



Ängens wastewater treatment plant

- we are building for the future



Why do we invest in a new wastewater treatment plant?

Lidköping municipality is working intensively with the preparations for the largest investment over the years - to build a new modern wastewater treatment plant (WWTP). Lidköping is growing and expects a population of 45,000 citizens by 2030.

The existing WWTP, located in the harbour, does not have sufficient capacity for the growing population nor for the requirements that will be imposed on wastewater treatment in the future. In the plant, wastewater is treated from approximately 32,000 citizens and several local industries. The treatment is done in the common way with purification of organic matter as well as the nutrients (phosphorus and nitrogen.)

Of crucial importance is our high ambition in terms of environmental impact and that we will protect the water quality in lake Vänern. More-

over, the fact that the current plant has a lack of capacity and is outdated is important. Recycling of nutrients, minimizing emissions and a vision of a sustainable society with conscious inhabitants is a goal for the work. The plant has also an uncertain position with regard to future challenges. If the level in the lake Vänern should rise, for example as a result of climate change, there is a risk that the plant will be flooded. The plant is also an undesirable neighbour to future housing and green area development in the harbour.

The purified water from Ängen's WWTP will be led via landscaped ponds and a meander-shaped creek, Ängsbäcken, to the river Lidan. Along the creek, walking paths and stations with pedagogical learning will be available. Residents, schoolchildren and visitors will in an informative way see how Lidköping thinks about the water cycle in the city and the environmental heritage to future generations.

Lidköping Innovation Wastewater Eco-Hub - LIWE LIFE

In connection with the planning and construction of the new WWTP, a project has been started - Lidköping Innovation Wastewater Eco-Hub, LIWE Life.

The municipality cooperates under the EU flag with the Kompetenzzentrum Wasser Berlin, the Farmers' Association (LRF) and Lund University. At the university there is an industrial doctoral student is employed especially for this project.

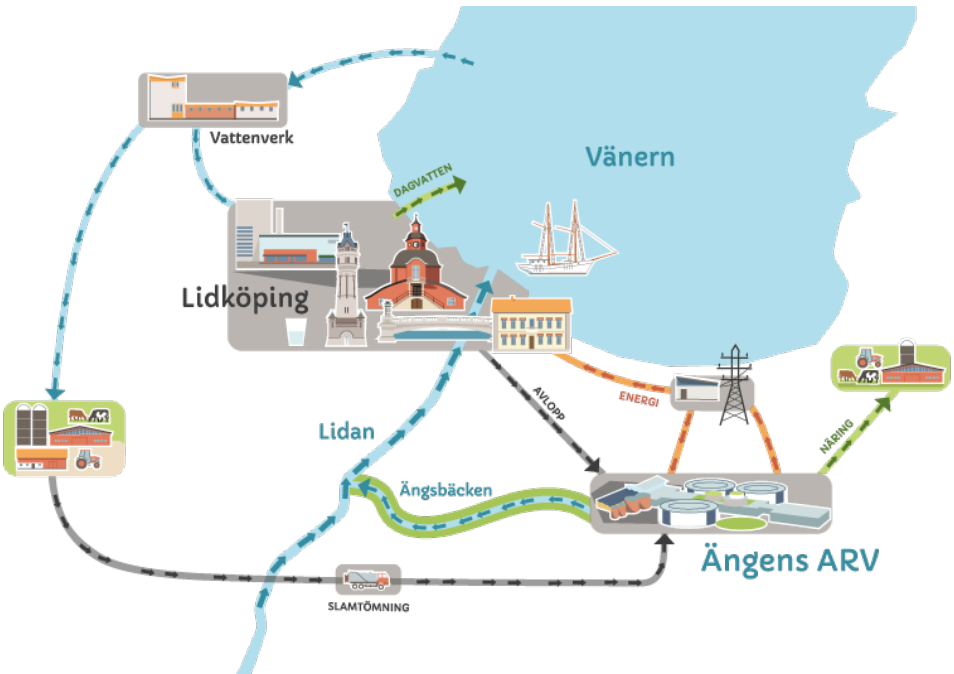
We will at Ängen WWTP, create an innovation hub for research, education and last but not least a dialogue with the citizens. By introducing advanced wastewater treatment technology and at the same time having a high



resource and energy efficiency, a circular wastewater treatment system is developed.

The project will challenge the traditional view of wastewater treatment as a series of separate processes. Instead, the concept is introduced with a sewage treatment system that puts circular flows of energy, resources and water in the center removal.

Focus will be on pharmaceuticals and microplastics, phosphorus and energy recovery by producing biogas.





Pharmaceuticals removal by ozonation

Pharmaceutical residues in wastewater streams present environmental problems. Such substances have adverse effect on fish, plants and whole ecosystems. Bacteria may also develop resistance to antibiotics.

In the new WWTP, there will be an ozone treatment that decompose pharmaceutical residues, antibiotics and hormones in the wastewater. The first generation of ozone treatment is established in Switzerland and Germany and in a few waste-water treatment plants in Sweden. LIWE LIFE will develop the second generation's more energy-efficient ozone cleaning technology. To reduce energy consumption, water is mixed with ozone gas in a smaller amount than previously used. The technology is expected to eliminate 80-99% of pharmaceutical residues.

Microplastics removal by disc filters

Microplastics are defined as small plastic particles that are less than five millimetres. Microplastic can be made as small particles or is formed later on during wear or degradation of plastic. The risks of the presence of microplastics in watercourses are complex. When plankton, clams fish or birds eat microplastics, it can give a false sense of saturation which can cause poorer growth or starvation. Toxic substances can also be present with the microplastics and thus cause damage and accumulate in the food chain.

In a traditional waste water treatment plant, between 85-90% of the microplastics are removed. At Ängen WWTP, special disc filters will be installed which are expected to remove 99.5% of the microplastics that thus do end up in the lake Vänern.

Energy recovery - production of biogas

The sludge produced in the sewage treatment plant will be led to a digester. In the digester, which holds about 38 ° C, the material is broken down by various types of microorganisms in an oxygen-free environment. The biogas produced will be combusted in a gas turbine where the energy is converted into electricity and heat.

The heat is used to heat up the digesters. During most of the days of the year, it is also sufficient to heat the buildings and produce hot water. The electricity will be used within the plant to operate pumps and other technical equipment. The use of bio-gas contributes to reduced emissions of climate-impacting carbon dioxide.

Recovery of phosphorus by the struvite method

In order to obtain a resource-efficient recycling, it is important that we can bring back phosphorus to arable land. The sludge produced in the purification process contains high levels of phosphorus, but unfortunately also other undesirable contaminants that we want to avoid getting into the environment.

In the new plant, with a new method in Sweden, extraction of pure phosphorus, which is a new method in Sweden, will be demonstrated and developed in the new WWTP. The method is based on the fact that different sub-streams of phosphorus-rich and ammonium-rich water are mixed with magnesium chloride in a phosphorus recovery reactor. Struvite is formed which can be granulated and used as a mineral fertilizer. The phosphorus recovery is estimated to be about 12 tonnes per year.





Ängsbäcken creek walk – learning, recreation and biodiversity

A recreational green area will be built at the new plant. Stormwater from the area and the purified water from the WWTP will firstly pass through ponds and then further out into an approximately 2 km long creek called Ängsbäcken, which will be built through the forest. The last part, through residential areas, is the creek culverted before it joins the river Lidan. The creek will be sealed at the bottom with a concrete carpet and led over existing watercourses via small aqueducts. The creek will promote biodiversity by providing habitats for birds, insects, frogs and small fish.

The area is already popular for leisure activities. Ängsbäcken will add a new dimension by increasing accessibility and creating places for learning and socializing.

Ängsbäcken will be available free of charge and be a recurring element of school education, from experiments in preschool to recycle-oriented project work in upper secondary school. The area is accessed via existing walking paths and tied together with the urban area with a safe walkway - a green infrastructure.

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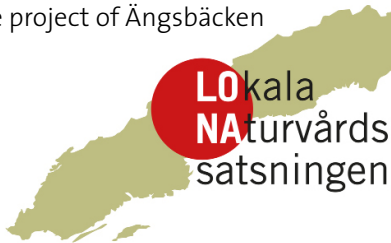
Bidrag till projekten

The investment in a new WWTP, the LIWE LIFE project and the project with the creek Ängsbäcken, has attracted interest both nationally and internationally. We have therefore been able to receive the following grants;

- The LIWE LIFE project has received funding from the LIFE Programme of the European Union by approximately SEK 31,4 million (2 991 076 EUR)



- Swedish Agency for Marine and Water Management – approximately SEK 2.2 million (EUR 210,316), co-financing of the LIWE Life project
- Swedish Environmental Protection Agency - SEK 13.5 million (app. EUR 1,280,000) or ozone purification of pharmaceutical residues
- County Administrative Board - SEK 0.5 million (app. EUR 47,500) for local nature-care project for a feasibility study into the project of Ängsbäcken



- The National Board of Housing, Building and Planning - SEK 12.5 million (app. EUR 1,280,000) for greener cities and for the project of Ängsbäcken

Our collaboration partners

Learning and development requires collaboration and we are grateful for the inspiration that it provides.

Our partners are:

- *Berlin Centre of Competence for Water Research - Centre for Applied Water Research and Knowledge Transfer*
- *Lund University – Faculty of engineering*
- *The Federation of Swedish Farmers*



KOMPETENZZENTRUM WasserBerlin



**LANTBRUKARNAS
RIKSFÖRBUND**

Do you want to follow the progress of the project;

LIWE LIFE
www.angensarv.se

Lidköpings municipality's homepage
www.lidkoping.se

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www.lidkoping.se

 **LIDKÖPING**
VIDVÄNERN