup>3</sup> /day

In addition to the Kuivala plant area, Kymenlaakso Vesi has a water extraction permit to Kouvola's Selänpää, where additional water is available in the future. The artificial groundwater plant's current capacity is 26,000 m<sup>3</sup>/day. We also have the readiness to increase the production of artificial groundwater at the Kuivala plant by up to approximately 10,000 m<sup>3</sup>/day.



The amount of clean water flowing to our shareholder municipalities is currently 20,000 m<sup>3</sup> per day. In other words, there is plenty of water and it can be enjoyed without worries.



Kymenlaakson Vesi's shareholder municipalities

\*Kymenlaakson Vesi distributes water to Kouvola's former Anjalankoski area.

## NATURAL GROUNDWATER IN 50 DAYS

We deliver our customers artificial groundwater, which has a consistent quality throughout the year.

Artificial groundwater differs from natural groundwater in terms of raw water: natural groundwater is formed when rainwater is infiltrated by the soil while the amount of water to be infiltrated in the production of artificial groundwater is increased with surface water.

**Kuivala artificial groundwater plant's water is produced with Lake Haukkajärvi's water by infiltrating it through the esker's sand layers to the groundwater layer.**

The amount of raw water to be extracted for artificial groundwater processing is an average of 3% of the so-called Valkeala waterway's\* natural average flow rate.

The natural filter formed by the esker terrain effectively purifies the infiltrated water because the soil has the ability to reduce or entirely eliminate substances flowing in the water. With this method, the surface water makes for artificial groundwater similar to natural groundwater.

## WATER TEMPERATURE REGULATED BY SOIL

During the process, the soil also operates as a type of thermal storage. In the summer, when the soil infiltrates the warm lake water, the water begins to warm up the sandy esker slowly. When the sandy esker warms up, the temperature of the groundwater also increases. In the winter, when the lake water is cold, the infiltrations of it causes the soil as well as the groundwater to cool down. Thus, the water directed to the water pipe network is at its warmest in January and at its coldest in July. Generally speaking, the water temperature remains cool and fresh throughout the year, at about 7-12 degrees.

\* Valkeala's waterway (also known as Väliväylä, Kivijärvi waterway or Lakanvirta) is a waterway in the water areas of Kymijoki between the First and Second Salpausselkä. The waterway was initially formed from the small ponds and lakes of the municipalities of Lemi and Luumäki, and it flows from there to the west.

## MOST OF THE PLANT OPERATIONS ARE AUTOMATED

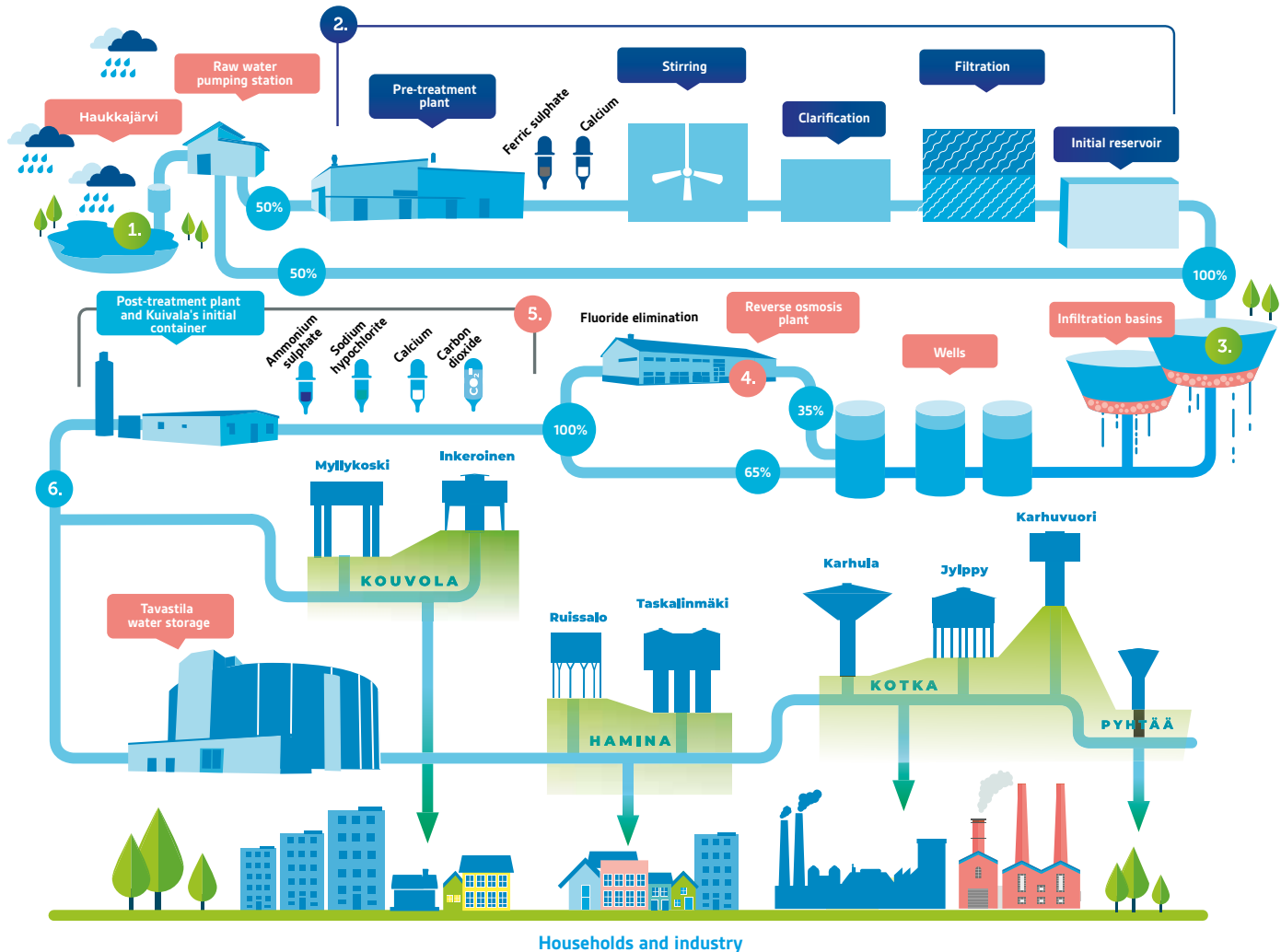
**Our organisation structure is very light.** Most of our water acquisition system is automated, so the need for operating personnel is minimal. We employ three full-time employees. We have outsourced the administrative office services and maintenance services concerning the plant to Kymen Vesi Oy, with which we work in close collaboration. Kymen Vesi sells us approximately seven man-years of labour services each year. Kymen Vesi purchases approximately 75% of the water we produce. The on-call department cooperates with the shareholder municipalities.

**100%** of the water  
we deliver is natural and  
artificial groundwater.





# HOW DRINKING WATER IS PRODUCED



**1. Raw water extraction.** The raw water used in the production of artificial groundwater is pumped from Lake Haukkajärvi.

**2. Pre-treatment.** The raw water is pre-treated before the soil infiltrates it. During pre-treatment, the amount of organic material in water reduces and the oxygen content of groundwater increases. The raw water is treated with chemical precipitation and rapid filtration. Finally, the water's pH to be infiltrated is increased with calcium to the raw water's pH level.

**3. Infiltration.** The artificial groundwater plant's water is produced with Lake Haukkajärvi's water by infiltrating it through the esker's sand layers to the groundwater layer. In this case, e.g. bacteria is naturally removed from the water. Raw water is infiltrated to the soil via the infiltration reservoirs.

**4. Fluorine removal.** Fluoride that is naturally present in the soil in our region is removed from the groundwater with reverse osmosis based treatment.

**5. Post-treatment.** The alkalinity and pH of the artificial groundwater are increased to a suitable level to prevent the water distribution network's corrosion. The microbiological quality of the network water is also ensured with chemical methods.

**6. Water transfer to shareholder municipalities.** Domestic water is supplied to the customers. There are two main water pipelines so that the water operating reliability remains high even in case of a broken pipe.



# WATER QUALITY

The water we produce is of high quality.

The following table presents the results of the water quality measurement we carried out in 2019.

	Kymenlaakson Vesi	Limit values
Water pH	7,8	6,5–9,5
Fluorine	1,3 mg/l	1,5 mg/l
Iron	35 µg/l	200 µg/l
Hardness	2,7 °dH	Water under 4.9 °dH is soft
TOC*	2,2 mg/l	
Temperature	7–12 °C	

\*) Acceptable by users and no unusual changes.



## WATER IS TRANSFERRED ON THE BASIS OF GRAVITATION

We transfer domestic water from the Kuivala artificial groundwater plant to the shareholder municipalities along two parallel main water pipelines.

The connection points to the distribution system are lower than the domestic water's initial container at the artificial groundwater plant, which is why the transfer of water occurs on the basis of gravitation. The main pipelines' flow is regulated with the main control valves at the Tavastila container and the Korkeakoski valve station.

Water is directed to the former Anjalankoski with the branching pipeline, which has an increased level of pressure, and which has been built to the Utti-Tavastila main water pipeline.

The total length of the Utti-Tavastila main water pipeline is approximately 43 kilometres. The reliability of water supply has thereafter been increased significantly with the construction of parallel water pipelines: nowadays, water flows in a 30-kilometre-long parallel water pipeline from Keltakangas in Kouvola to Korkeakoski in Kotka, and in a 26-kilometre-long parallel water pipeline from Utti to Keltakangas.

**The water remains in the main water pipeline for 2-3 days, so residents are supplied daily with fresh and clean water to their homes.**

**Due to the parallel water pipeline, our shareholder municipalities' water supply capacity has increased, and water supply can also be ensured in case of possible services and interruptions without cut-offs or water supply limitations.** All the main pipelines have an automation system, which identifies potential leaks and alerts them to the operating personnel.

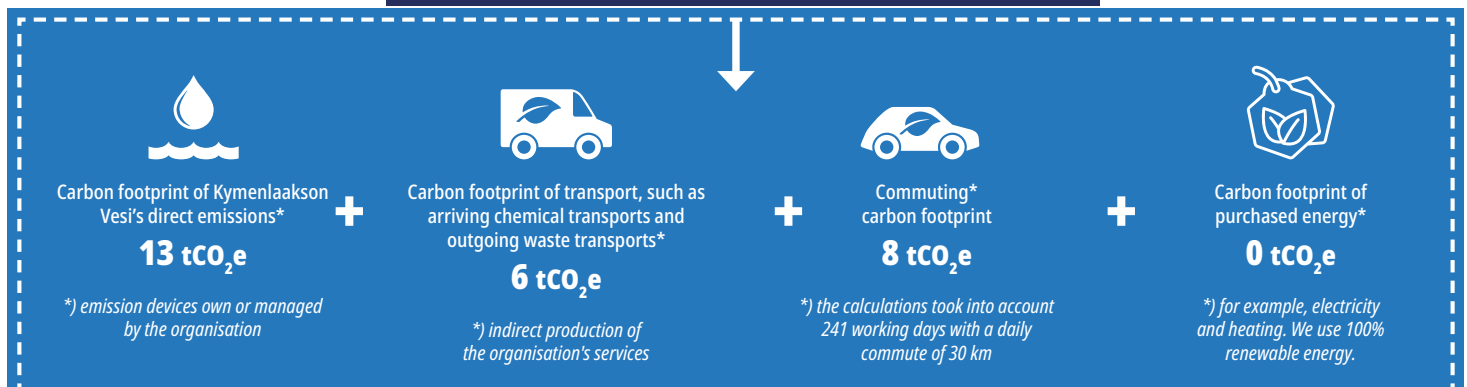
## A NEW WATER PIPE PLANNED FOR THE FUTURE

Together with Haminan Vesi, we are planning the construction of a water pipe from Tavastila in Kotka to Mäkelänkangas in Hamina as a joint venture. The water pipe will allow us to safeguard Hamina's water supply, maintain the existing water pipe and increase the water transfer capacity under normal conditions. The construction work is intended to be carried out in 2023.

# SUSTAINABILITY

## Environmental values and sustainability play an important role in our operations.

To follow the environmental impacts of our operations, we have calculated the carbon footprint of our operations. In 2019, Kymenlaakson Vesi's carbon footprint value was 27 tCO<sub>2</sub>e. We reduced our carbon footprint by moving over to using renewable energy compared to the previous year. We have also been able to reduce our carbon footprint by reorganising work stages.



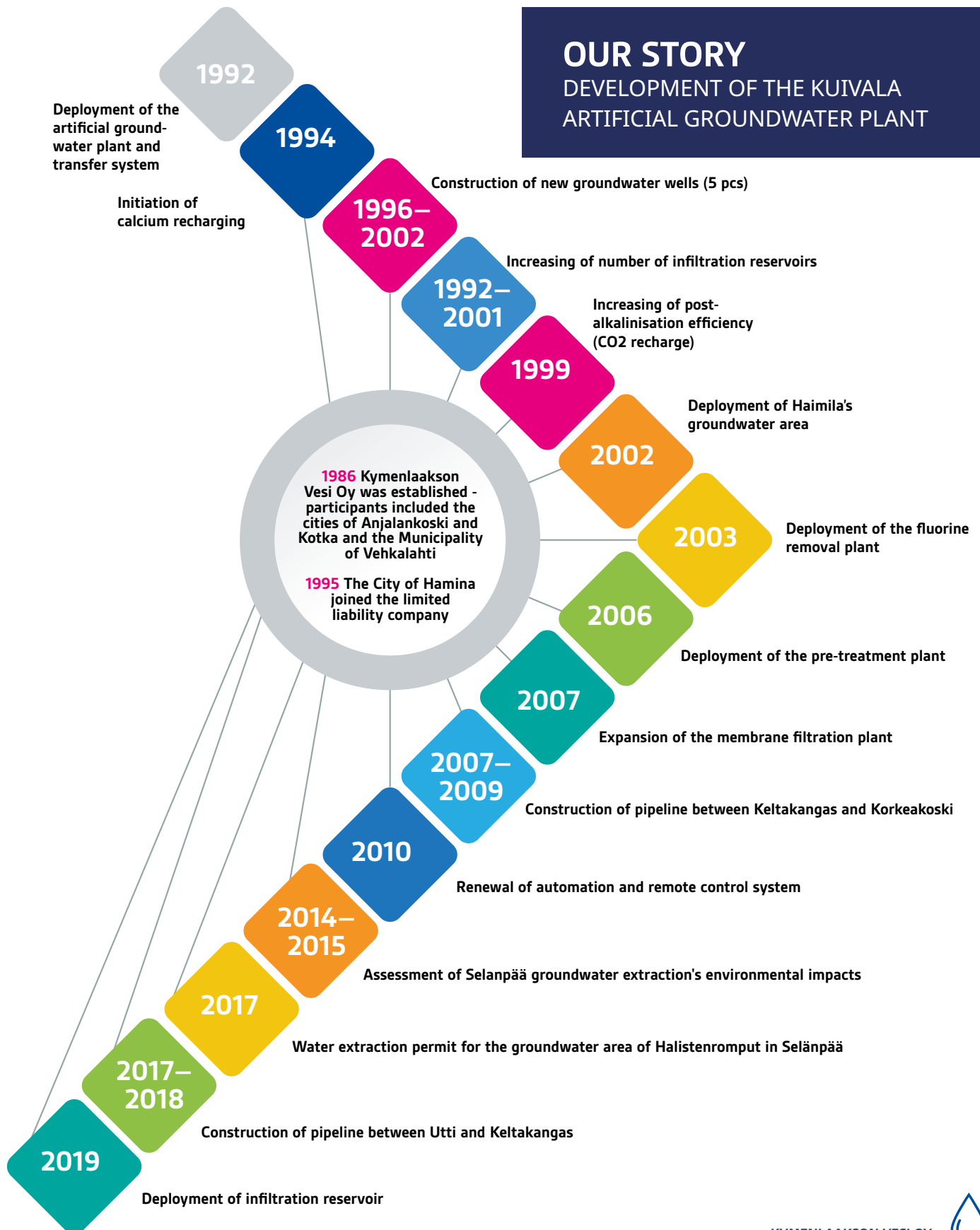
**KYMENLAAKSON VESI'S CARBON FOOTPRINT HAS BEEN REDUCED SINCE 2018 BY A TOTAL OF**

**1845 tCO<sub>2</sub>e.**

This has been further promoted by transferring to renewable electricity and the reduction of driven mileage.

# OUR STORY

## DEVELOPMENT OF THE KUIVALA ARTIFICIAL GROUNDWATER PLANT







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