

Several Pipes, One Goal

To prepare for a future in which water recycling will play a much bigger role and water of different quality levels will be used more systematically, Region Kalmar County equipped a newly built hospital with several separate pipe systems from the outset. A feasibility study has now examined in greater detail how this system can soon be put into use.

While in many parts of the Baltic Sea Region, people are still debating whether water recycling is really necessary, Kalmar in southern Sweden has already moved on. Recurring droughts and temporary water shortages, caused by climate change, have sharpened awareness that even comparatively water-rich regions will need to rethink the way they use water. The question here is no longer if water should be recycled in the future, but how the right infrastructure can be put in place to support that shift.



The Water Recycling Plant Kalmarsundsverket in Kalmar / Sweden

At the heart of Kalmar Municipality's water strategy is Kalmarsundsverket, a new state-of-the-art wastewater treatment plant currently under construction on the Kalmarsund strait. From 2027 onwards, it will be capable of large-scale water

recycling, producing both drinking water quality and water of other qualities for a range of uses. Several years earlier, Region Kalmar had already taken another important step with the construction of the new county hospital, Länssjukhuset. The building was equipped with an additional separate pipe system, creating the option of using water of other qualities alongside drinking water.

Although these two measures sound like a perfect match, it had not yet been examined in detail how they could best work together in practice. Which water sources and which water qualities should feed the hospital's multiple pipe system? And what exactly should that water be used for? These were the questions addressed in a feasibility study elaborated by Region Kalmar County with support from external engineering experts. The study is now available, providing concrete results to guide the next practical steps.

The location is a remarkable choice. With Länssjukhuset, one of Kalmar's larger hospitals, the project focuses on a building with very high hygiene requirements and correspondingly sensitive operations. Despite this challenging setting, the hospital's separate piping system opens up the possibility of using water qualities below drinking-water standard for applications where drinking water is not actually needed.

This so-called KV3 system already supplies some of the hospital's toilets today and is to be used much more extensively in future: with fit-for-purpose water for technical applications, for washing vehicles at a new ambulance station and for irrigating green spaces in addition to flushing toilets. Yet the water available inside the building, such as shower water, will not be sufficient for these uses. The feasibility study therefore centres on the question of how treated water from the new municipal water recycling plant, Kalmarsundsverket, can in future be safely fed into this piping system, which applications it can be used for, and how health risks can be ruled out.

Infrastructure One Step Ahead of the Future

What is notable is not only the concrete planning and the technical solutions being considered. It is above all the attitude behind them. In Sweden, the public sector is well aware of its responsibility to move ahead into new fields of action through innovative projects. This also applies to water recycling.

While municipalities in many other countries tend to begin investing in infrastructure only once everything has been clarified down to the last detail, Kalmar has moved forward with determination. With both the planning and construction of Kalmarsundsverket and the design of Länssjukhuset, Kalmar has created structural conditions that now need to be brought together in a meaningful way – and that, in turn, generate momentum for action.

This is also what makes the project so powerful as an example. Here, water recycling is no longer seen as an emergency fallback, but as a natural component of modern, resilient public services. The public sector is leading the way, creating the necessary conditions and showing that a different approach to water use is both necessary and within reach in the Baltic Sea Region as well.

Three Applications, One Central Principle

The feasibility study for the county hospital does more than specify where recycled water of which quality should come from. It also breaks down in greater detail what it can be used for.

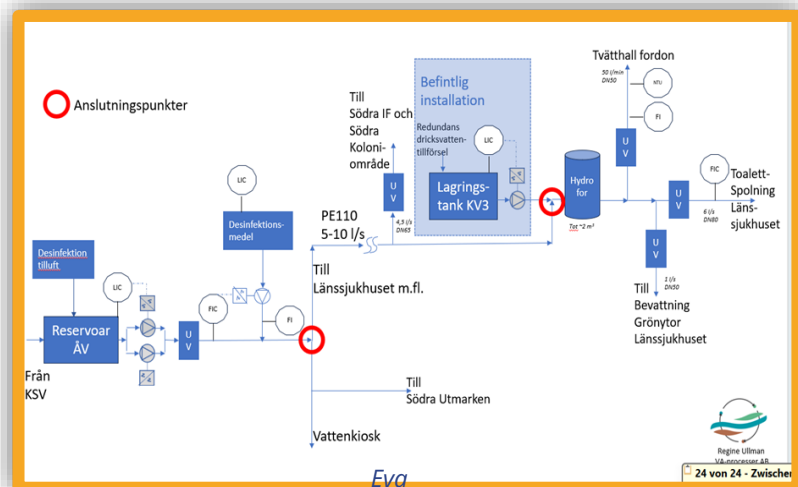
The largest volumes of water are needed for toilet flushing at Länssjukhuset, which is why this application is one of the study's central areas of focus. According to the study, the hospital has around 1,100 toilets, of which approximately 20 percent are currently connected to the separate KV3 system. In future, this share is expected to increase significantly. For this application, future water demand has been estimated at around 250 cubic metres per day.

Another application is the irrigation of green spaces, with an estimated demand of around 20 cubic metres per day during the summer half of the year. In addition, the new ambulance station, with two vehicle wash bays, is expected to require around 3 cubic metres of water per day. Taken together, this results in a future consumption of around 250 to 300 cubic metres per day..

The Greatest Challenge Is Safety

Precisely because the project is located in a hospital environment, risk analysis received particular attention. The study identifies four main challenges: the risk of spreading pathogenic bacteria, possible recontamination in the distribution system, ensuring a reliable water supply, and environmental aspects related to irrigation.

The toilet flushing system and the vehicle washing process are considered particularly critical, as people may come into unintended contact with the water and health risks cannot be excluded in the event of system failure. For irrigation, the risk was assessed as lower, provided that over-irrigation is avoided.



Water flow diagram around the County Hospital in Kalmar / Sweden

The feasibility study proposes a multi-stage safety concept. At Kalmarsundsverket, recycled fit-for-purpose water is to be produced, among other things, using membrane filtration and disinfected with UV light. For the pipeline to the hospital, the study recommends adding a disinfectant to the water. At the destination itself, further disinfection steps are envisaged depending on the intended use, including further UV treatment.

In addition, safety barriers are needed inside the hospital to prevent possible recontamination in the distribution system. For vehicle washing at the ambulance station, for example, the study points to hygiene requirements relating to legionella, which could be addressed by heating the water. At the same time, the system is to be designed so that drinking water can be automatically fed in if the recycled water supply fails or if quality problems occur.

Turning Feasibility into a Strategic Lever

In other words, Kalmarsundsverket will be a reliable source of recycled water in different quality levels. To use this water under the demanding conditions of the county hospital, however, additional components are still required: a transmission pipeline from Kalmarsundsverket to the hospital, a connection point feeding into the hospital's existing internal KV3 piping system, and additional technical components such as a low-level reservoir, pressure boosting and disinfection stages.

For all of this, the study presents concrete and feasible solutions. Investment costs are roughly estimated at around 10 million SEK (approx. 0.9 million EUR), while annual operating costs for the system are estimated at around 150,000 SEK (approx. 14,000 EUR). At the same time, the study sets out concrete questions that need to be clarified in the next step. These include the detailed design of the system, identifying the long-term operator, quality monitoring, and the division of responsibilities between Region Kalmar County and the water utility Kalmar Vatten.

With this combination of robust findings and concrete points for further implementation, the feasibility study provides not only a strong basis for further local actions in Kalmar. It is also highly relevant and transferable for other municipalities in the Baltic Sea Region: It focused on a concrete use case in which a central and widely used municipal infrastructure is being designed for water recycling. It is about real volumes, real pipes, real risks and real costs. And the study shows not only what is technically possible, but also identifies what still needs to be clarified before larger volumes of recycled water can actually flow through the hospital's pipes in the foreseeable future.

At the same time, the example makes very clear that municipal water recycling is more than a technical issue. It requires a culture of cooperation and can only succeed if water utilities, building operators, hygiene experts, legal experts and decision-makers work closely together and think ahead jointly. When presenting the study at the WaterMan final conference in Kalmar in November 2025, Regine Ullmann, whose engineering office supported Region of Kalmar Country, therefore emphasised the importance of transparent and open dialogue with all key

stakeholders. For the implementation phase, she explicitly recommends continuing and deepening this network-based work.

An Example with Reach Far Beyond Kalmar

What other regions and municipalities can take away from this WaterMan pilot measure in Kalmar is therefore not only a technical solution, but above all a shift in planning perspective.

Anyone dedicated to moving water recycling forward should not wait for a perfect master plan in which every detail has been clarified and all measures fit together seamlessly. A first step can simply be to design new municipal infrastructure, which is needed anyway, so that it creates room for future solutions. That, in itself, creates momentum.

About the WaterMan project

WaterMan promotes a region specific approach to water recycling, which intends to use the alternation of too much and too little water that has become typical in the Baltic Sea Region to make the local water supply more resilient, and supports municipalities & water companies in adapting their strategies.

More information: <https://www.eurobalt.org/WaterRecyclingToolbox/>
<http://interreg-baltic.eu/project/waterman>