HydroCircle

Recycling waste water to new process water

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Complete concept for waste water recycling

A considerable amount of waste water is generated during production – between one and three litres per litre of beer or soft drink and two litres per kilo of PET. This is exactly the reason why not only beverage and liquid-food producers but also recyclers are constantly looking for solutions to reduce this waste water volume. Krones has therefore developed the HydroCircle – a concept for recycling production waste water to new process water. All process steps that produce waste water during production are taken into account.

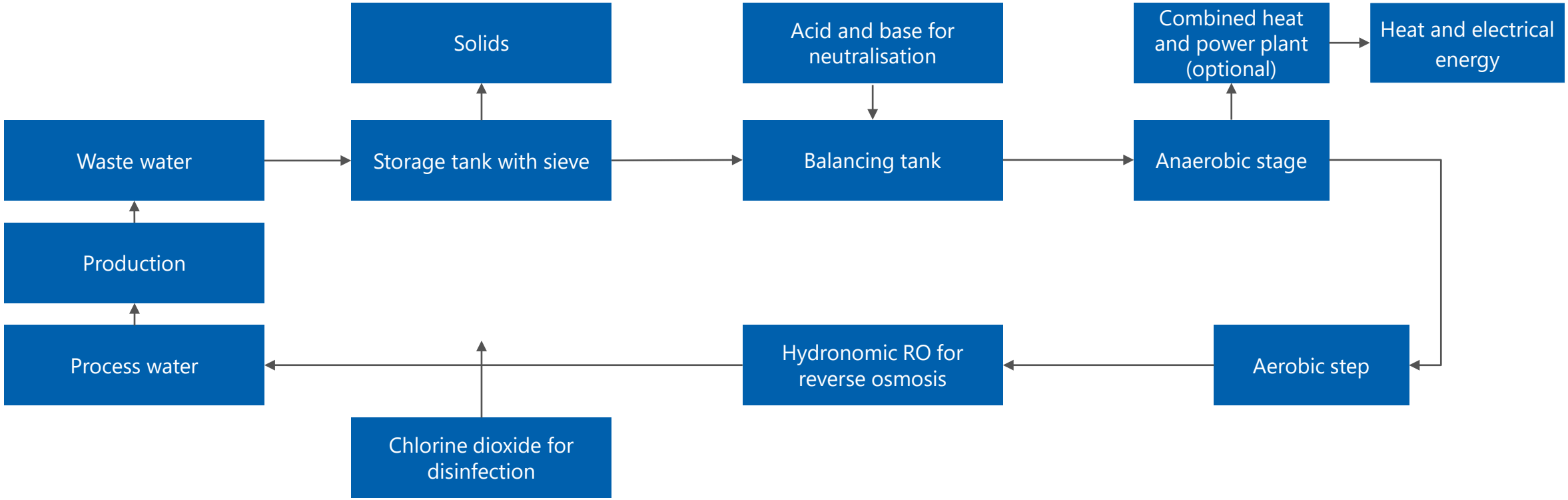
At a glance

- Recycling of waste water into process water
- Up to 80 percent lower water consumption during production
- Closed loop concept under consideration of the entire process chain
- Use of proven plant technology such as Krones Hydronomic and patented fully biological waste-water treatment technology
- For beverage and liquid food producers as well as for recyclers

Example of a schematic representation

Variant 1
Closed circle concept for treating brewery waste water

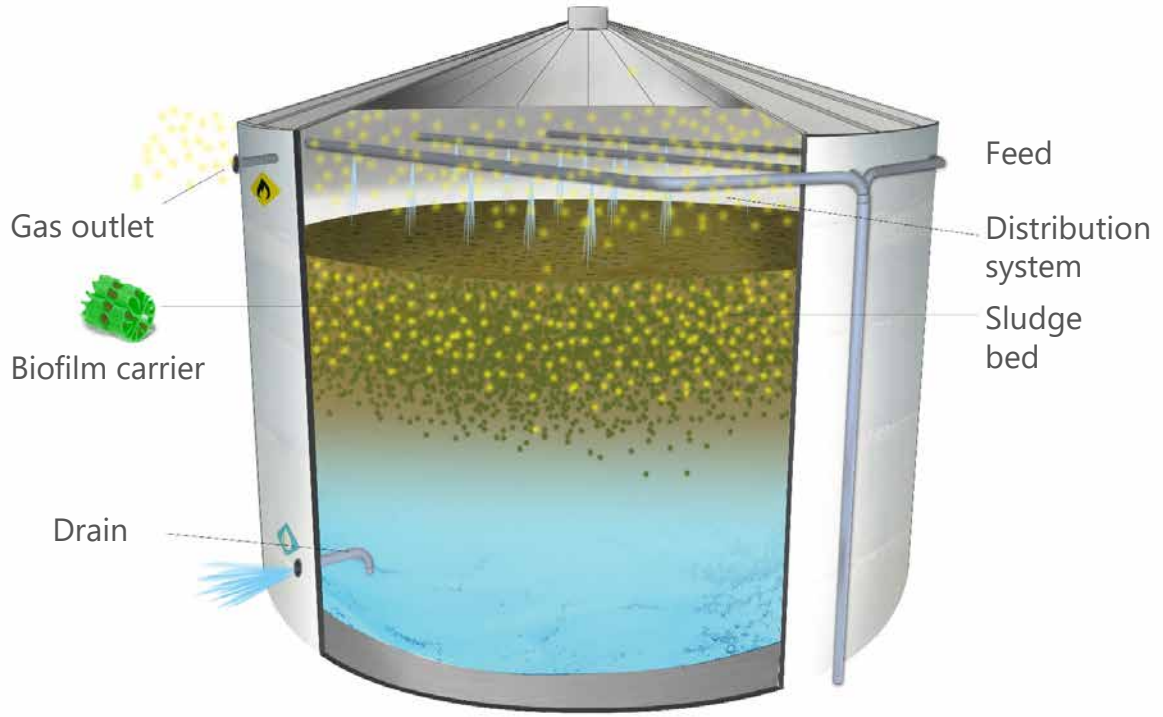
With the HydroCircle system, waste water from production is treated to produce new process water. All process steps that produce waste water during production are taken into account.



Example of a schematic representation

Biological waste water treatment

The biological contaminants contained in waste water must first be cleaned before it can be reused. Here, Krones uses a patented solution that guarantees high process stability.
At the heart of this technology is a unique down-draft reactor, in which the waste water is sprayed through nozzles mounted on the roof and then sinks. In the process, it migrates through anaerobic biomass, which is located in so-called carriers, i.e. biofilm carriers. The methane-enriched biogas produced in the upper part of the reactor immediately rises to the top, while water and sludge sink to the bottom and leave the reactor separately. Thanks to this down-draft technology, the chemical oxygen demand (COD) can be reduced by up to 90 percent anaerobically within a short period of time.



The carriers are characterised by a particularly open structure which prevents blocking and allows high material conversion rates to be achieved.

Hydronomic RO for HydroCircle

Water – as pure as it gets

The Hydronomic RO module serves to desalinate water down to a usual residual content of less than three percent.

- Tangential flushing of a semi-permeable membrane with untreated water
- Discharge of the permeate to a central collecting pipe
- Flushing with permeate to prevent scaling and biofouling

The components

- Consecutive switching of several spiral modules (stage configuration) for graduated concentrate treatment
- Separation of the spirally-wound membrane surface via mesh spacer

Efficiency in figures

- Permeate output: up to 120 m^3/h
- Yield: approx. 70 %
  (on the basis of the respective initial CO_2 content)

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Versatile in use

Once reprocessed, process water can be reused at numerous points of production:

- at the cooling tower
- CIP plant
- as boiler feed water
- at the washer
- at the pack washer
- at the rinser
- as grey water

The waste water treatment system can be used not only for the integration of new factories, but also for retrofitting existing factories. The only prerequisites are: Waste water streams should already differentiate between process water and other water and there should be sufficient space for the required tanks and utilities.

VarioClean CIP system

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Benefits to you

New installation or retrofitting

This system can be used not only in the integration of new factories, but also for retrofitting existing factories.

Significant savings in water

Thanks to HydroCircle, up to 80 percent less water is required for production - which naturally has a noticeable effect on both water costs and the company's environmental balance.

Tried-and-tested technology

Krones relies on proven technology for its concept: Thus the system for waste water treatment comes from an experienced partner. Krones provides the Hydronomic system for water treatment.

High hygienic standard

The Hydronomic systems are completely designed of stainless steel. They can therefore be completely sanitised with hot water.

The whole factory at a glance

The concept takes into account all process steps that produce waste water during production. In this way, the volume of waste water can be significantly reduced throughout the entire production process.

Requesting a new machine
You can easily send a request for a non-binding quotation in our Krones.shop.

Certified ecological efficiency
Machines with enviro seal

At Krones, the enviro label stands for excellent ecological efficiency. Products that bear the enviro label have proven in an objective test procedure that they efficiently use energy and media, and that they produce in an environmentally-friendly way. The requirements are defined by the EME standard that has been developed by TÜV SÜD (technical inspection authority) for assessing production plants. The enviro test procedure, too, has been certified by TÜV SÜD as an independent expert. Therefore, you can be sure that: an enviro label stands for ecological efficiency.

Benefits of the enviro-classified Hydronomic

Energy efficiency
- Use of energy-efficient motors and optimally designed pumps and heat exchangers

Media efficiency
- Reduced waste water quantity via automatically controlled yield
- Loss of water is prevented thanks to the recovery of coolants

Environmental compatibility
- Economical use of environmentally sound cleaning media due to intelligent control queries
- No use of chlorine and polluting disinfectants

Perfectly matched
Cleaning and water treatment agents from KIC Krones

In the field, of course, the water treatment systems must be maintained, cleaned and disinfected. This task is taken over by the membrane cleaning agents developed by KIC Krones especially for this purpose.

- Alkaline diaphragm cleaners are preferably used for cleaning diaphragms. The combination of high alkalinity with cleaning boosters, complexing agents and special wetting agents guarantee best cleaning results.
- Acidic diaphragm cleaners are cleaning concentrates based on inorganic acids for cleaning diaphragms cyclically.
- **Cleaning boosters** based on hydrogen peroxide increase the cleaning performance of alkaline and acidic solutions.

The hardness stabilisers from KIC Krones …

- are suitable for drinking water.
- are used exclusively for reverse osmosis lines.
- can be added to the untreated water directly and in an extremely low dose.
- prevent alkaline earth salts, silicates or phosphates from the untreated water from depositing on the diaphragms.

Membranes and filter media from KIC Krones

In addition to chemical products for water treatment, KIC Krones has also sold special membranes for Krones systems along with the necessary filter media.

All products that are required for reliable operation of the Hydronomic system are available under the name Hydrocare.

These include (among others):

- Membranes for ultrafiltration
- Membranes for reverse osmosis
- Garnet sand
- Basalt
- Anthracite N
- Activated carbon

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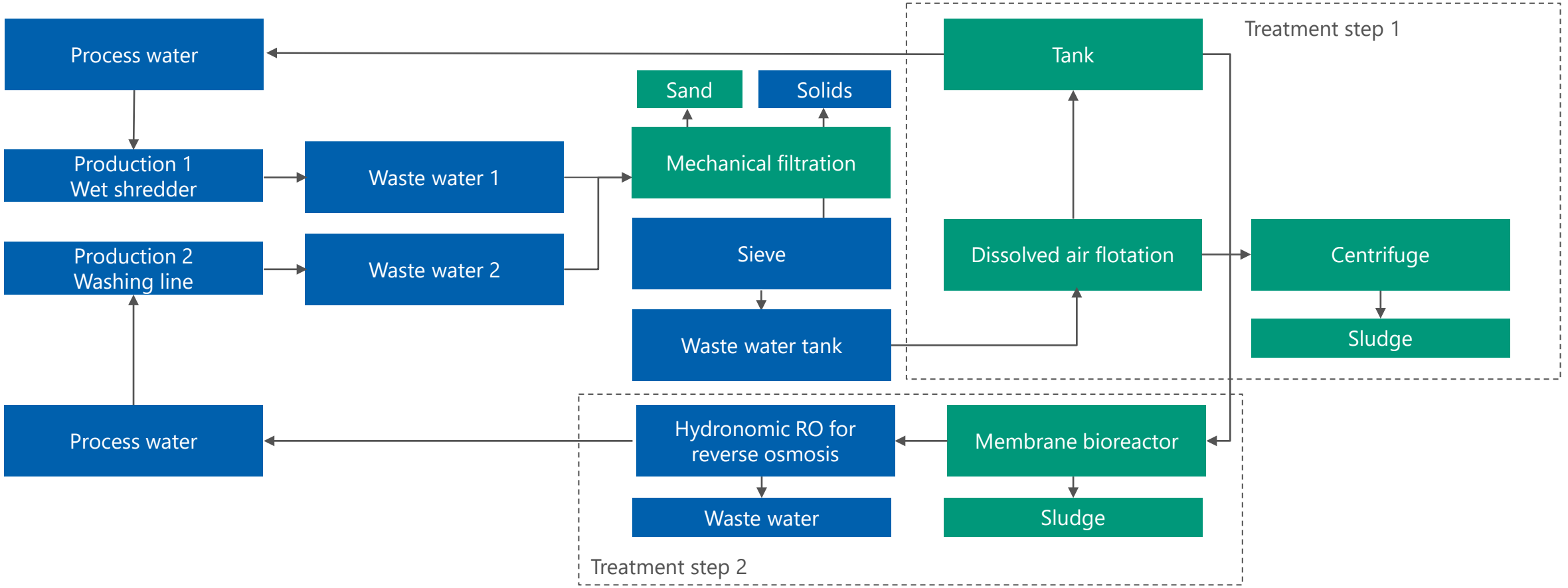
variant 2

Closed circle concept for processing waste water of recycling systems



Example of a schematic representation

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From waste water to process water in the plastic recycling process

Treatment step 1

Waste water from the recycling process contains suspended solids, among other things. These are removed with the help of **dissolved air flotation** (DAF). For this purpose, the suspended solids contained in the waste water are transported to the water surface through adhering gas bubbles while air is supplied. They are then removed from the water surface with an appropriate clearing device.
The solids removed from the water surface are fed into a sludge retention tank. From there, the sludge goes to a **decanter centrifuge** for dewatering. The waste water from this centrifuge is fed back into the DAF unit and the dewatered sludge is collected and disposed of.

Treatment step 2

In order to achieve the fresh-water quality, a second treatment step is necessary. Impurities, such as heavy metals, microplastics or organic compounds, are removed from the liquid phase by means of the **membrane bioreactor**.

Optionally, the membrane bioreactor can be followed by **reverse osmosis**, for example using the Hydronomic RO.

Possible uses of waste water treatment in plastics recycling

In plastics recycling, the process water can be reused in various places:

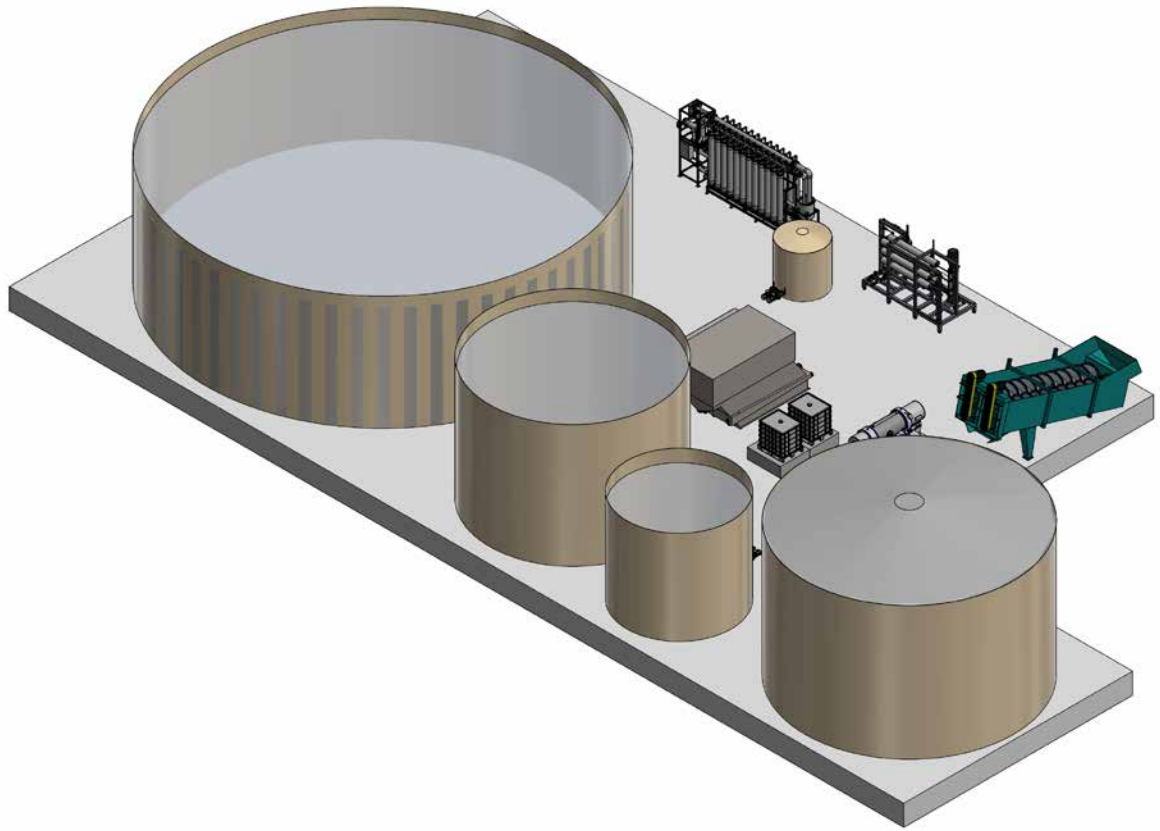
- Grinder water
- Wash water in the water cascade

By using the HydroCircle technology, you will...

- save large quantities of fresh water in plastics recycling.
- remove large amounts of microplastics in the water.

Thus, only a minimal discharge into the municipal sewage systems is required. The dewatered sludge is sent to a sewage sludge incineration plant.

The HydroCircle technology is a very robust and low-maintenance system with low operating costs and worldwide service and training support.



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Everything from a single source

Training sessions at the Krones Academy – trained personnel for an increased efficiency of your line

The multifaceted offer by the Krones Academy ranges from operation, servicing and maintenance courses through to management training. We will gladly also create your individual training programme.

High-quality components from Evoguard and Ampco

Are you looking for shut-off, separation or control valves? For hygienic or aseptic applications? Would you like to have pump technology that perfectly fits into your machines? You will find exactly what you are looking for at Evoguard and Ampco Pumps. The two Krones subsidiaries cover the entire spectrum of process technology components that you need for high-quality production.

Krones Lifecycle Service – Partner for Performance

It goes without saying that also after the purchase of new machines, Krones takes care of your lines: The Krones LCS experts are always there to help you reaching your goals and turn your wishes into optimal LCS solutions.

SOLUTIONS BEYOND TOMORROW

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