



**Clewer technology inside**

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DEPURACIÓN INTELIGENTE y EFICIENTE S.L.

**Ignacio Fortón**  
Director Comercial

Av. de Bruselas, 15 Planta 2  
28108 Alcobendas  
Madrid

[iforton@grupodpie.com](mailto:iforton@grupodpie.com)  
☎ 609 800 929  
[www.grupodpie.net](http://www.grupodpie.net)



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**Javier Cano León**  
Ingeniero de Caminos  
Canales y Puertos

Av. de Bruselas, 15 Planta 2  
28108 Alcobendas  
Madrid

[jcano@grupodpie.com](mailto:jcano@grupodpie.com)  
☎ 639 162 389  
[www.grupodpie.net](http://www.grupodpie.net)

## OUR FOOTPRINT IS BLUE

# Only clean water behind

Clewer Group of Companies, a Finnish undertaking, is a leading developer of patented wastewater cleaning technology. We operate in the global market combining long-term development work with the latest innovations in creating environmentally friendly solutions for more efficient water treatment and re-use.



## CLEWER WAY OF THINKING

Clewer strives to take the overall environmental approach into account in everything we do. This benefits both our customers and the environment. We believe that the treatment of wastewater locally where it is produced and the re-use of water are the key elements for success.

We constantly search and develop new innovations to support circular economy on our part. We provide solutions for fighting the global water crisis by decreasing the water intensity of food industry with innovative recirculating aquaculture systems, re-using water and avoiding the negative impacts of wastewater to human health and ecosystems with Clewer treatment solutions. In the following pages you will learn how we are able to do this.

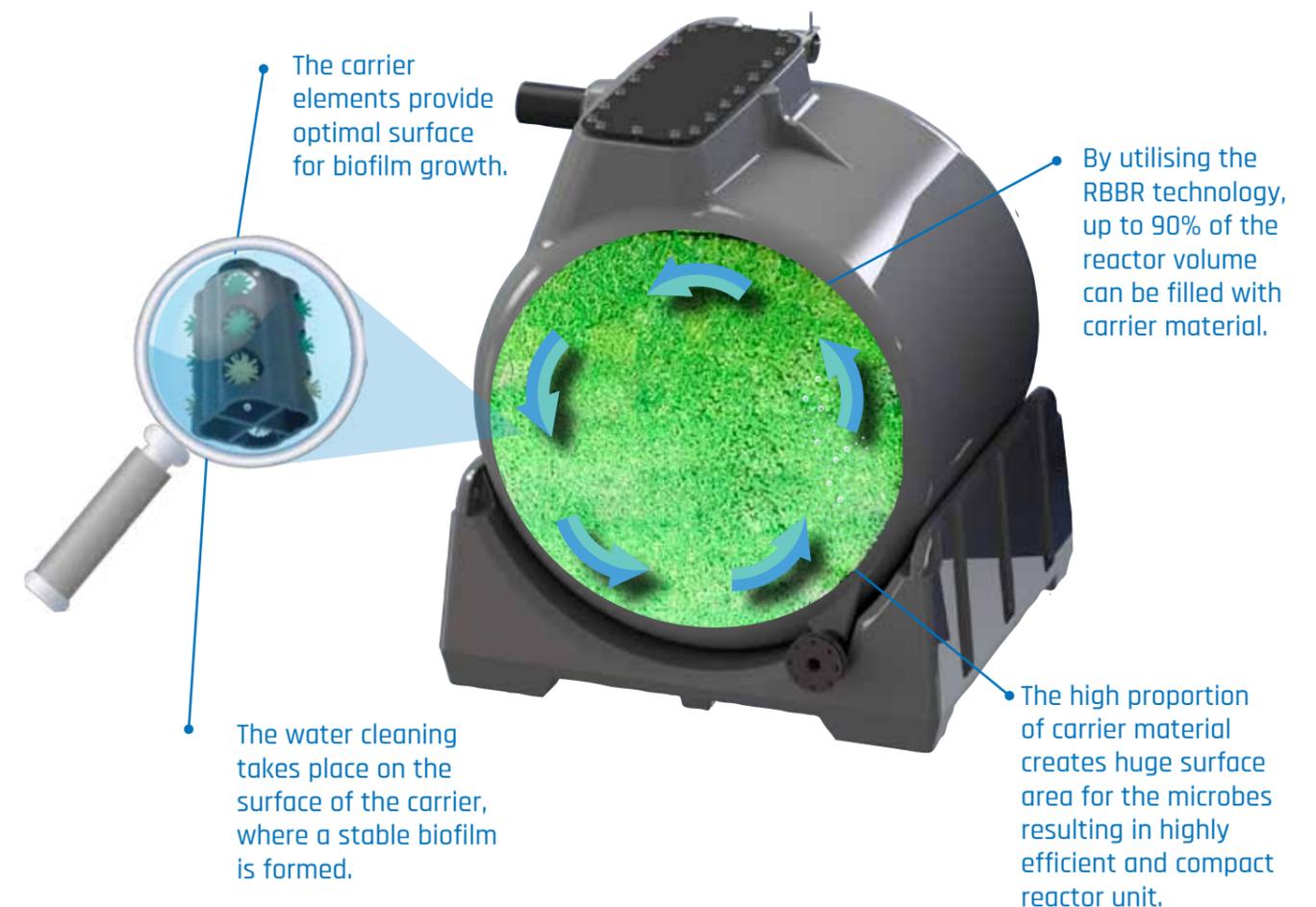
Clewer Group is a part of the Finland-based Salmela Yhtiöt established in 1985. Together with other companies owned by Salmela family, companies employ more than 6 700 employees with annual turnover exceeding 300 M euros.

We consider the environment in our daily operations.

## THE HEART OF EVERY SOLUTION IS THE PATENTED ROTATING BED BIOFILM REACTOR (RBBR)

### THIS IS HOW IT WORKS:

One of the foundations of the bioreactor's operating principle is utilising centrifugal forces in biofilm growing. Air is blown into the bioreactor and the air generates a rotating movement, which mixes and aerates the water and keeps the reactor clean. Therefore, the reactors are self-cleaning, do not clog and require no maintenance inside the reactor units!



## DIFFERENT REACTOR FOR DIFFERENT NEEDS

The Rotating Bed Biofilm Reactor (RBBR) technology is utilised in different sized reactors in order to guarantee optimal solutions for different applications.

Sometimes, especially in retrofit projects, space is a limiting factor, and smaller reactors provide more flexibility for installation. For applications requiring large treatment capacity the bigger reactors offer a cost effective solution.

The modularity enables flexibility and makes preparing for the future easier.

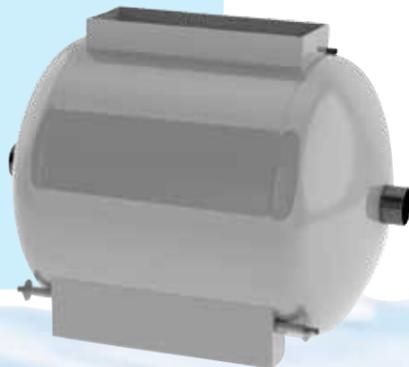
The RBBR systems are easily upgradeable for higher flows, or the system can be adjusted for lower loads, always providing the fit for purpose solution with minimized costs.



**R1000**  
Ø 1600 mm  
l. 800 mm  
h. 1800 mm



**R4000**  
Ø 1900 mm  
l. 1820 mm  
h. 2300 mm



**R10000**  
Ø 2300 mm  
l. 3000 mm  
h. 2550 mm

## We know there is a problem. And we know how to solve it

Water consumption is rising as population increases, ground waters are being used and are not replenished and sensitive areas are becoming dependent on transferred water. Increased discharges of untreated sewage and inadequately treated wastewater result in degradation of water quality around the world.

Proper treatment of wastewater is needed not only to avoid endangering human lives and ecosystems, but also to provide a sustainable solution for the water crisis by re-using the treated water. Wastewater should not be considered as waste or burden at all, it should be considered as a valuable resource. Also food production has to reform from water intensive and resource consuming practises towards more intelligent and sustainable solutions.

With the scalable modular products, we offer solutions for wastewater treatment and re-use right at the point of production. Our recirculating aquaculture systems (RAS) enable fish farming in urban areas with minimal water consumption providing sustainable protein production near consumers. Due to the modularity of our plants we are able to provide solutions for water treatment also in the most difficult locations, from the great Sahara desert to the islands of Finnish archipelago.

We leave only clean water behind



### MODULAR, LOW MAINTENANCE RBBR SYSTEM SAVES COST

- Practically maintenance-free due to self-cleaning rotating bed biofilm reactor
- Easy to store, transport and install
- Modular and scalable system that can be utilized in the most demanding locations
- Cost efficient

### EFFICIENT TREATMENT PROCESS

- Proven and reliable RBBR technology
- Large treatment area - up to 90 % carrier filling ratio
- High oxygen transfer efficiency and mixing due to rotational movement

### SAFE FOR PEOPLE AND THE ENVIRONMENT

- Closed process is hygienic, safe and odour-free, excellent in urban environment
- Environmentally sustainable solution with minimal foot print
- Long life-cycle up to 20 years



# MUNICIPAL WASTEWATERS

Wastewater treatment of 1 600 people university in Mexico  
- 240 m<sup>3</sup>/day treated water  
- 98 % of water re-used



Installation of a single house treatment system

## Comprehensive wastewater treatment solutions for up to 5 - 10 000 people

Municipal wastewater treatment is a prerequisite for a functioning society. Proper treatment guarantees a safe environment with clean water. We provide treatment systems starting from the wastewater's of single households, up to the needs of municipalities up to 10 000 people.

Our speciality is decentralized wastewater treatment, where wastewater is treated where it is produced. This makes also the local re-use possible in areas where it is needed the most. Our solutions can be used in Municipalities, Hotels, Office Buildings, Restaurants, Camp sites and wherever wastewater treatment is needed, regardless of the location.



Scalable wastewater treatment plants for 1-10 000 people

## A carefree and safe wastewater solution for single houses

Clewer's small scale water treatment system is an easy-to-use and reliable system for cleaning wastewater. This solution keeps your soil, groundwater and shoreline safe for future generations. Designed to be highly automated, the system does not require close monitoring or continuous maintenance. The chemical refilling and septic tank emptying interval is long. The technical parts can be easily serviced and changed, if necessary.



# Containerized systems

In many cases there is a need to provide wastewater treatment also in rural areas where there is no possibility to connect to municipal sewer network. In these locations it might be difficult or very expensive to do construction work on site.

Our plants are installed fully ready into ISO containers by qualified technicians at Clewer's premises. Connection manifolds can be installed on the sides of the containers for fast and effortless commissioning on site.



## Easy to install and easy to maintain

In challenging locations it is critical that the wastewater treatment plant operates smoothly without the need for extensive maintenance work. Due to the self-cleaning RBBR technology, the most challenging and time-consuming maintenance tasks are avoided. During periods with low loads (seasonal fluctuation etc.) it is possible to shut down parts of the system that are not needed and save energy.

## For challenging conditions, in the middle of nature in Örö-island

We leave only clean water behind

Örö-island, located in the Finnish archipelago, features a marina, hotel and a restaurant for tourists interested in the exciting cultural and military history of this fortress island. The island is also one of the most important areas of endangered species and biotopes in Southern Finland.

In order to combine tourism and the preservation of the island's unique nature, Clewer's containerized wastewater treatment plant is installed enabling safe and sustainable wastewater treatment also in this challenging location.





# CAR WASHES

## CHOOSE CLEWER!

- Low maintenance
- Eco-friendly, meets the requirements of the strictest legislation
- Recycle up to 90% of the water
- High-quality recycled water
- Easy to install in new or existing car washes
  - Scalable
  - Reliable

We believe that wastewaters should be treated locally and recycled whenever possible.

## Car washes waste water treatment and water recycling

The ecological Clewer system offers remarkable savings for car washes: you can recycle up to 90% of the water. Fresh water is needed only for the final rinse. In addition, the RBRR keeps the reactor vessel clean without wear or friction minimizing the need for maintenance.

The modularity of the system enables various possibilities for installation. The water cleaning and recycling system can be installed in both new and existing car washes. In addition, the equipment can be installed into a separate container, which does not require any space inside the car wash premises.

The payback period of investment in Clewer recycling system can be less than 1 year!

Clewer water recycling system installed inside the technical room of a car wash



## CASE STUDY iwASH



In 2015 iwASH built a modern and environmentally friendly car wash in Norrköping, Sweden with a capacity of washing 80 cars automatically in one hour. Clewer's water recycling system was incorporated in the design of the car wash from the beginning.



# INDUSTRIAL SOLUTIONS

## Industrial biological waste water treatment

Clewer provides customers with tailor-made solutions for industrial wastewater treatment. The industrial wastewaters are always different and require expertise to tackle.

Through our extensive microbiological knowledge and flexible project execution we have successfully delivered solutions to treat very different industrial wastewaters.

"Sustainability is no longer about doing less harm. It's about doing more good."

-Jochen Zeitz-

### CASE STUDY HES-PRO

Hesburger, the biggest fast food chain in Finland, has their production facility in Kaarina. Hes-Pro Finland Oy produces approximately 700 tons of salad and 3 000 tons of mayonnaise in a year. The factory's wastewaters are cleaned using Clewers RBBR treatment plant. The daily wastewater amount is approximately 90 m<sup>3</sup> that includes 95 kilograms of BOD, mostly in the form of fat and grease. From this amount 99 % is removed by the wastewater treatment plant.



Clewer treatment solutions enable industries to operate in a sustainable way - and save costs. Efficient and reliable RBBR technology reduces the operational cost significantly by minimizing the maintenance need.

Tobacco factory wastewater treatment in Russia



Winery wastewater treatment in Italy





# AQUACULTURE



## Fish grow in clean water

Clewer recirculating aquaculture system (RAS) is a sustainable way to produce high quality fish. The RAS system is based on the fact that the water can be used several times when it is purified in the system. Thus the amount of water needed for production can be really small, only around 1 % compared to the amount needed in traditional flow-through systems.

Our systems are built in modules - all the equipment needed are organized into one functional system. The modules include both the tanks and water management systems with biofilters, drum filters, settlers, UV, oxygenating units, ozone etc. All the modules are tailor-made for certain fish species and unique production environment.

Food should be prepared where it is needed.



Different species of both cold and warm water fish can be grown in Clewer RAS systems.



Modular design offers flexibility and risk management.

### CASE STUDY LATVIA

Near Riga, the fish farm grows cold-water fish using Clewer RAS technology, thus decreasing energy consumption to the lowest optimal level whilst at the same time providing top quality water for fish to grow. This method gives a year-round stable production of market size fish. Additionally, solid by-products from the water purification process will be used in agriculture as fertilizer.

### Clewer Aquaculture

Our personnel have over 30 years of experience in aquaculture both in design and practical fish farming. We have made plans, equipment sales and turnkey projects in fish farms and research units. Our expertise includes also aquaculture training and courses, which are vital for successful project execution.



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**CAR  
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clean water