Gateway to clean water

Blue Foot

Short introduction

January 2024

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Market drivers for structural growth of the wastewater market

Driven by:

Ever increasing demand for water-treatment

Driven by population growth and increasing scarcity due to climate change and pollution

Decreasing availability

Water becomes less available due to increasing regulation and water scarcity

Increasing sustainability awareness

Both public and private pressure on sustainability are strongly increasing

Urge for TCO

Decreasing availability increases cost of water which drives the quest for lowest TCO and further drives innovation and technology

Blue Foot proposition:

Blue Foot provides the critical ingredient for every wastewater re-use effort:

our unique membrane technology.

We partner with OEM's that design and build wastewater re-use solutions for industrial and municipal end-customers.

We deliver unique membrane modules and the required integration know-how to our OEM partners, so they can be successful.

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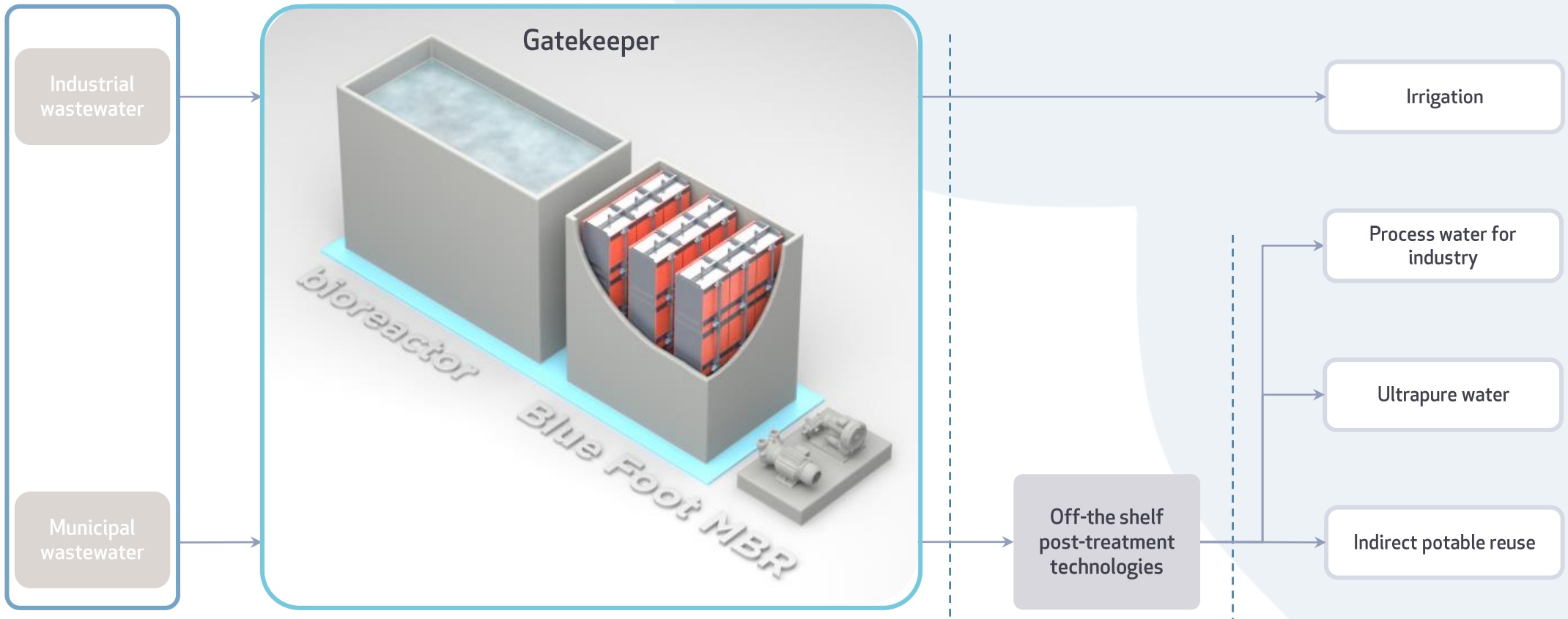
Application areas for Blue Foot's technology

Blue Foot's membranes are the *gatekeeper* for post treatment solutions and/or direct usage



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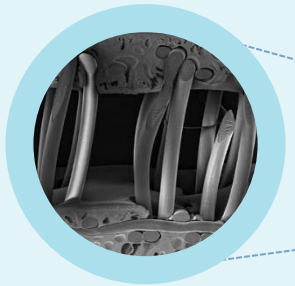
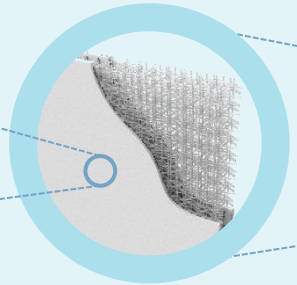
Patented IPC®-membrane[1]: the only truly backwashable flat sheet membrane



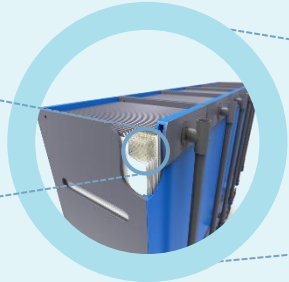
Membrane anchorage

Two ultrafiltration membrane layers encapsulate the 3D spacer material ensuring anchorage across the whole membrane surface, providing backwashability and robustness



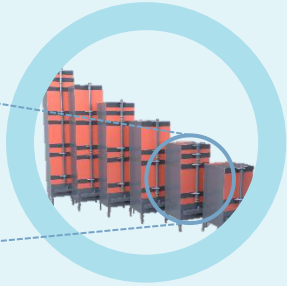
IPC®-membrane sheet

The Blue Foot flat sheet membrane is the only flat sheet membrane which can be backwashed up to 2 bar, allowing for an attractive set of operating parameters



IPC®-module

Membrane sheets are combined in a standardized IPC®-module enabling standardization and easy scaling through a modular approach



IPC®-stacks

Stacked modules with a common aeration box at the bottom ensure modularity and flexibility in plant design, and the lowest energy consumption for the customer

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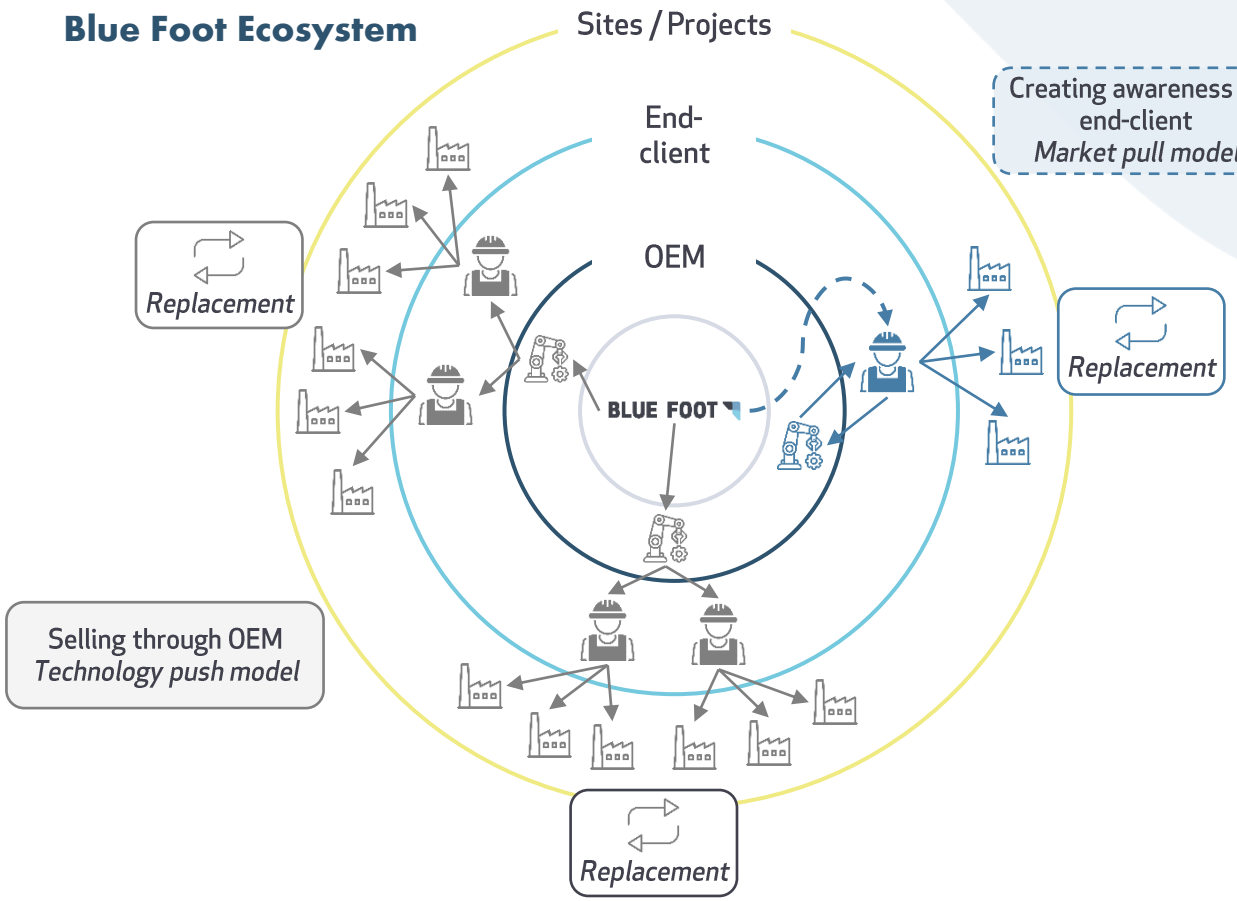
1. Integrated Permeate Channel

Highly scalable multi-level sales model

Combined *push-and-pull* model drives self-reinforcing demand through different channels



OEM

- The direct route to market is by engaging with selected OEM's to set up long-term partnerships which are mutually beneficial
- OEMs have multiple end-clients to roll-out Blue Foot's technology

End-client

- Engaging with end-clients directly leverages customer awareness for Blue Foot's proposition and its attractiveness. It creates an indirect route where end-users request Blue Foot's technology from OEM's

Site

- Many end-clients have multiple sites and projects to deploy Blue Foot's technology
- Successful implementation in one client site, leads to internal referral and further roll-out on other sites

Replacement

- Blue Foot's membrane modules need replacement approximately every 10 years, generating a future replacement business
- Due to the superiority and space efficiency of the technology, Blue Foot can replace other membranes, whilst other membranes are not likely to fit inside Blue Foot plants, securing customer lock-in

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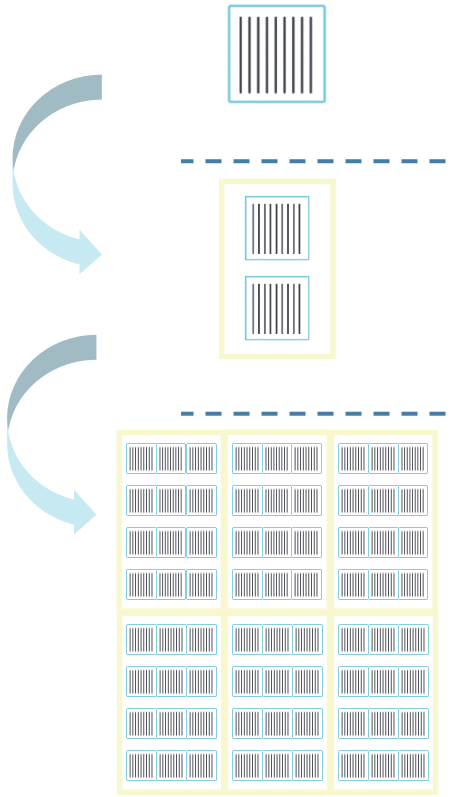
Modularity and standardisation facilitates scalability

Completely standardized, yet fully customizable to the customer's needs

"Lego-like" stacking



- Membrane sheets are combined in one module and placed side by side
- The spacing is critical, ensuring an equal flow along all membrane sheets

- Modules are easy to assemble, install and maintain
- Up to three modules can be stacked for optimal use of space and minimizing footprint
- The modules in a stack use the same air diffuser box, resulting in minimal aeration and energy consumption

- Stacks can easily be grouped to create a customised solution with standardized building blocks
- Large capacities can be achieved to fit the client's need

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Our Unique Selling Points

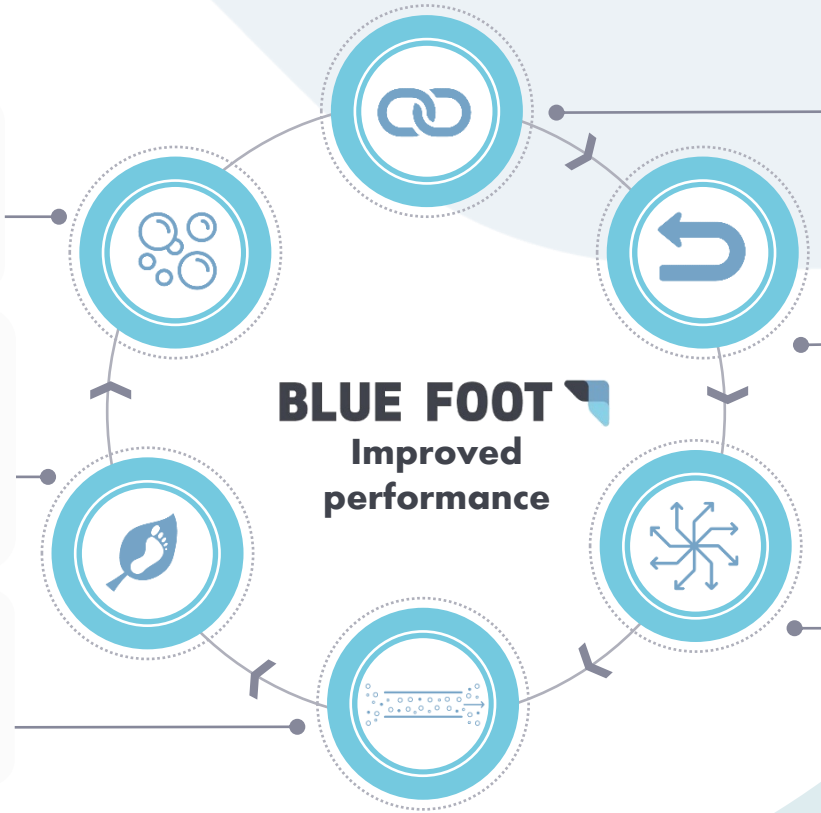
The most reliable and robust membrane separation technology at the lowest TCO

Customer benefits

6. Lower aeration rate
- Typically a 50% lower aeration rate, requiring only half the blower capacity and half the power to drive the blowers in the filtration process, lowering both CAPEX and OPEX

5. Lowest footprint
- The high sustainable flux also leads to a very compact system, typically 1.5 to 3 times more space efficient, decreasing the plant CAPEX
- Due to the small footprint, Blue Foot can easily replace competing membranes, and even add capacity within the existing civils structure

4. Best peak flow handling
- Due to its ability to backwash and its high sustainable flux, the membrane can cope with large variations in and throughput enabling it to handle peak flows very well



Product features

1. Unbreakable
- With the IPC®-sheet construction, the membrane layer is integrated into the 3D backing material
- This creates an inherently unbreakable bond that makes the membrane virtually indestructible

2. Truly backwashable
- Blue Foot has developed the world's first and only flat sheet membrane that is truly backwashable[1], up to 2 bar, providing a robust and easy to clean solution

3. Higher sustainable flux
- As a result of membrane material, ultrafiltration morphology, average pore size of 0.04 µm and the ability to backwash, Blue Foot typically performs at twice the flow per square meter of membrane surface area

The IPC®-membrane translates product features into customer benefits

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1. Competing polymeric flat sheet products, if backwashable at all, restrict backpressure to 150 mbar, which makes them unsuitable for frequent backwashing

Attractive offering throughout the value chain

Aimed at four distinct project types, tailored to end-customer needs

Project types

1. **Greenfield plant**
   The Blue Foot compact design leads to significantly lower Total Cost of Ownership for newly built plants

2. **Existing plant upgrade**
   Converting conventional wastewater treatment plants to compact, high performing MBR's with reuse capability by adding a "bolt-on" Blue Foot membrane section

3. **Existing MBR membrane replacement**
   Lower OPEX and increase capacity with Blue Foot's compact and energy efficient membrane modules

4. **Mobile solutions**
   Tailored module form factor to make full use of the available space in a standard (high cube) container by means of "half size" module

Attractive proposition for End-customer:

- Low OPEX & TCO
- Compact membrane system – space and CAPEX saving
- Positive impact on end-customer sustainability KPI's

Attractive proposition for OEM:

- Provides unique competitive position for OEM
- Standardization and scalability on technology reduces OEM's project risk
- Blue Foot's proposition includes full technical support to OEM's during bidding, project execution and commissioning

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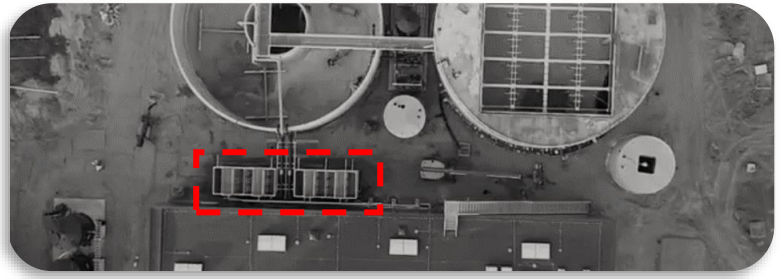
Proven technology with track-record through full-scale plants at international clients

Industrial and municipal, greenfield and brownfield, MBR and non-MBR (upgrade conventional WWTP)

Carlsberg

✓ New plant ✓ Industry ✓ MBR



Challenge

Fulfil Carlsberg's sustainability goal of "ZERO water waste"

Solution

A Belgian OEM realised this project which reuses all wastewater discharged by the brewery, except black water. The plant includes a membrane bioreactor with Blue Foot membranes to separate treated water from biological sludge. The filtrate is fed to downstream posttreatment to reach potable water standards for reuse within the brewery to clean and rinse bottles.

Result

Carlsberg's Frederica (DK) plant has exceeded expectations by reaching a water consumption of 1,4 hl water per hl beer in 2023, saving approximately 500.000 m^3 of water per year.

Lakes by Yoo

✓ Replacement ✓ Municipal ✓ MBR

Challenge

The Lakes by Yoo, a holiday park in the UK, is located in a natural environment that is subject to stringent local discharge restrictions. The park is expanding capacity and experiences significant seasonal wastewater flow variations, which the existing membranes were unable to handle.

Solution

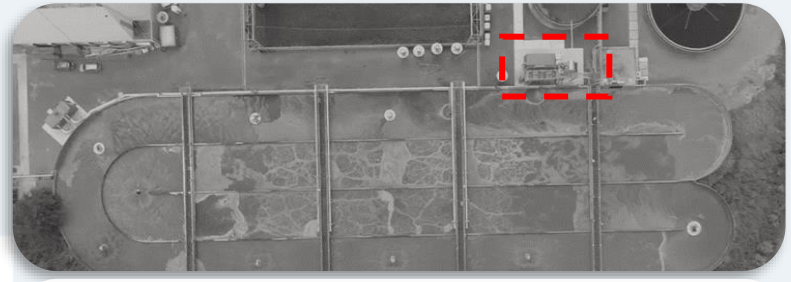
The UK OEM which built and manages the membrane bioreactor on site retrofitted the plant with Blue Foot membrane modules, increasing plant capacity while using the existing tanks.

Result

The Blue Foot replacement with 6 IPC®-modules ensured a higher treatment capacity while maintaining discharge compliance and lowering energy consumption and operator time

Rendac

✓ Upgrade ✓ Industry ✓ Non-MBR



Challenge

Rendac, a Belgian animal waste processing company and part of the Darling Group, needed to increase the hydraulic load of their existing wastewater treatment plant whilst maintaining discharge limits

Solution

A Belgian OEM installed Blue Foot's membranes as a "bolt-on" solution, taking the load of the existing clarifiers. The system was expanded twice since to increase capacity even further and allowing Rendac to initiate the step to start reusing its wastewater.

Result

To date, Blue Foot installed 48 IPC®-modules as a bolt-on to the existing wastewater treatment plant. This plant has led to a follow-up project at a Darling Group's Australian subsidiary, which is due to start up in 2023

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Proven technology with track-record through full-scale plants at international clients

Industrial and municipal, greenfield and brownfield replacement MBR

Tervuren

✓ Replacement ✓ Municipal ✓ MBR

Challenge

Replace the current Kubota membranes at Aquafin's Tervuren Wastewater treatment plant at the lowest TCO.

Solution

The current membranes at the Tervuren plant have reached the end of their life and are due to be replaced. Based on a public tender, which called not only for membrane replacement, but also for any necessary changes to the plant to accommodate the new membranes, Blue Foot bid this project together with a local general contractor.

Result

Blue Foot was awarded the job based on its lowest TCO, despite having to install additional equipment for backwashing, demonstrating the strength of Blue Foot proposition in the replacement market.

Apical

✓ Replacement ✓ Municipal ✓ MBR

Challenge

Apical owns and operates several palm oil refineries in Indonesia. Due to tightening regulations and Apical's ambition to operate in a more sustainable way, the on-site wastewater needed to be treated to a high standard.

Solution

Aquakimia, Blue Foot's local partner OEM, has build a new membrane bioreactor which was commissioned in 2020.

Result

The MBR, which incorporates 36 Blue Foot membrane modules, has been running satisfactorily since its startup. This has led to a follow up project on another Apical site for an MBR containing 90 membrane modules.

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Sustainability-driven enterprise offering impact to customers

Aligned mission with UN Sustainable Development Goals and EU Taxonomy Regulation

Blue Foot helps clients contribute to UN's SDGs

Embedded in the company DNA

Creating measurable impact

Life cycle analysis (LCA)

Uniqueness
- The first to propose a quantified impact analysis

Purpose
- Provide yet another buying incentive for end-customers with clear sustainability goals

Impact for End-customers

Lower CO_2 footprint
- Low energy consumption translates to a lower CO_2 footprint and a low environmental impact (36% lower compared to Kubota)

Lower water footprint
- Water reuse leads to a low water footprint and a low environmental impact

Blue Foot is committed to sustainable solutions and enables companies and authorities to do the same

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Join us!

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Visible growth story

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