

The WaterMan Project

Final draft of the local water recycling strategy for Kalmar Municipality

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Kalmar Municipality





Strategy - Overview

- Main Goals
- Scope
- What Problem/Opportunity Does it Address in Kalmar Municipality?

Main Goals for Local Strategy in Kalmar

This strategy aims to clarify the conditions for water reuse within the municipality's operations, primarily focusing on irrigation of public green spaces, as this represents a significant water consumption area. Furthermore, the strategy seeks to explore the potential for relieving drinking water resources by reusing technical water from the future wastewater treatment plant Kalmarsundsverket, either directly or indirectly. The strategy also aims to raise awareness and promote acceptance of water reuse among residents and decision-makers, thereby supporting the broader implementation of sustainable water practices.

- Coordinate challenges and opportunities within municipality concerning water reuse.
- Explore alternative raw water sources to ensure redundancy and resilience.
- Develop conditions for using technical/recycled water from Kalmarsundsverket.
- Increase awareness and acceptance of water reuse among residents and decision-makers.
- Integration of circular water principles into municipal planning and infrastructure.
- Increase water retention measures in both rural and urban environments within municipality.
- Implement reuse of recycled waste water in Department of Parks and explore additional potential areas of application.



Scope for Local Model Strategy in Kalmar

Sustainable water management should include strategies that include actions that promotes *preparation* as well as *prevention* for water scarcity.

The local strategy for water reuse in Kalmar focuses mainly on municipal wastewater as a resource and will explore the further potential end-users for those water source. However, stormwater should also be considered a resource that can be used for irrigation of public areas e.g., sport fields.

By reusing water, we reduce the pressure on freshwater resources.



Scope for Local Model Strategy – Specific Questions to Investigate:

The strategy seeks to explore the potential for relieving drinking water resources by reusing technical water from the future wastewater treatment plant KSV, either directly or indirectly.

- What potential/possibility is there to replace today's use of drinking water (for other than food) with technical water?
- What potential does recycled wastewater, that is treated for drinking water quality, have in Kalmar municipality's future drinking water supply?
- How could this contribute to the municipality's long-term ability to supply drinking water?

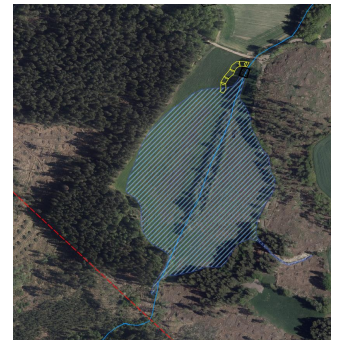


Main Problem / Opportunities Adressed in Kalmar's Strategy

Problem: Under the assumption that population will continue to increase, and the vulnerability of our region to drought and water scarcity, the current water resources will not be enough in the future.

Opportunities:

- **Municipal wastewater:** Kalmar Municipal Water Company is currently constructing a new (circular) utility plant that will purify the municipal wastewater to the same quality requirements as for class A in the EU regulation 2020/741. This is a large opportunity for water reuse.
- **Stormwater retention:** Harvesting and utilization of rainwater are key measures to consider in all land development projects and there would be largely beneficial to use rainwater from retention ponds to irrigate sport fields for instance.
- **Circular water use instead of linear:** Exploring the potential of reuse within our municipality will promote sustainable water management and help ensure a robust water supply.



Local / Regional Context and Background

- Description of Region/Organization
- Existing Relevant Strategies/Framework
- Key Environmental, Socio-Economic, Institutional Conditions Shaping the Strategy



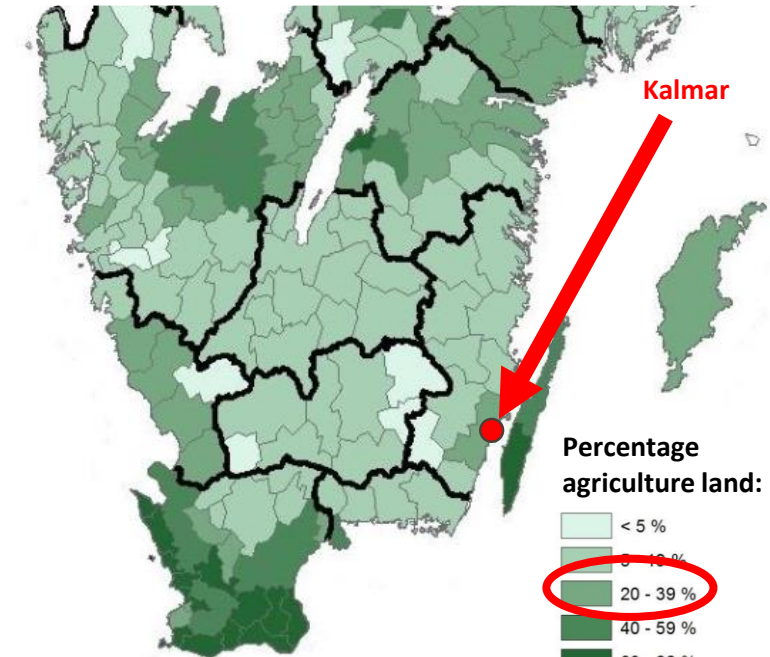
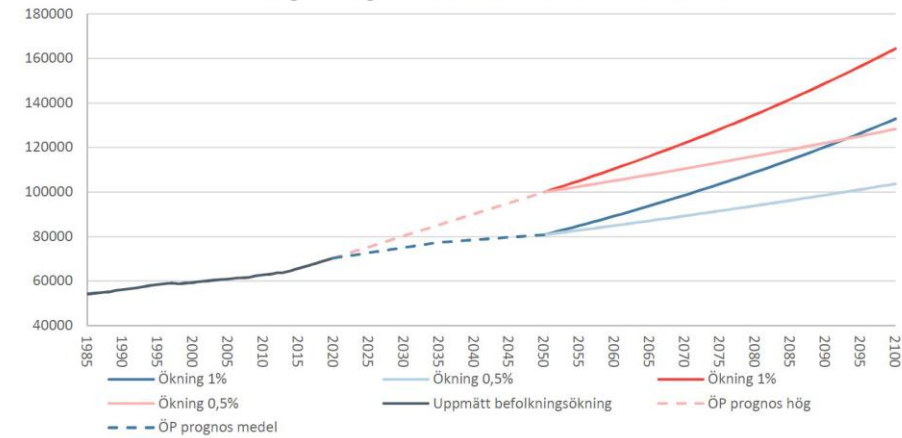
Description of Kalmar Region

Kalmar municipality is located in a dry region with no large groundwater reservoirs in the vicinity. Due to interacting factors such as changing climate conditions (i.e., higher mean temperatures and altered precipitation patterns), and geographic location (rain shadow), and historical and present land use (e.g., high degree of drained land and impervious surfaces), **Kalmar region is highly sensitive to droughts.**

The municipality has a current population of 73 000 inhabitants on 1250 km² (76 inhabitants/km²). Rural / forestry / agriculture areas are dominating throughout the municipality.

Today's consumption of drinking water is 5.6 million m³ of drinking water for 66,000 inhabitants (92% total population). In 2050 about 7,7 millions m³ of drinking water for 95,000 inhabitants (this number is based on highest predicted population increase and on the current daily water use 140 l/person/day). Groundwater and artificial soil filtration are the basis for the municipality's drinking water production.

Befolkningsökning i Kalmar kommun från 1985 till 2100



Jordbruksmarkens användning 2020. Slutlig statistik - Jordbruksverket.se

Description of Kalmar Region: Distribution of Water Usage

User	Percent	Volume (m ³)
Private users	70%	3.9 million
Industry	20%	1.1 million
Public use	10%	0.56 million

Kalmar municipality is classified as a public user and has an annual consumption around 180,000 m³, which accounts for around 32% of the total public usage.

A significant proportion of this consumption is attributed to the irrigation of sport fields (34, 000 m³) and green areas such as parks, plants and trees (9000 m³).

Existing Relevant Strategies/Framework - *Regional*

EU Water Framework directive is implemented in Kalmar region through The Action Program for the Southern Baltic Sea River Basin District (2022–2027): The program outlines measures needed to achieve environmental quality standards and address water-related challenges in the region. It emphasizes the importance of securing water resources in the face of climate change, including periods of drought and reduced availability of surface and groundwater. However, it doesn't contain physical measures on *how* to implement, for that we have the Municipal Action Plan for Good Water Status for reaching good ecological and chemical status in the waterbodies within our administrative area.

EU Regulation 2020/741: Although EU Regulation 2020/741 focuses on minimum requirements for water reuse in agriculture, Kalmar Municipality applies its principles more broadly—especially in risk assessment and water quality monitoring. The regulation's framework for risk management, including microbiological standards and validation procedures, is used to guide local initiatives for reusing treated wastewater in non-agricultural contexts, such as urban irrigation and industrial use.

Regional Water Supply Plan 2024-2030: *"We must protect our water and find new solutions to secure future water supply — and we must do it together."*



Delåtgärdsprogram
mot torka och vattenbrist 2022–2027
Södra Östersjöns vattendistrikt



Regional vatten-
försörjningsplan för
Kalmar län 2024-2030



Local framework and political decisions of importance

Municipal Action Plan for Good Water Status: Developed year 2020 and contains actions that need to be taken to achieve good water status, primarily according to the Water Authority's Action Program. It addresses issues related to ecological, chemical, and quantitative status. It specifies which departments are responsible for which measures, as well as planning and progress, and is therefore important for managing the cross-corporate work related to water issues.

Political decisions: The goal in the municipal council's operational plan and budget for 2020 was to reduce the municipal group's water use by 10 percent, but this goal was not achieved. The goal was then converted into an assignment in the 2021 operational plan and budget.

The assignment from the Water and Environment Committee in Kalmar Municipality's operational plan states that the municipality should minimize drinking water use within the municipal group by identifying and gradually starting to use alternative irrigation methods for outdoor sports facilities, plantings, and other irrigated areas.

The Municipal council gave Kalmar Water Utility company the mission of building a new wastewater treatment plan to meet future requirements for wastewater treatment and the result was a Circular Utility Plant.



Key environmental, Socio-Economic, Institutional Conditions Shaping the Strategy

- **Environmental:**

Anticipated drier climate in Kalmar County may reduce availability of groundwater and surface water for drinking water production.

- **Socio-Economic:**

Need to ensure long-term water supply and reduce pressure on drinking water resources.

- **Institutional:**

Local political decision to decrease the use of drinking water for irrigation and to develop the conditions for the use of re-cycled water from KSV.

Key Environmental, Socio-Economic, Institutional Conditions Shaping the Strategy

The mission of building the Circular Utility Plant from Municipal council together with the goal on reducing our drinking water consumption paved the way for the focus in Kalmar's local strategy. Within the WaterMan project we have aimed to develop the conditions for the use of technical/recycled water from KSV (wastewater treatment plant and a drinking water plant).

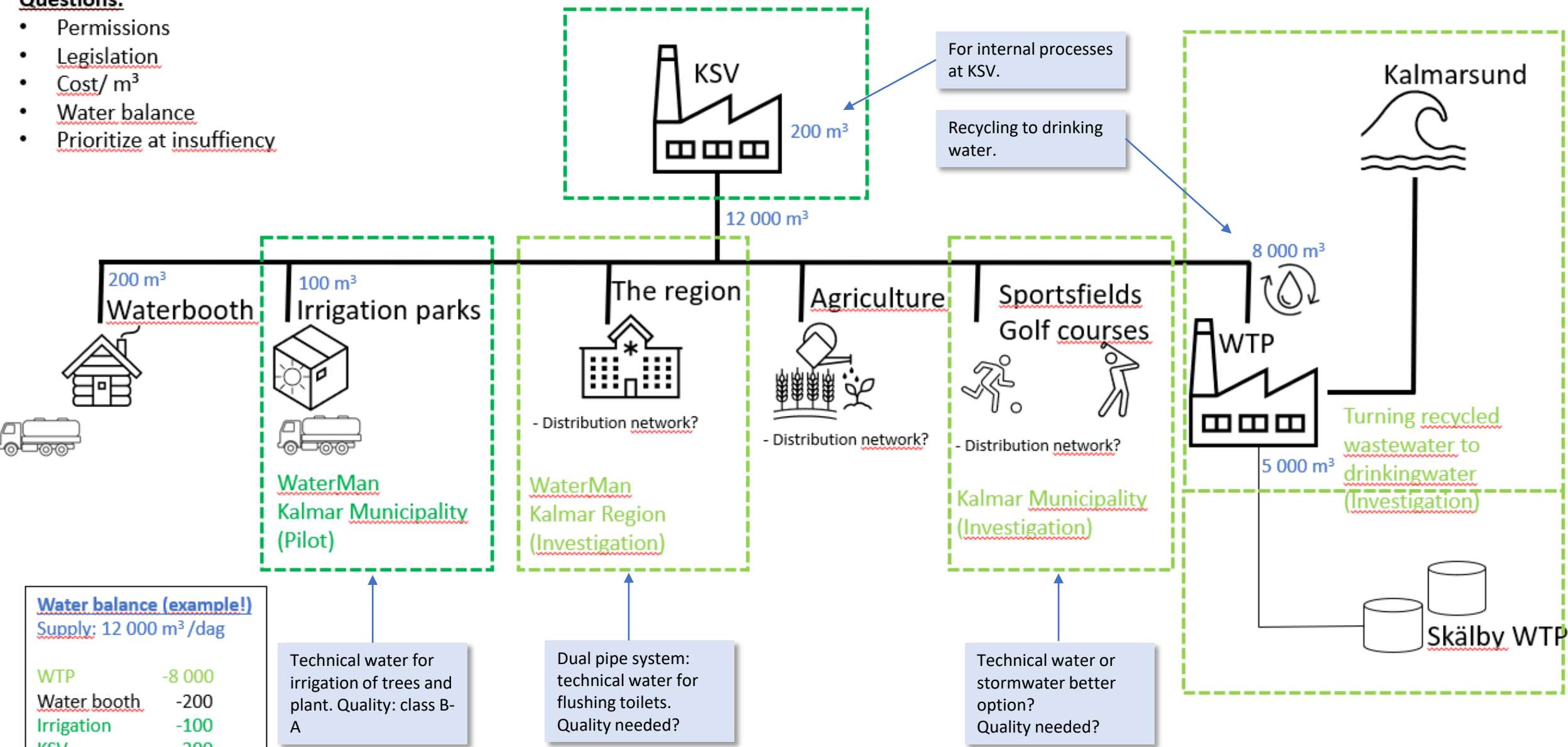
Recycling of Municipal Waste Water!



“The original purpose of a wastewater treatment plant is to manage society’s wastewater in an environmentally friendly way. Kalmarsundsverket (KSV) does much more. In addition to functioning as a treatment plant, we also recycle water that can be used for irrigation of green areas, agriculture and forestry, as well as for industrial purposes. We also produce a certified soil improvement product (fertilizer) that is in high demand. Our self-produced biogas provides both electricity and heat. In other words, we create circular systems in several areas — that’s why we call it a circular treatment plant.”

Questions:

- Permissions
- Legislation
- Cost/ m³
- Water balance
- Prioritize at insufficiency



Water balance (example!)
Supply: 12 000 m³/dag

WTP	-8 000
Water booth	-200
Irrigation	-100
KSV	-200
Region	-?
Agriculture	-?
Sportsfields	-?
Left:	3 500

Potential end users of recycled wastewater

Potential End Users of Recycled Waste Water

Through the pilot project in Kalmar, UV purification of effluent from the wastewater treatment plant (WWTP), we have had a valuable opportunity to increase awareness and generate interest in water recycling. This has been achieved both among the general public through media outreach, and among professionals via study visits from other municipalities and regional water utility companies.

However, several challenges remain. Estimating the water balance—determining who will have access to recycled water and who will not—depends on the volumes produced, the volumes needed, and the distribution capacity. In addition, the quality of the recycled water must be defined and ensured. On top of that, the legal framework is not yet in place.

There are initiatives that are still ongoing that will contribute to the knowledge bank of potential end users for the technical water produced in KSV:

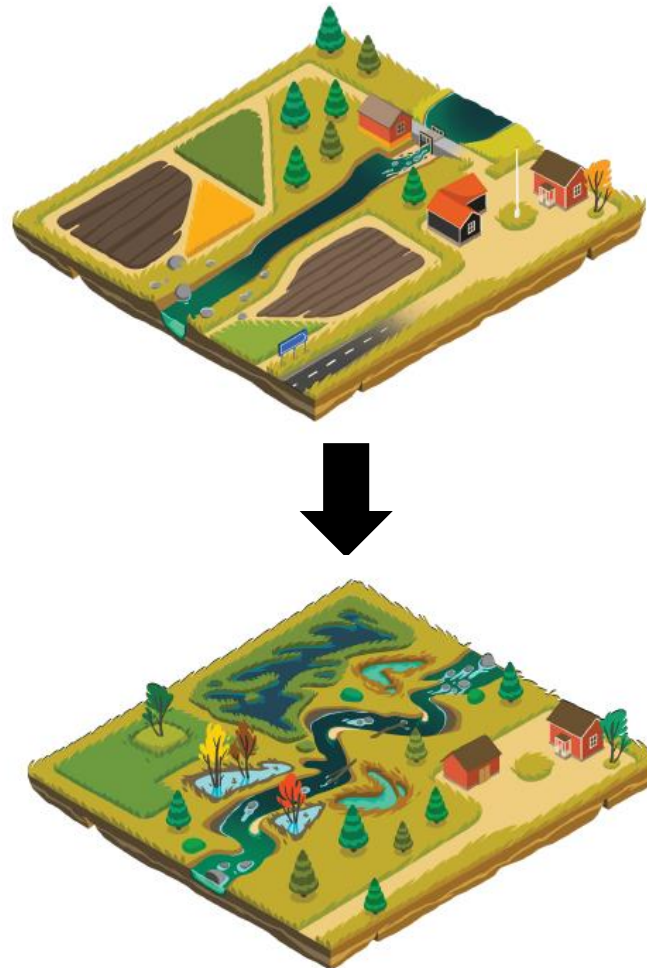
- Feasibility pilot study by Region Kalmar Län (WaterMan Project) evaluating the potential for reuse within a public health care building.
- Kalmar Water Utility is exploring ways of directly reuse treated wastewater for producing drinking water.



Water Retention – Restoring Landscape Ability to Retain Water

Kalmar municipality actively supports the establishment of wetlands, irrigation dams and other water retention measures.

These measures can be designed for various purposes, and where appropriate, the retained water can be reused for irrigation – either on agricultural land or in urban environments.



Development process

Who led or contributed?

- Project team in WaterMan initiated the dialogue between municipal departments, identifying different opportunities, needs, and perspectives as well as investigations already done when it comes to water recycling.
- Important contributors: The municipal water company Kalmar Water, Project partners within WaterMan Project.

Stakeholder involvement and consultation process

- Local politicians within relevant municipal departments.
- Department of Culture and Leisure (irrigation of sport fields <math>< 34\ 000\ m^3</math>).
- Planning and building Permit Office (detailed development plan).
- Municipal Executive Office (leads and coordinates all operations in Kalmar Municipality with focus on strategic and municipality-wide issues).



Timeline/Milestones in Strategy Elaboration

November 2023: The WaterMan Steering Committee decided that the water supply plan should include greater emphasis on sustainable water use, including the identification of alternative water sources for “*fit-for-purpose*” applications.

May 2024: The WaterMan project group, together with the municipal director and the water utility company, agreed to investigate the potential for replacing current non-consumptive uses of drinking water with technical water. Additionally, the potential of further-treated recycled wastewater—meeting drinking water standards—for future potable water supply in Kalmar Municipality was identified as a key area for exploration.

January 2025: Procurement preparations completed for an in-depth investigation into the future use of technical water within Kalmar Municipality.

September 2025: A seminar/workshop arranged by local WaterMan team inspired political engagement that potentially will result in investment in circular water solutions, particularly stormwater basins for irrigating sport fields.



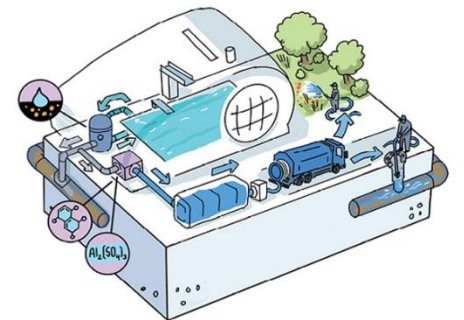
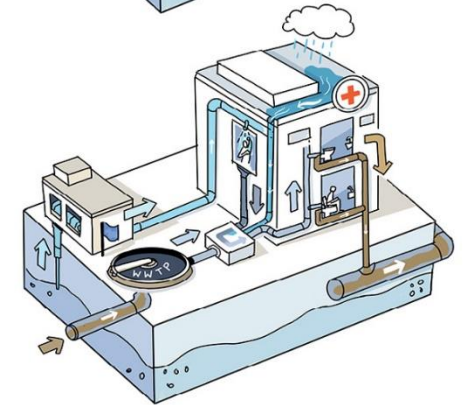
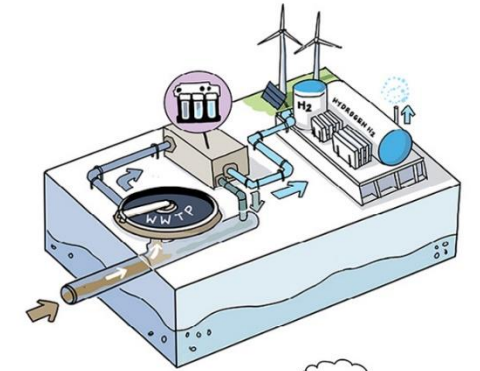
Core Components/Measures/Initiatives

Main Objectives and Focus Areas

- Reframe both wastewater and stormwater as valuable resources.
- Spread awareness of the need for water reuse and the gain of adapting water quality for suitable purpose.

Key Actions, Measures and Initiatives

- Develop a local water supply plan to:
 - Ensure water resources, create a robust water supply, and protect both existing and future water sources.
 - Assess current and future water needs in relation to possible extraction in a changing climate.
 - Establish long-term sustainable water use.
 - Ensure that environmental quality standards are not compromised—specifying how this will be achieved.
 - Identify opportunities and limitations when it comes to water reuse
 - Assess the possibilities and potential of seawater and technical water as supplement to current.
 - Help coordinate interests.
- Promote water reuse by demonstrating practical implementation of water recycling (i.e., pilot action mobile disinfection of municipal wastewater for irrigation).
- Workshops, seminars and study visits to UV-pilot within WaterMan to raise discussion about water reuse.
- Highlighting previous initiatives and investigations that were carried out but never implemented.



Expected Impact/Outcomes

- Political decisions regarding investments to further implement recycled water for irrigation purposes
- Sustainable water use that secures water sources that can be used for drinking water quality
- Increased awareness of drinking water as a limited resource and acceptance of water reuse.

Outcomes:

What potential does recycled wastewater, that is treated for drinking water quality, have in Kalmar municipality's future drinking water supply?

- Costs of **indirect use**, such that recycled water is **returned to the ground water reservoir** which is replenished and provides a natural purification process, was estimated to exceed those associated with direct reuse.
- **Direct reuse** of treated wastewater for drinking water production is a complex and relatively untested technology. While the individual process steps proposed in the preliminary study already exist, there is limited experience with combining these steps in a single facility. Compared to conventional drinking water production from groundwater or surface water, direct wastewater reuse places much higher demands on operational reliability and involves significantly higher energy and chemical consumption. This results in considerably high production costs. Establishing a water reuse facility is therefore currently considered a high-risk project. As **this remains a long-term option**, the municipality will instead **focus on investigating more feasible alternatives that can be implemented within the coming years.**

What potential/possibility is there to replace today's use of drinking water (for other than food) with technical water?

- There is great potential for saving a lot of drinking water by replacing irrigation water within the municipality (and beyond) with technical water from KSV or with stormwater (~45 000 m³ per year)
- Challenges:
 - No Swedish legislation for water of other qualities than drinking water and bathing water. There are also uncertainties regarding the responsibilities of the Water Utility Company and the applicable product liability for technical water.
 - Difficulty in achieving cost recovery for financing technical water as a new product and substitute for drinking water, which already has an established infrastructure.
- Feasible within 1 km radius from Kalmarsundsverket.

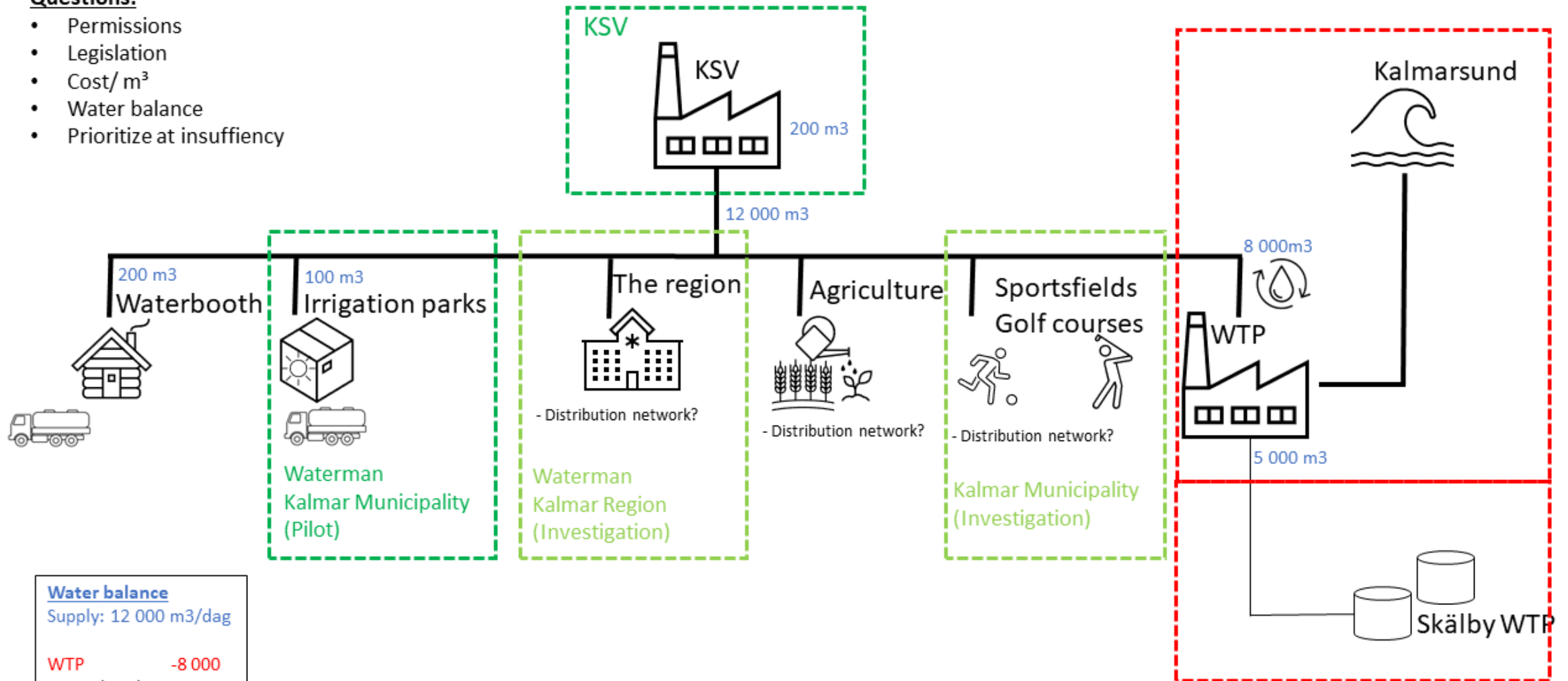
Implementation considerations

What enabling conditions are necessary for implementing the defined measures?

What are potential challenges/barriers?

Questions:

- Permissions
- Legislation
- Cost/ m³
- Water balance
- Prioritize at insufficiency



Water balance	
Supply: 12 000 m³/dag	
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Left:	3 500

Challenges in Implementing a Local Water Reuse Strategy

Water balance:

- Recycled municipal wastewater: Quality needs to be decided and guaranteed depending on enduser as well as if the volumes needed can be guaranteed.

Water needs to be retained and reused both in natural landscapes and urban areas:

- **Conflicting interests** arise between long-term sustainability and short-term economic gains.
- Some stakeholders prioritize land development and immediate financial returns. **Achieving consensus** is difficult when strategic goals clash with commercial incentives.
- **Long-term thinking** is essential but **often undervalued** in decision-making processes.



Adaptability?

The goals of the strategy are largely permanent, but the methods for achieving these goals are dynamic and will be continuously reviewed and adjusted as external conditions change or new information becomes available.

Relation to Other Strategic Documents and Scalability

Strategic Documents that Relate to Water Reuse

- **Development Plan / Master Plan / Green Plan:** A comprehensive plan that outlines the long-term vision for land use and development within Kalmar municipality. In terms of water management, it identifies strategies for safeguarding water quality, managing stormwater, protecting groundwater resources, and adapting to climate-related risks such as flooding or drought. The plan includes zoning recommendations and green infrastructure solutions to ensure sustainable water use and resilience in urban and rural areas → Green Plan.
- **Stormwater Management Plan:** Kalmar's Water Services Plan, adopted in June 2025, outlines the municipality's long-term strategy for ensuring access to public water services, including drinking water, wastewater, and stormwater. While the plan primarily focuses on infrastructure resilience and expansion in response to extreme weather events, it also supports sustainable water use. The plan is developed in collaboration with Kalmar Vatten and aligns with broader municipal goals, such as reducing pressure on freshwater resources. Although water reuse is not a central theme, the plan complements ongoing initiatives—like the development of Kalmarsundsverket that explore the reuse of treated wastewater for irrigation, industrial processes, and other non-potable applications.
- **Action Plan for Good Water Status:** Kalmar Municipality's Action Plan for Good Water Status includes measures to reduce pressure on freshwater resources by exploring alternatives such as the reuse of treated water. In response to recent summer droughts and declining groundwater levels, the municipality is investigating ways to reduce drinking water consumption and promote the reuse of purified wastewater. This initiative is part of a broader strategy to build a water-smart society, supported by projects like *Waterman* and the development of the new Kalmarsundsverket treatment plant, which aims to be one of Sweden's most advanced. These efforts reflect Kalmar's commitment to sustainable water management and long-term resilience.
- **Climate Adaptation Plan:** Kalmar's Climate Adaptation Plan, adopted in 2021, outlines strategies to strengthen the municipality's resilience to climate change, including more frequent droughts and intense rainfall. While the plan primarily focuses on managing risks such as flooding and rising sea levels, it also emphasizes sustainable water management. This includes improving stormwater systems, reducing hard surfaces, and utilizing green infrastructure. Although water reuse is not a central theme in the plan itself, it is indirectly supported through initiatives that promote alternative water sources and reduce pressure on drinking water supplies—especially during dry periods. These efforts align with Kalmar's broader goal of building a water-smart and climate-resilient community.

Scalability

- Supports replication in other regions facing similar climate and water challenges.



Final reflections

We have identified several key initiatives that are essential to maintaining momentum in our efforts toward sustainable water use:

- Appointing a dedicated water coordinator to oversee and align water-related activities across departments.
- Establishing regular meetings with decision-makers from relevant municipal departments to foster collaboration, share insights, and inspire joint action.
 - These initiatives will be clearly communicated and integrated into our strategic planning to ensure long-term impact and commitment.
- Ensure meetings in person
- Engage decisionmakers that have an interest in the issues
- Hang in there! Progress will come

Wishful thinking:

On a local level, the following actions are essential to support sustainable water use:

- **Recognizing water as a strategic priority** within municipal planning and decision-making.
- **Appointing a water coordinator** to ensure continuity, coordination, and integration across departments and projects.

To enable broader water reuse—beyond agriculture—for irrigation of parks, sports fields, and industrial use, several key developments are needed:

- **Clear national guidelines** that interpret EU Regulation 2020/741 for non-agricultural applications, including urban and industrial reuse.
- **Defined water quality standards** for different reuse purposes, such as irrigation of public green spaces or street cleaning, to ensure safety and public trust.
- **Streamlined permitting processes** and support for municipalities to conduct risk assessments and implement monitoring systems.
- **Public awareness and acceptance**, supported by transparent communication and education about the safety and benefits of reused water.
- **Investment in infrastructure**, such as advanced treatment technologies and distribution systems, to make reuse feasible and scalable.





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eurobalt.org/WaterRecyclingToolbox

interreg-baltic.eu/project/waterman

WaterMan promotes a Baltic Sea Region-specific approach to water recycling, which makes use of the alternation of too much and too little water that has become typical for humid areas in the EU to strengthen the resilience of local water supply. Building on this approach, the project supports municipalities and water companies in adapting their water supply strategies.

The contents of „BSR Water Recycling Toolbox” are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Union, the Managing Authority or the Joint Secretariat of the Interreg Baltic Sea Region Programme.

