The water's journey through Kungsängen's wastewater treatment plant.

Approximately 50 million litres of wastewater is treated at Kungsängsängen WWTP every day. In addition to Kungsängsängen WWTP, Västerås, there are also four smaller treatment plants in Skultuna, Kärsta, Kvicksund and Orresta. Two of those last mentioned will be shut down in the next few years. The wastewater from these two will be pumped into Kungsängsverket instead.

Kungsängsängen WWTP was put into operation in 1938 and has been expanded in several stages. In 1956, the plant was extended with the addition of the current digestion chamber. In 1965, an activated sludge plant was added and in 1972, chemical precipitation started to be used for phosphorus removal. A pumping station was built for the incoming wastewater in order to reduce odour emanating from the plant. The air from all the built-in components of the plant is filtered before it is released. In 1997, the biological treatment stage was updated and extended with the addition of nitrogen removal. This has led to reduced emissions of nitrogen to Lake Mälaren.

Wastewater - a resource

District heating, district cooling, soil improvement agents and biogas are some examples of what can be produced from recycled wastewater. The wastewater generates a large amount of sludge, which is then recycled to produce biogas used as fuel for buses and cars. In Västerås, there are 2 centrally-located refuelling stations that are owned by Växtkraft.

The sludge that is left over after treatment contains plant nutrients. Thus, it can be used as a soil improvement agent in energy forestry, in the production of compost and for landfill protective layers. The required conditions for this to work are that it does not contain too high level of heavy metals and any unwanted organic contaminants. Before the treated water reaches Lake Mälaren again, it travels through a heatpump, producing district heating and cooling.

Key ratios

	% reduction	/threshold limit value
P - Phosphorus:	95%	/0.3 mg/l
BOD_7:	97%	/15 mg/l
N - Nitrogen:	65-75%	/15 mg/l guideline value

Nitrogen and phosphorus are nutrients that in high quantities promote growth in watercourses. A high level of BOD leads to oxygen-poor watercourses.

Mechanical and chemical treatment stage

1A Inlet pumping station

Lifting height: approx. 9 m
Worm pumps: 3 pcs
Total capacity: 16 200 m^3/h
Centrifugal pumps: 2 pcs
Total capacity: 2 600 m^3/h

Pre-precipitation with ferrous sulphate.
Dosage approx.: 10 g Fe/m^3
Flow measurement: Incoming flow is measured using electromagnetic measurement after the bar screen.

1B Preliminary treatment/screen

Screens: 4 pcs
Gap width: 3 mm
Screenings washers: 2 pcs
Screenings that have got caught in screens are washed in screenings washers. Here is where the organic material is washed out. The wash water containing the organic material returns to the incoming wastewater. The washed screenings are incinerated.

1C Aerated grit chamber

Aerated grit chambers: 2 pcs
Total volume: 1 000 m^3
Total area: 176 m^2
Blowing engine total capacity: 1 920 m^3/h
The sand from the sandtrap is pumped to the sand washer. Here is where the organic material is washed out. The wash water containing the organic material returns to the incoming wastewater.

1D Pre-sedimentation basins

Basins: 18 pcs
Total volume: 5 225 m^3
Total area: 2 200 m^2

1E Bio pumping station

Lifting height: approx. 3 m
Frequency-controlled propeller pumps: 4 pcs
Capacity: 9 900 m^3/h
The propeller pumps lift the water from pre-sedimentation to bio-basins.

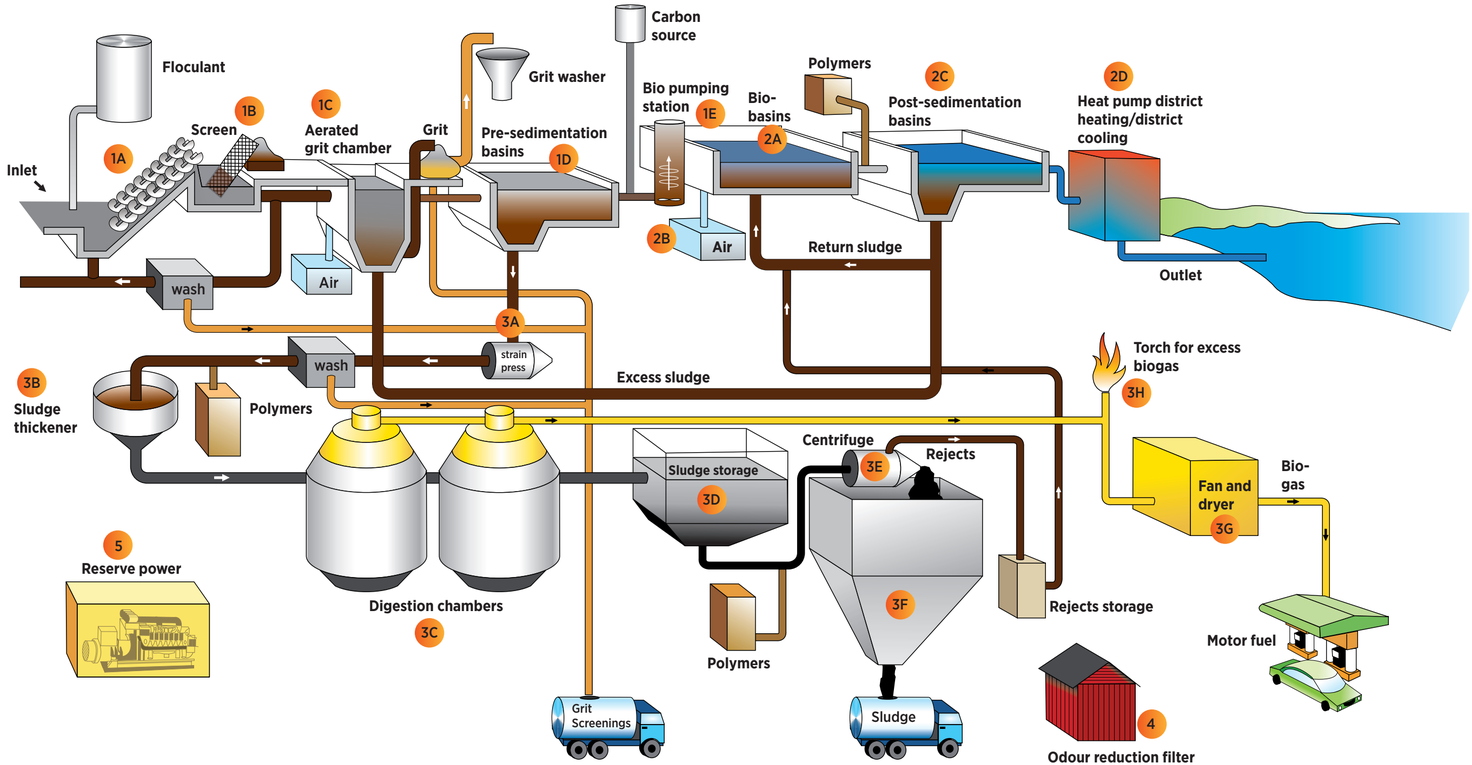
Biological treatment stage

2A Bio-basins

Basins: 12 pcs
Capacity: 5 400 m^3/h
Total volume: 12 600 m^3

2B Blowing engines

Turbocompressor
Blowing engines: 4 pcs
Total capacity: 24 000 m^3 air/h



2C Post-sedimentation basins

Basins: 18 pcs
Total volume: 9 210 m^3
Total area: 2 610 m^2
Total capacity: 6 840 m^3/h

2D Heat pump (District heating/District cooling)

The heat pump produces heating and cooling from the treated wastewater.

Sludge handling

3A Strainpress

Capacity: 40-45 m^3/h
The strainpress removes the screenings that the screen (3 mm) lets through. Hair and small bits of rubbish are washed and separated. The screenings are taken to be incinerated. The wash water runs down into a basin. The sludge is pumped forward to the sludge thickener.

3B Sludge thickener

Gravimetric sludge thickener: 1 pc
Volume: 545 m^3
Reserve sludge thickener: 1 pc
Volume: 288 m^3

3C Digestion chambers 2 pc

Total volume: 7 000 m^3
Residence time: approx. 20 days
Temperature: 36°C

3D Sludge/rejects storage

Sludge storage
Volume: 900 m^3 for digested sludge.
Volume: 400 m^3 for the rejects from the centrifuges
The reject water is pumped into the biological treatment stage's pre-nitrification zones.

3E Sludge dewatering

2 centrifuges
Total capacity: 40 m^3/h
Maximum dry matter content: approx. 27% (DM content)

3F Sludge silos for digested sludge

Sludge silos: 2 pcs
Total volume: 300 m^3
The sludge is digested and used for agriculture, grass surfaces and landfill cover.

3G Biogas methane

2 million Nm^3/year (normal m^3/year) is produced here, of which the methane concentration is approx. 62%.
The gas is sent 8 km to Växtkraft, where the upgrade takes place. There is approx. 1.15 million m^3 of ready-to-use motor fuel from the wastewater treatment plant per year.

3H The torch - a safety valve

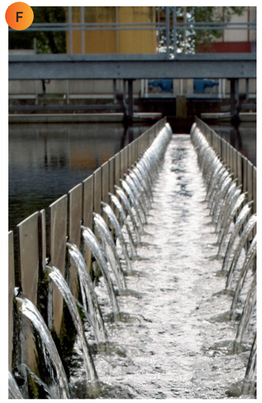
In case of a shutdown, the biogas produced is incinerated in the torch at Kungsängsverket.

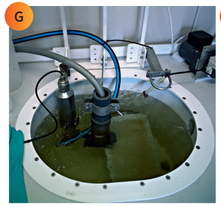
4 Odour reduction filter

The ventilating air from the covered buildings where the wastewater and sludge are treated goes to a biological odour reduction filter.

5 Reserve power station

Has the capacity to operate the entire plant in case of a long-term power failure.





A On average, 2.2 million litres of wastewater flow into Kungsängsängen WWTP every hour from the inhabitants of Västerås.

B The water is pumped to a building where a process of preliminary treatment occurs. Large screens catch objects, such as plastic bags, sanitary towels, cotton buds, collections of hair etc, which should never have been flushed away with the wastewater.

C The water is carried on and put into deep basins - the sand trap. Air streams keep the water in motion, while the sand is sucked up from the bottom.

D Next, the water flows to pre-sedimentation basins. Sludge gets collected up on the bottom and taken to a digestion chamber. On the way, it passes through strainpress, which catch hair, among other things.

E The biological treatment area is known as the heart of the plant. Organic material and nitrogen is separated here by bacteria – microorganisms.

F The post-sedimentation phase, is the water's last stop before it is sent out into Lake Mälaren.

G On its way out towards Lake Mälaren, the treated water passes one last control station, which continuously checks for phosphorus and nitrogen, among other things.

H Not only is the treated water returned to the cycle after the journey through the treatment plant, but the sludge is used on farmland, in topsoil production and as a material for landfill cover, for example.

We obtain our energy, our heat and our water from the nature. Protecting Mälaren Valley and our common habitat is therefore one of our most obvious missions.

We have over 100 years of experience in providing people with a more comfortable way of life. This is something we want to build on, through innovative technology and sustainable solutions. We stand firmly on our secure foundations, are straightforward and can be trusted by our customers.

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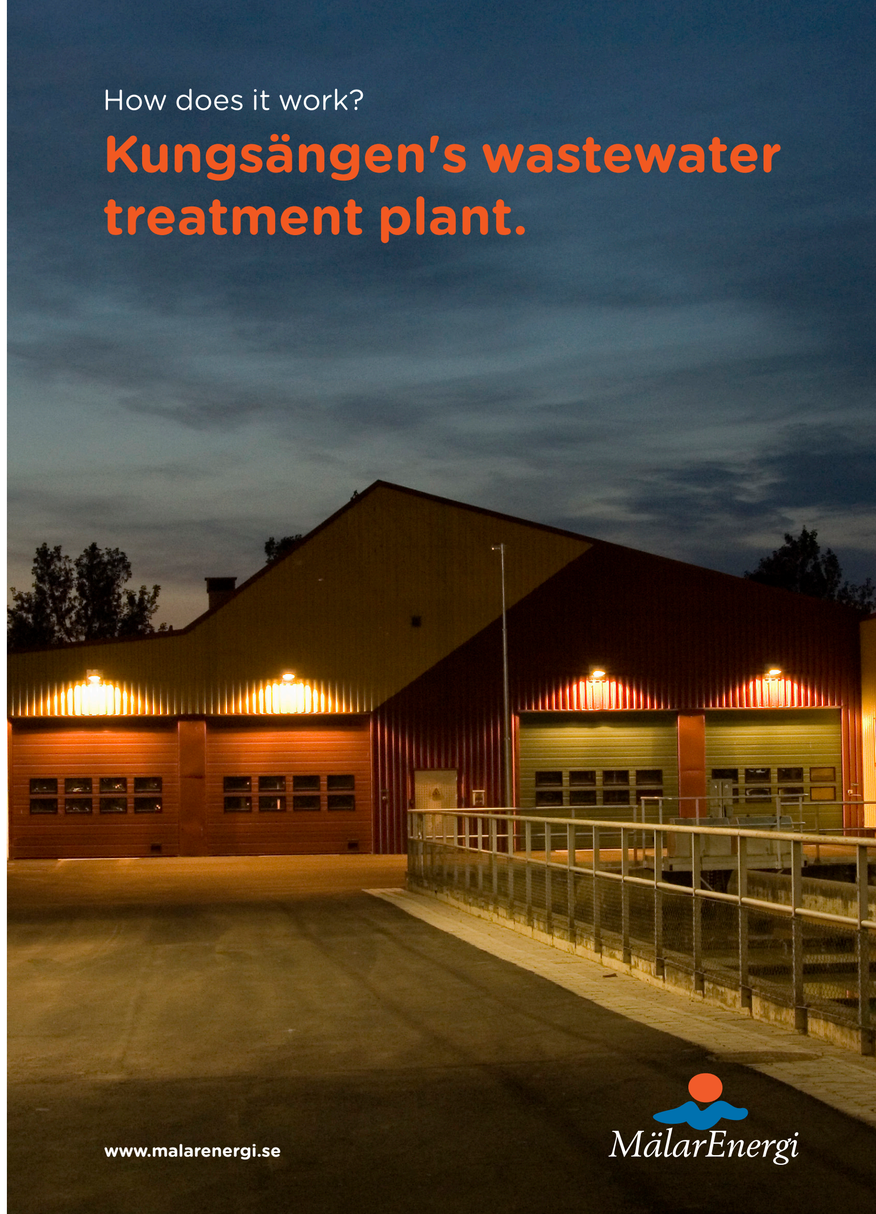
How does it work?

Kungsängen's wastewater treatment plant.



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