



IDROSISTEM
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WATER TREATMENT  RECOVERY
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CASE STUDY:



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CASE STUDY:

WASTEWATER TREATMENT AND RECOVERY AT YAZBEK – MEXICO

Introduction

This case study describes the water filtration process at one of our recent facilities in Mexico.

YAZBEK (COMERCIALIZADORA Y DISTRIBUIDORA ZAY, S.A. DE C.V.) is a PES and Cotton dyeing house located in San José Iturbide, Guanajuato. The maximum daily flow that enters the factory is 3000 m³/d.

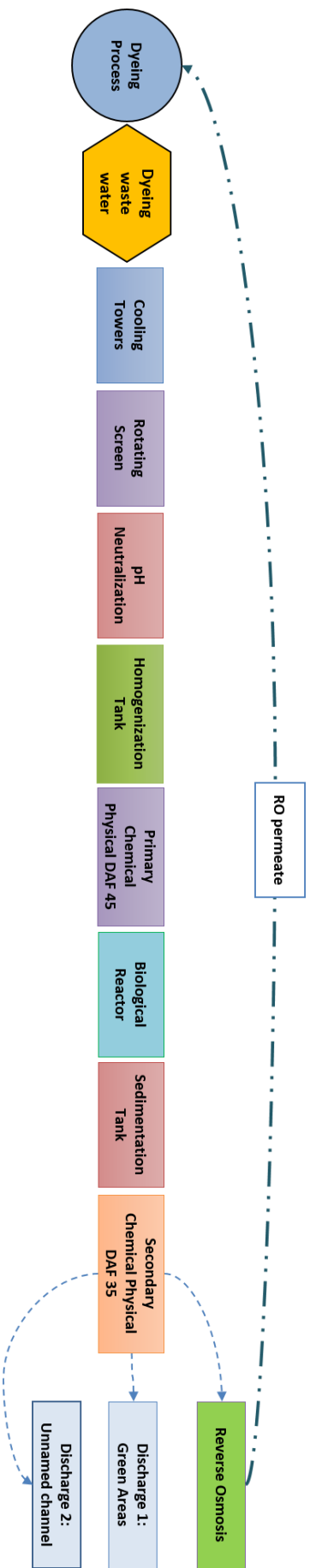
Before the installation of our water treatment plant, YAZBEK had a filtration system that consisted of: Chemical-Physical treatment, traditional biological treatment and Reverse Osmosis System. At the end of 2020, IDROSISTEM completed the assembly and installation of the New treatment plant, so YAZBEK decided in 2021 to make a gradual passage starting with the use of both plants at the same time until completely eliminating the "Chemical-Physical" plant by mid-October, leaving only the IDROSISTEM's biological plant in operation.

Thanks to Idrosistem's wastewater treatment and recovery plant, Yazbek could **recover up to 70% of the water** that would normally end up down the drain. Currently only 40% of the water is recovered, due to the size of the Reverse Osmosis system (which was part of the previous existing plant).



Layout of the previous Chemical Physical Plant

The system previously installed in Yazbek was based on a flotation process called DAF (Dissolved Air Flotation).





Description of the New IDROSISTEM Treatment Plant

The water coming out of the dyeing house goes directly into a **rotating screen** where the long fibers that can create blockages in the equipment are initially eliminated. Then, the water is sent to the **cooling towers**, which, as their name suggests, are responsible for "cooling" the water, adapting it to the survival temperatures of the bacteria (< 38°-40°C).



ROTATING SCREEN

Once the water has reached the desired temperature, it is transported to an Initial Tank where the **pH is neutralized**, always with the aim of creating an environment suitable for the survival of bacteria (pH = 6.5-8.5) and then to the Homogenization Tank.



PRE-FILTERS PLACED BEFORE THE BIOLOGICAL OXIDATION TANK



All the water accumulates in the **Homogenization Tank** (capacity: 2900m³); Its main function is to homogenize all the parameters of the water (COD, Color, SST) that will then be sent to the **Prefilters** for a complete elimination of fibers and residues that could damage the MBR modules.

The Key Phase of our treatment plant installed in Yazbek is the Biological Oxidation (tank with a capacity of 4200m³): its main function is to reduce the COD of the water through a biological degradation of the contaminants through the action of aerobic bacteria.



AIR DIFFUSERS INSTALLED AT THE BOTTOM OF THE BIOLOGICAL OXIDATION TANK

The water that comes out of the Oxidation Tank passes through a **flow separator** that evenly distributes the water flow to the **4 MBR Modules**. Each MBR module performs a membrane ultrafiltration to separate bacteria (sludge) from the filtered water, which constitutes a first pre-treatment phase for the **Reverse Osmosis system**.

The **water recovery phase** is achieved thanks to the **Reverse Osmosis** system placed at the end of the entire process; this system was part of the previously existing treatment plant. IDROSISTEM decided to recover this system by making an improvement through the use of **washable cartridges** (in the past the system used only disposable ones).

At this point, the water has reached a quality suitable for any type of production process. In Yazbek this water represents about 40% of the total water feed of the dyeing factory.

It is important to highlight that this type of recovered water, in contrast to raw feed water, does not have to be conditioned (i.e. does not require softening or alkalinity removal), as it is of such good quality that it can be used even in boilers.



MBR MODULE WITH ULTRAFILTRATION MEMBRANE



Sludge Recirculation

Another very important aspect related to the operating costs of the plant is the type of sludge produced by our treatment plant (NON-toxic biological sludge), which can be used as fertilizer for the fields without having to be treated as special waste.

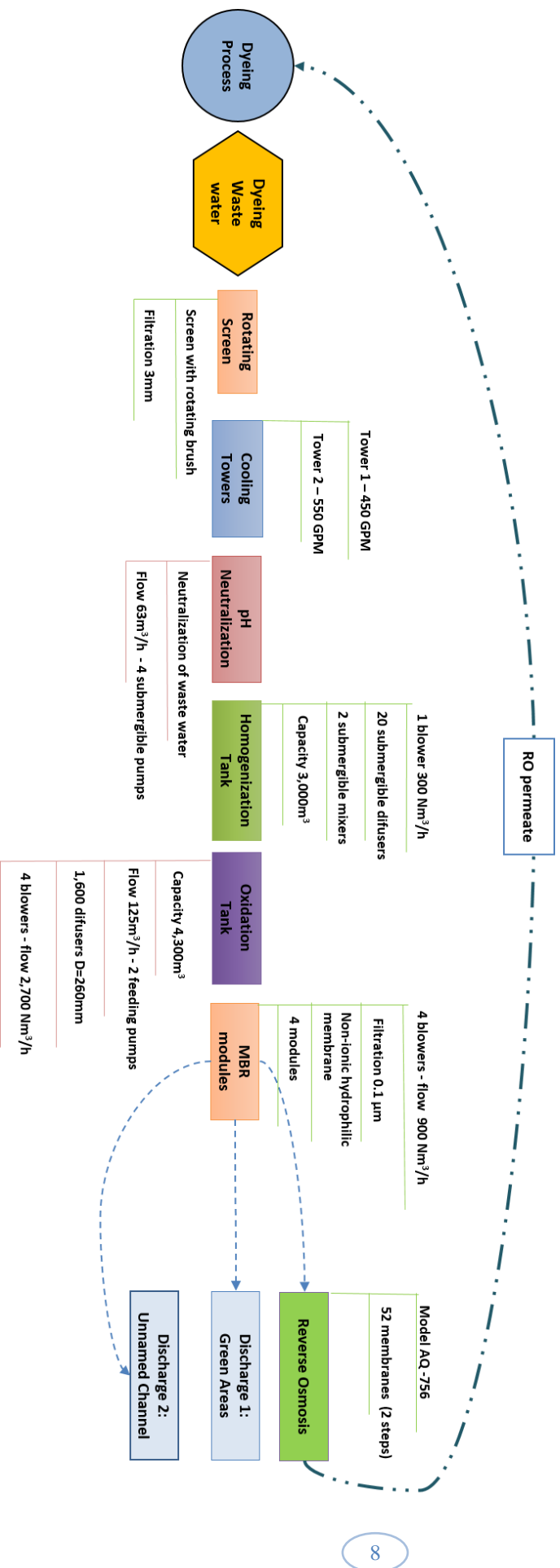
Furthermore, our treatment plant performs a **Sludge Recirculation** where practically all the sludge that comes out of the MBR modules (with the exception of a small part that is sent to the dehydration treatment) is sent back to the Oxidation Tank recirculating and continuously recycling the mass of bacteria, and in this way the costs for the purchase of bacteria are progressively reduced.



CENTRIFUGAL PUMPS FOR SLUDGE RECIRCULATION IN YAZBEK

Layout of of the new IDROSISTEM plant

The new water treatment and recovery plant is based on a 100% **Biological** treatment system.





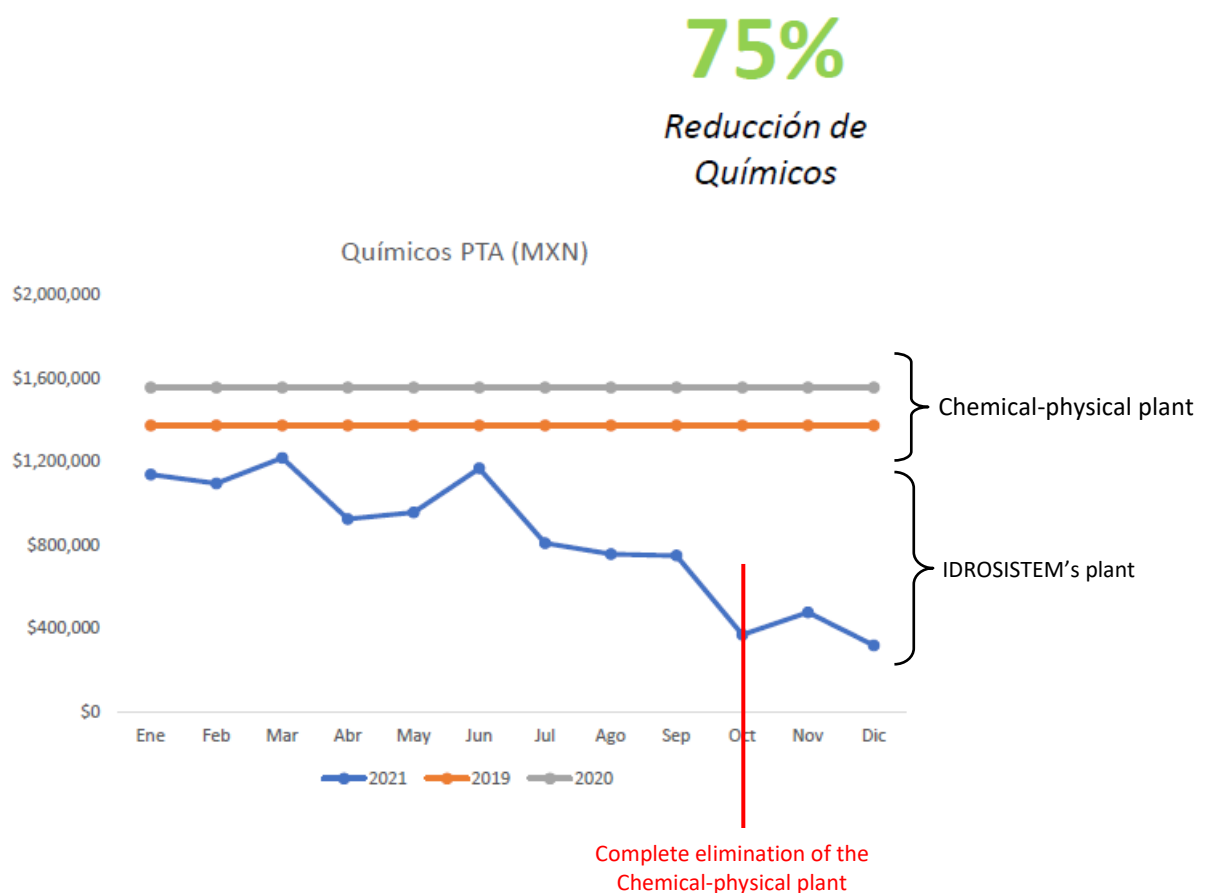
COMPARISON BETWEEN THE OPERATING COSTS WITH THE PREVIOUS CHEMICAL-PHYSICAL PLANT AND WITH THE NEW IDROSISTEM TREATMENT PLANT

Los gráficos siguientes muestran una comparación entre el promedio de costos sostenidos en los años 2019-2020 (antes que se instalara la planta de tratamiento Idrosistem) y el costo mensual sostenido durante el año 2021 (primer año de operación de nuestra planta). Cabe recordar que durante los primeros meses del 2021 Yazbek decidió mantener en función ambas plantas, eliminando completamente la planta "Químico-Física" a mediados del mes de Octubre; a partir de ese momento quedó operativa solo la planta nueva IDROSISTEM.

During the first year of full operation of the new IDROSISTEM Wastewater Treatment and Recovery Plant in Yazbek, many data related to its main operational indicators were collected. The following graphs show a comparison between the average OPEX costs in the years 2019-2020 (before the IDROSISTEM treatment plant was installed) and the monthly OPEX costs during the year 2021 (the first year of operation of our plant). As mentioned before, during the first months of 2021 Yazbek decided to keep both plants in operation, completely eliminating the "Chemical-Physical" plant in mid-October; from that moment on, only the new IDROSISTEM plant was operational.

Consumption of Chemical Products

Between 2019 and 2020, the Yazbek Plant had borne costs for the purchase of chemical products of around 1,500,000 Mexican pesos. During the first year of operation of the Idrosistem plant (2021) costs were gradually reduced until reaching approx. 400,000 Mexican pesos, **obtaining a 75% reduction in the use of chemical products**. The reduction in the consumption of chemical products was directly related to the progressive reduction in the operation of the chemical-physical plant until it was completely eliminated in October 2021.

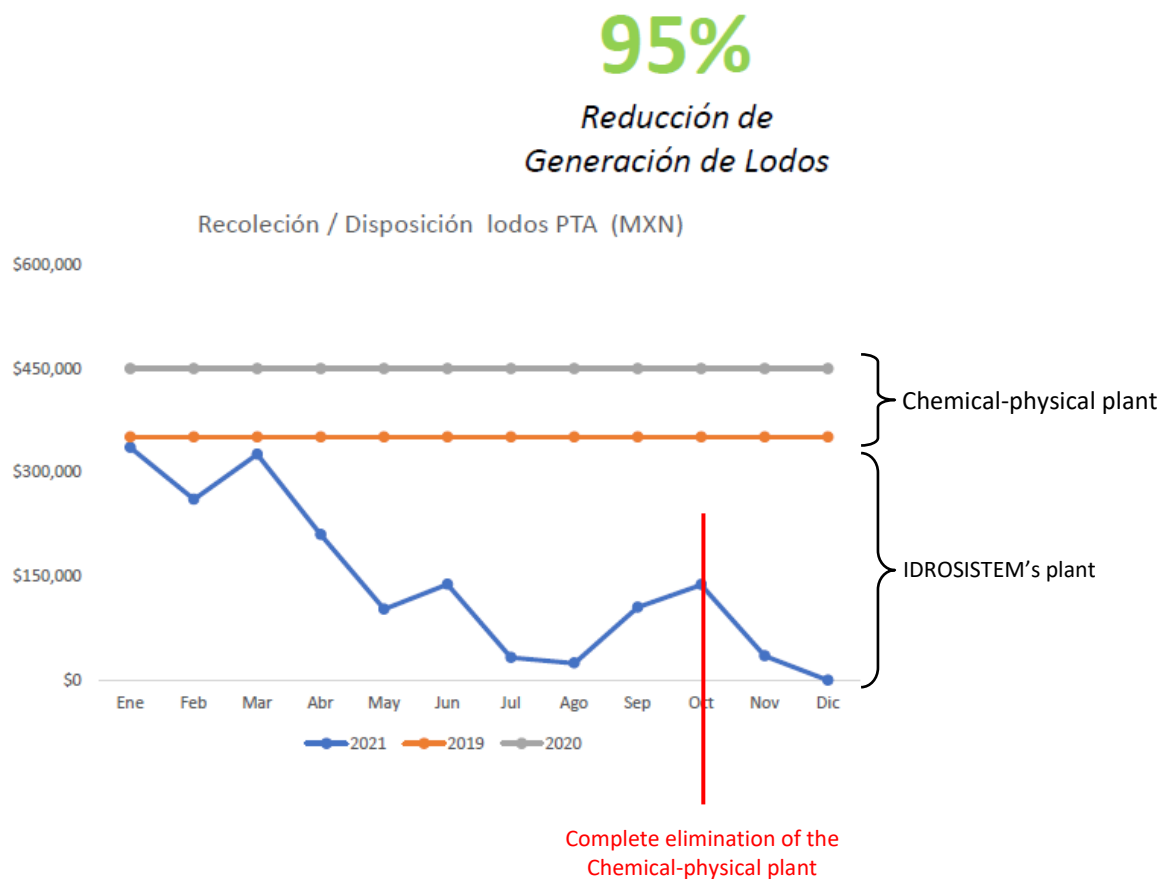




Sludge production and Recycling

As mentioned above, the type of sludge produced by our treatment plant is **NON-TOXIC BIOLOGICAL SLUDGE** that can be used as fertilizer for the fields, without having to be managed as "special waste". This is reflected in an evident **ZERO COST** for sludge disposal expenses in Yazbek.

As can be seen in the following graph, between 2019 and 2020 the Yazbek Plant had borne costs for the collection and disposal of sludge produced by the plant of around 430,000 Mexican pesos. During the first year of operation of the Idrosistem plant (2021), these costs were progressively reduced until they were almost completely eliminated. With the Idrosistem treatment plant, **a 95% reduction in sludge production was obtained.**





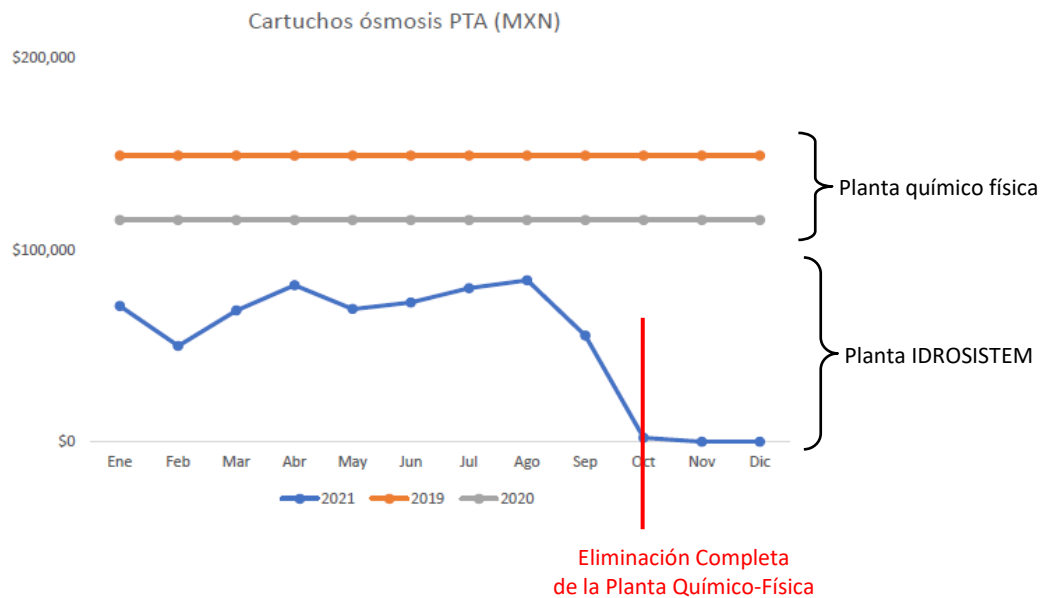
Consumption of Cartridges for Reverse Osmosis System

Between 2019 and 2020, the Yazbek Plant had borne costs for the purchase of disposable cartridges for the Reverse Osmosis system of about 140,000 Mexican pesos. The reduction is due to the improvement applied by IDROSISTEM which consists of two factors:

1. Replacement of disposable cartridges with **WASHABLE cartridges**.
2. Increase in the quality of the water entering the system through the **two treatment phases** applied (Biological + MBR); This also allows a reduction in the frequency of cleaning of the cartridges.

“Cero”

*Cartuchos
Desechables.*

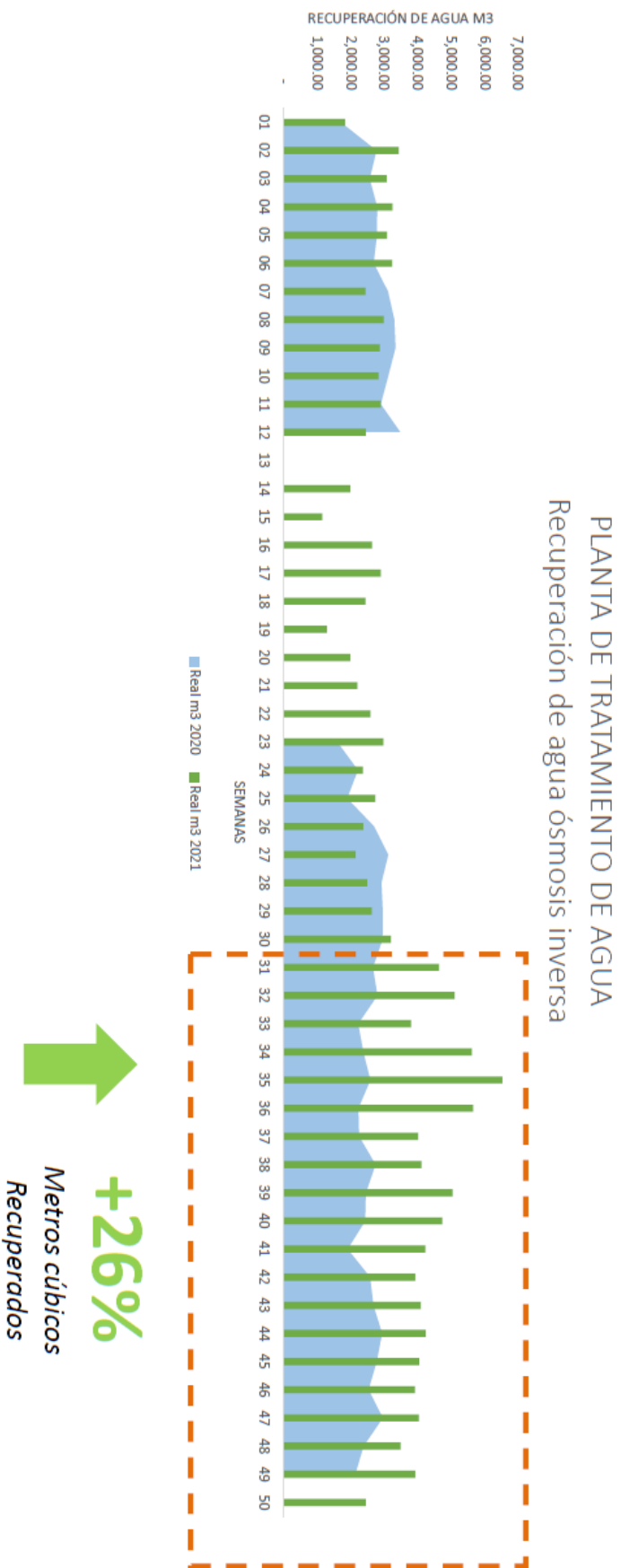


WASHABLE CARTRIDGES FOR THE REVERSE OSMOSIS SYSTEM



WATER RECOVERY - (REVERSE OSMOSIS SYSTEM)

The graph below shows a **large increase in the amount of RECOVERED WATER (+26%)** with the Reverse Osmosis system. As mentioned above, this increase is due to the improvement in the quality of the water entering the system, thanks to the two treatment phases applied by IDROSISTEM (Biological + MBR).





REFERENCES

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