

You can obtain further information on Zurich Water Supply or about guided tours through the three water plants at the following address:

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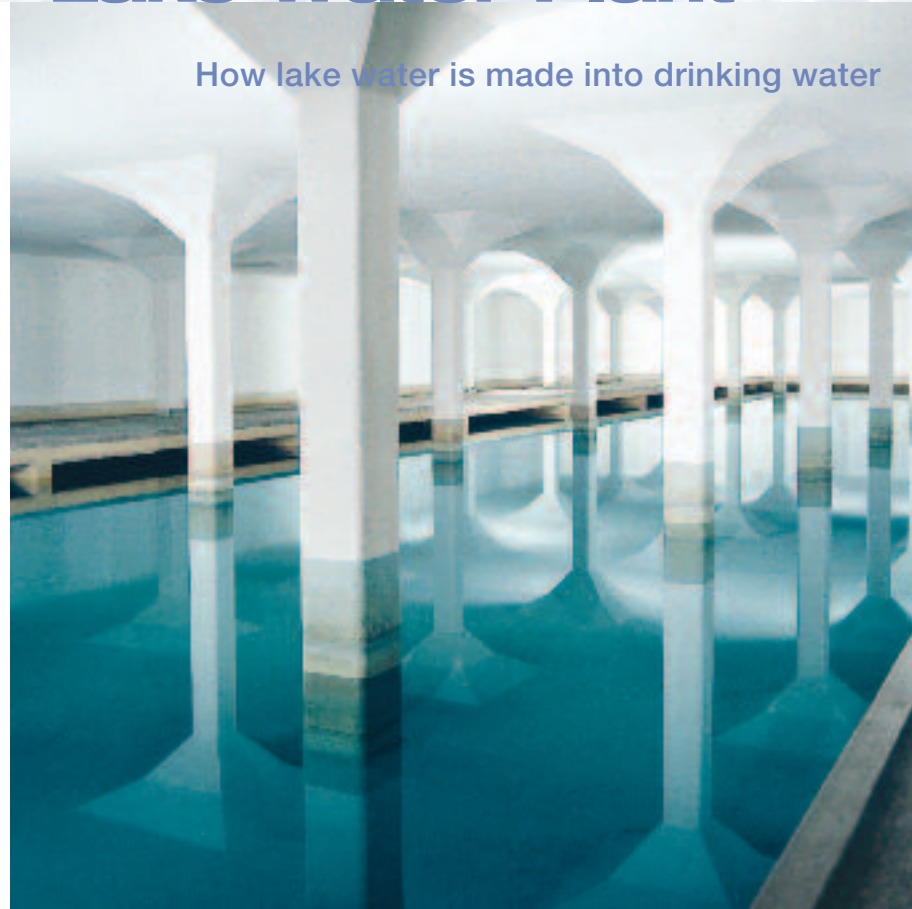
natürlich **züri**
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The Lengg Lake Water Plant

The most important facilities of Zurich Water Supply



How lake water is made into drinking water



How does the water get to the tap?



Hand washing 2 to 4 litres, showering 30 to 90 litres,
drinking 2 to 3 litres per day: Zurich's drinking water
is healthy, tastes good and it is, thanks to Lake
Zurich, the groundwater and spring water available
in virtually unlimited quantity!

On the way from the lake to the tap, a large amount
of the water flows through the Lengg Lake Water
Plant, where it is prepared with processes similar to
those found in nature.

Water – (not) a matter of course

Hardly anyone asks where the water comes from when they are standing under the shower in the morning or putting some water on the stove to boil for tea. Water available at any time in unlimited quantity and top quality is a matter of course for us. But before the fresh drinking water gushes out of the tap at our home it must be abstracted, treated, pumped into the reservoirs and ultimately piped into the quarters and dwellings.

Lake Zurich Reservoir

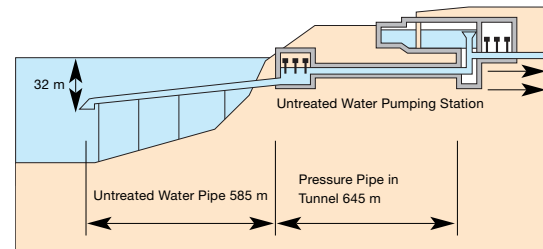
Zurich is in a comfortable position when it comes to water supply, because Lake Zurich is a huge natural reservoir with a capacity of 3.4 billion cubic metres. On average, the water needs 400 days to flow through the lake. About 70 percent of our drinking water comes from the lake and 20 percent from groundwater and 10 percent spring water from the Sihl and Lorze valleys. Like the groundwater and spring water, the water from Lake Zurich is of good quality thanks to the stringent water protection regulations. Drinking water is treated in three plants: besides the Lengg Lake Waterworks, which has the largest capacity, there are also the Moos Lake Water Plant and the Hardhof Groundwater Plant.

The Zurich Water Supply, with its 270 employees, makes sure that around 800,000 people in the city of Zurich and in the 67 customer municipalities are supplied with sufficient drinking water around the clock.

Untreated water from 32 meters deep



70 percent of the Zurich drinking water comes from the lake. That is 120'000 cubic metres per day on average. A large proportion of this is collected in the vicinity of Tiefenbrunnen and from where it is elevated to the Lengg Lake Waterworks.



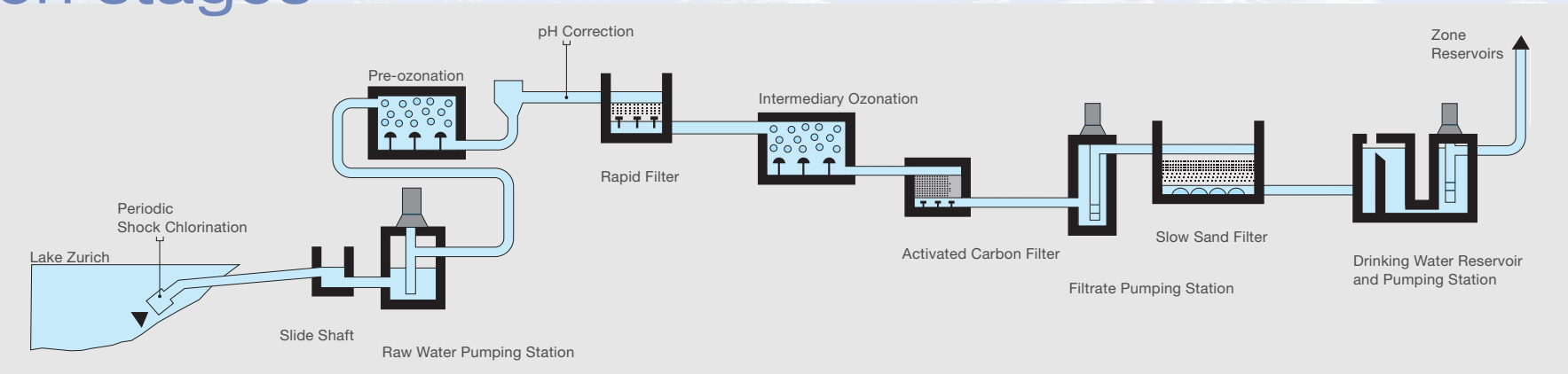
How the water reaches the plant

The untreated water is taken from Lake Zurich at a place named Tiefenbrunnen. The abstraction point is 500 metres from the bank at a depth of 32 metres which is 16 metres above the lake bed. At this depth the water is a cool 4 to 8 degrees Celsius and of good quality throughout the year. From here it flows via a bell-mouth intake, protected by a grid, through a pipe to the suction well of the pumping station at Tiefenbrunnen. Pumps lift the water from this well through a pressure pipe into the Lengg Lake Waterworks located 50 m higher where it is distributed between two identical halves of the works for treatment.

Zebra mussels – unwanted guests in Lake Zurich

During the sixties of the last century, zebra mussels found their way into Lake Zurich from Eastern Europe. Their mobile larvae get carried with the raw water into the intake pipeline where they settle and can grow into large mussels, substantially reducing the cross-section of the pipe. To prevent this occurring the lake pipe is filled once a month, for eight hours, with chlorinated water at a concentration of 10 mg per litre. This shock chlorination kills off the larvae before they have formed their protective shells.

Natural treatment in seven stages



Water treatment is carried out in a way that is as environmentally friendly as possible. That is why only filters that function like natural processes and absolutely residue-free ozone and hydrated lime are used.

A process inspired by nature

Water treatment should be environmentally friendly and lasting. It must be possible to produce perfect drinking water even under unfavourable conditions. Fulfilling these requirements takes considerably more effort with lake water than with ground and spring water, because surface water always contains foreign substances and is also exposed to the danger of contamination from accidents with chemicals. In processes that imitate nature, such as filtration and biological decomposition with bacteria, minimisation of chemical additives and the use of completely biodegradable chemicals, the lake water works operates along ecologically sound lines. The seven stage treatment

forms a multi-barrier system. In the event of higher loading, caused by increased water pollution, or the failure of a treatment stage the remaining ones continue to ensure perfect drinking water.

Turbid water becomes clear - filtration

38 rapid filters with a total area of 1,710 square metres provide the first purification, a filtering out of particles. The double layered filter media, made up of coarse-grained, light pumice and underneath it a layer of fine quartz sand, is around 1.5 m high. Every 14 days, dirt that has collected in the filter media is removed by backwashing.

The 14 slow sand filters, with a total surface area of 15,140 square metres, take over the fine purification at the end of the treatment chain and also hold back germs. That is why the water flows here ten times more slowly than in the rapid filters. The filter bed is made up of lake sand of various grain sizes and is around 80 centimetres high.

Technical data of the Lengg Lake Water Plant	
Plant Layout:	2 parallel streams
Maximum production:	250,000 m³/day
Lake inlet pipe:	length 585 m, diameter 1,600 mm
Raw water pumping station at Tiefenbrunnen:	6 pumps, each 2,300 m³/h
Pressure pipeline to plant:	length 695 m, diameter 1,350 mm
Ozonation system:	2 ozone generators, each with max. production of 20 kg/h from oxygen
Pre-ozonation:	dose 1.2 mg/l (adjustment range 0.4–2.0 mg/l) reaction time minimum 10 minutes
Rapid gravity filtration:	38 filters, each with 45 m² surface area, filter media dia 70–90 cm sand and 50 cm pumice
Intermediate-ozonation:	dose 0.5 mg/l (adjustment range 0.4–2.0 mg/l) reaction time minimum 6 minutes
Activated carbon filtration:	12 filters, each with 44 m² surface area, filter media: 40 cm quartz sand and 130 cm activated carbon
Slow sand filtration:	12 filters, each with 1,120 m² surface area and 2 filters, each with 850 m² surface area, filter media: 50–60 cm fine sand/gravel on a supporting layer of coarse gravel
Drinking water reservoir:	2 chambers with 4'300 m³ and 4,100 m³ capacity
Drinking water pumping station:	5 pumps, each 2300 m³/h, discharge head 100 m 2 pumps, each 1'150 m³/h, discharge head 60 m

Ozone, Activated Carbon, Bacteria



The Zurich Water Supply infrastructure

Zurich Water Supply maintains the following infrastructure for the treatment and distribution of the water for 800,000 people in the city and region of Zurich:

- 3 water plants
- 29 pumping stations
- 21 reservoirs
- 1,200 fountains
- 1,550 kilometres of pipes
- approx. 9,000 hydrants

Ozone – the residue-free chemical

Because ozone is absolutely residue-free it has proven to be the ideal oxidant for the treatment of drinking water. It kills bacteria, spores, cysts and viruses as well as other small life-forms to be found in the lake (plant and animal plankton). Harmful organic material is destroyed by ozone. This also includes substances which impair the colour, odour and taste of the water. Following ozonation the water is now excellently conditioned for the following filtration. Because ozone is toxic to the respiratory system, all waste gas containing ozone is collected and treated in special ozone destruction systems.

Bacteria – the invisible helpers

Bacteria that colonise the activated carbon and the top layer of the slow sand filters perform an especially important task. They remove all biodegradable substances from the water by using them as nutrients for their metabolism. No more bacteria can then grow in this nutrient-poor water and so it is biologically stable. That is why the drinking water, after the slow sand filters, can be fed to the distribution network without addition of a disinfectant.

The versatility of the activated carbon

The 12 activated carbon filters fulfil different important functions. Water-purifying bacteria fix themselves to the grains of activated carbon. In addition any toxic ozone remaining in the water after the intermediate ozonation is transformed here back into oxygen. The activated carbon also acts as a safety barrier: if the water is contaminated with organic substances such as petrol, phenol or solvents, as the result of an accident, these substances are held back through absorption.

Corrosion – not a problem, thanks to hydrated lime

By addition of hydrated lime the level of carbonic acid in the water is reduced. The soft water of Lake Zurich causes slight precipitation of lime which promotes the formation of a thin protective layer in the piping and household appliances and thus reduces corrosion.

High safety of supply – good water quality



The Lengg Lake Water Plant can treat up to 250,000 cubic metres of drinking water daily. Thanks to automation, operation is ensured around the clock and water quality is constantly well supervised.

Automatic operation and continual supervision ensure quality

The Lengg Lake Water Plant functions automatically. Sensors and measuring equipment watch over the plant. The measurement of water quality parameters such as temperature, oxygen content, pH value, absorption of UV light, turbidity, and ozone content guarantee perfect drinking water at all times. The data is passed on to the plant control room by the plant computer, together with malfunction, fault, and alarm messages.

The backbone of water distribution

At the plant outlet, five pure water pumps convey the treated drinking water into a transport pipe. This connects all of Zurich's water plants and large reservoirs with one another. Whereas this transport pipe on the right side of Lake Zurich has been in operation for some time, the last section between the Lyren Reservoir and the Moos Lake Water Plant must still be completed for the left side. Afterwards, the lost performance of a system will be compensated for by the others in the event of a breakdown, and the safety of supply will be further increased.

Drinking water reservoirs for every height zone

Due to the topographical location of Zurich – the city area reaches up to a height of 400 to 870 m above sea-level – the supply area is divided into different height levels, so-called pressure zones: the higher reservoirs, which are filled by 29 pumping stations, supply the individual zones. From the reservoirs, the drinking water flows over 1,550 km of piping to every tap in the city.

Sport on the roof

The Lengg plant is remarkable not only for its daily delivery quantity of a maximum of 250,000 cubic metres, but also for its construction. The plant is built downwards into the ground, which is why the large-area slow sand filters take up so little space. Tennis is played on the roofs.