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DRIVING WATER CIRCULARITY
AT A POLISH POULTRY PROCESSOR



END CUSTOMER
Cedrob S.A.

LOCATION
Ciechanów, Poland

SECTOR
F&B – Meat Processing

OEM PARTNER
Nijhuis Saur Industries

APPLICATION
Retrofit

KEY WINS

≈50%

LOWER AERATION ENERGY DEMAND
Compared with the alternative evaluated in this case.

5,000 m³/ day RECLAIMED
The overall facility converts nearly 50% of its 11,000 m³/day wastewater into certified drinking water.

RELIABLE UNDER VARIABLE LOADS
Stable filtration performance and consistent treated-water quality, even under variable loads.

From wastewater treatment to a resource for growth

Cedrob S.A., a major Polish poultry processor, has expanded its production and utilities for over a decade. Since 2009, Nijhuis Saur Industries (NSI) has supported successive slaughter line and wastewater treatment expansions. Most recently, NSI selected **BLUE FOOT** Membranes technology to handle highly challenging wastewater with high energy efficiency and a compact footprint.

Initially focused on discharge compliance, the treatment plant evolved into an integrated system for waste reduction, energy recovery and industrial water reuse.

Anaerobic digestion reduced sludge volumes and increased dry solids content. The biogas was initially flared. As volumes increased, it became a valuable resource and is now used to generate heat and energy for the slaughterhouse.

As water availability came under pressure, reuse became critical to Cedrob's growth. NSI developed a water reuse master plan alongside the site's production expansion. An earlier phase delivered 4,000 m³/day of reclaimed water through sand filtration, ultrafiltration, reverse osmosis and final disinfection.

When Cedrob needed another 1,000 m³/day of reclaimed water and began planning further capacity increases, NSI selected membrane bioreactor (MBR) technology with **BLUE FOOT** Membranes as the next step, particularly as available footprint became increasingly constrained.

Any interruption in reclaimed water production directly affects site operations. The membrane system therefore had to maintain reliable performance and recover quickly from process disturbances under highly variable conditions.

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THE CHALLENGES

WHEN WATER REUSE BECOMES ESSENTIAL

Securing water availability under demanding operating conditions

NSI has supported Cedrob's wastewater treatment since the installation of its first slaughter line in 2009. Initially, the treatment plant was a conventional setup designed strictly for river discharge, utilising primary treatment, biological systems with nitrification and denitrification, and flotation units.

As Cedrob expanded its operations, **water availability became an increasing constraint.** During the development of the third slaughter line, local groundwater levels declined and well water quality deteriorated. Securing a municipal water connection would have required a new pipeline of up to 10 kilometres, with no guarantee of approval from local authorities.

At the same time, the wastewater presented significant challenges. Poultry processing wastewater is highly variable and typically difficult to treat with membrane systems. The biological treatment stage receives fluctuating loads from both the slaughterhouse and the rendering plant. The rendering stream is particularly unpredictable, operating outside normal design conditions around 10% of the time and causing **shock loads of nitrogen and solids.**

In addition, the slaughterhouse stream contains high volumes of blood, which is rich in iron. This iron naturally precipitates, a problem compounded by the addition of ferric chloride and polymer coagulants during pre-treatment phases. Without careful control, these factors can lead to severe fouling of membranes downstream.

> **The system had to prove itself in a real operating environment, not under simplified or idealised conditions.**
>
> *Stephan van Hoof*
>
> *CEO of Blue Foot Membranes*

As Cedrob transitioned from discharge to water reuse, the operational context also changed. In a discharge-focused system, process upsets can be managed over time through adjustments in chemical dosing and clarification. In a reuse-driven system, the impact is immediate: any interruption in reclaimed water production directly affects site operations. As Thijs Wolbrink of Nijhuis Saur Industries describes it, water reuse had become the site's "license to operate."

The membrane system therefore had to deliver increased capacity within a limited footprint, while maintaining performance under highly variable conditions. The key challenge was not only achieving higher flux or lower energy use, but ensuring rapid recovery from process disturbances in a live industrial environment.

Finally, this was not a greenfield installation. The membrane system had to be integrated into an existing treatment and reuse setup.

Cedrob faced four main challenges:

Water availability: declining groundwater levels and deteriorating well water quality constrained further growth.

Complex wastewater: variable loads, blood, iron and chemical carryover increased the risk of membrane fouling.

Operational continuity: any interruption in reclaimed water production directly affected site operations.

Integration constraints: additional treatment capacity had to fit within an existing installation and a limited footprint.

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THE SOLUTION

COMPACT MBR TECHNOLOGY
FOR INDUSTRIAL WATER REUSE

Selected for three key strengths

01 Reliable operation under demanding industrial conditions

02 Compact footprint

03 Low energy consumption

NSI evaluated new technologies to replace the traditional sand filter and UF approach. In September 2024, they selected and integrated the IPC® Flex modules from **BLUE FOOT** Membranes into the system.

The MBR installation was designed to treat an inlet flow of approximately 1,333 m^3/day.

> **What really stood out is that it's much smaller in terms of footprint, and the aeration energy required to operate these membranes is about 50% less than the alternative evaluated for this project.**
>
> *Stephan van Hoof, Blue Foot Membranes*

Nijhuis installed the system in a dedicated section of the existing building, using a prefabricated stainless-steel vessel. The **BLUE FOOT** section supplied feed water to a newly added fifth reverse osmosis (RO) line. This allowed Cedrob to increase reclaimed water production without further expanding the existing sand filtration and capillary ultrafiltration (UF) systems.

BLUE FOOT Membranes' role extended beyond the supply of membrane modules. As Stephan van Hoof describes it, the company supports OEM partners with "integration know-how" alongside membrane technology, including expertise in hydraulic design, pumps, piping, automation, operator training, and commissioning.

This approach is critical in projects like Cedrob, where membrane performance depends on how the system is embedded within the overall treatment train. NSI contributed process history, a long-standing client relationship, and site-specific operational knowledge, as well as the contractual framework required to implement a high-performance system in practice.

> **We see this system as a working organism. One working machine, where we have raw wastewater coming in from a slaughterhouse with blood, solids, fats, and feathers and which we ultimately treat up till certified drinking water standard.**
>
> *Thijs Wolbrink, Nijhuis Saur Industries*

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OPERATIONAL RELIABILITY

RELIABLE PERFORMANCE
UNDER DEMANDING CONDITIONS

Maintaining membrane performance and continuous water production

Handling variable wastewater

BLUE FOOT's membranes operate at elevated fluxes compared to other MBR membranes, allowing the plant to process more water in a smaller physical footprint. To manage fouling caused by iron, blood, and polymer carryover, the system uses a rigorous and automated cleaning strategy. This includes frequent high-pressure backwashing (every 5–10 minutes) to remove accumulated solids from the membrane surface.

When unexpected biological upsets occur upstream due to rendering plant shock loads, operators are able to implement a specialised, in-situ chemical cleaning protocol developed specifically for this site. This enables the membranes to recover performance without extended downtime or manual removal of the modules.

Redefining the license to operate

The successful integration of the MBR and RO systems shifted Cedrob's operational mindset from simple waste disposal to critical utility generation. Because the slaughterhouse cannot operate without water, the continuous treatment of wastewater to produce clean water for use within the production facility became the facility's operational priority.

To support this critical function, NSI and **BLUE FOOT** focused on system reliability, a critical consideration for Cedrob and one which formed the cornerstone of NSI and **BLUE FOOT**'s technical solution.

27 membrane modules | **9 stacks of 3**

Reliability in practice

VARIABLE LOADS

Iron, blood and polymer carryover increase the fouling challenge on membrane surfaces.

MAINTAINING MEMBRANE PERFORMANCE

Frequent automated backwashing removes accumulated solids from the membrane surface, helping maintain stable filtration performance.

IN-SITU RECOVERY

A site-specific chemical cleaning protocol restores performance after biological upsets.

> **The whole mindset had to change from 'it's a wastewater treatment plant' to 'it's part of the drinking water production facility.**
>
> *Thijs Wolbrink, Nijhuis Saur Industries*

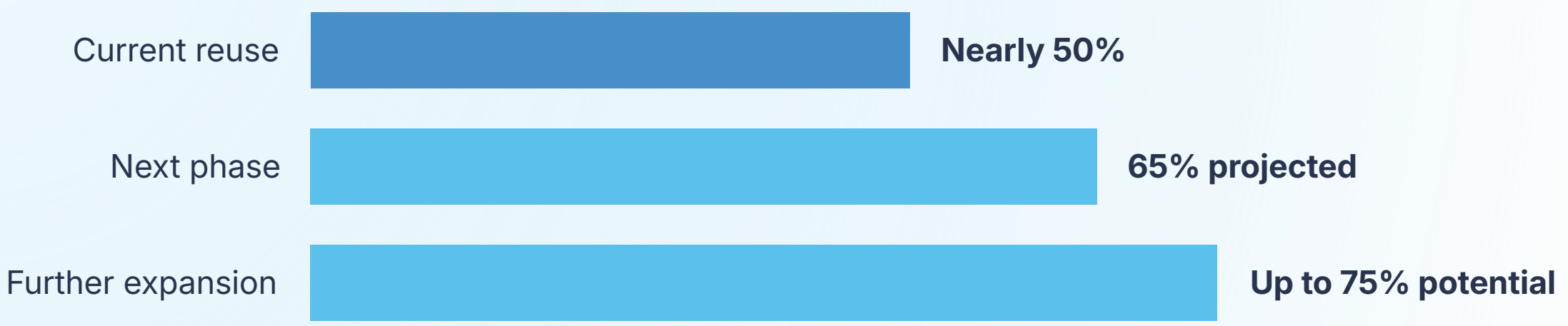
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CIRCULARITY & FUTURE GROWTH

MORE WATER RECOVERED
ROOM FOR FUTURE GROWTH

Connecting water reuse, energy recovery and future expansion

Overall site water recovery



Current recovery shown approximately. Future percentages are projections, not achieved results.

Driving the circular economy

Beyond reclaiming 50% of the wastewater for reuse, the Cedrob facility also recovers value from its solid waste. The anaerobic digestion plant was expanded to handle the increased volume of biological sludges generated by the larger wastewater plant. The biogas produced is captured and utilised to generate heat and energy that is fed directly back into the slaughterhouse.

The site also implemented an Anammox process on the anaerobic digester's centrate to remove nitrogen before it loops back into the centralised biological system. This advanced mapping and resource recovery strategy ensures that the concentrated brine leftover from the 50% water reclamation process still safely meets local river discharge limits.

Future scalability and water neutrality

With several permit applications pending for new and existing sites across Poland, Cedrob is using the MBR system based on **BLUE FOOT** Membranes technology as a proof of concept for future expansions. Environmental authorities are increasingly requiring water-neutral growth, meaning new slaughter lines cannot extract additional groundwater or increase discharge volumes.

To meet these upcoming regulatory requirements, overall water recovery at the Cedrob site is projected to increase to 65% in the next phase, and potentially up to 75% as further production lines are added. The partnership between NSI and **BLUE FOOT** has established a repeatable approach that reduces project risk and supports reliable regulatory compliance in future expansions.

A key lesson from this project is that circular water systems in industrial environments only work when the treatment process is managed as an integrated whole. At Cedrob, wastewater treatment, biogas generation, water reuse and production growth are now interdependent.

> The membrane system based on **BLUE FOOT** Membranes technology is one part of this integrated approach, but a critical one. It demonstrates how advanced membrane technology can increase capacity, reduce aeration energy demand, and maintain performance under variable operating conditions in a water-constrained environment.