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CASE STUDY:

REAL OPERATING COSTS OF AN ELECTROCOAGULATION PLANT COMPARED TO A BIOLOGICAL TREATMENT PLANT

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Introduction

In 2017, IDROSISTEM got in contact with a Dyeing House in Peru. This company needed a water treatment and recovery system to treat the wastewater produced each day.

At that time, IDROSISTEM presented them with a quotation for a plant that included a **biological treatment and an ozone decoloration system**. In this quotation, an estimation of the average operating costs borne by a system of this type was established, based on the experience acquired by IDROSISTEM in its more than 300 plants installed throughout the world.

After many meetings and negotiations, the Dyeing House finally decided to buy an electrocoagulation system offered by another company that provided the same operating costs as the IDROSISTEM plant.

This case study describes the **real** operating costs of this particular electrocoagulation plant, based on facts and data acquired during the last years (2017-2021).

REAL Operating Costs of the Electrocoagulation Plant

As indicated above, the Electrocoagulation plant installed in the Dyeing House in Peru has collected many data in recent years. Below are the tables that summarize the actual operating costs of this plant.

ESTRUCTURA DE COSTOS - PROCESO ELECTROCOAGULACIÓN
20/09/2021

1.- Resúmen Costos Tratamiento:

	$/m3
Placas	0,420
Energía eléctrica	0,181
Productos químicos	0,173
Trat. y disposición de lodos	0,171
Mant. Activos	0,171
Mano de obra	0,073
	1,189

Total operating Cost in USD/m³

2.- Detalle de mantenimiento de Activos

	$/m3	
Bombas para Electrocoagulación	0,003	
Bombas para Filtro carbón	0,003	
Bombas lodos	0,008	
Bombas neutralizante	0,001	
Bomba lavado ácido a EC	0,000	
Bombas polímero	0,001	
Bomba hidraulica	0,001	
Motor paleta DAF	0,001	
Carbón activado para filtro	0,007	
Telas para Filtro Prensa	0,011	
Cadenas de DAF	0,003	
Consumibles (Kit, orrin, empaquetaduras, etc)	0,024	0,063
Limpieza 3 pozas (Cap + Hom + Trat)	0,034	
Bombas para Torre de enfriamiento	0,003	
Mantto infraestructura civil	0,014	
Mantto infraestructura metálica	0,014	
Análisis de laboratorio Trimestral	0,034	
Calibración equipos	0,001	
Sopladores	0,005	
Inspección de los sopladores	0,003	0,171

3.- Detalle de Energía eléctrica

	$/m3
Sistema Ptar	0,173
Torre de enfriamiento	0,007
	0,181

TABLE 1 – Summany of Costs (Treatment and Maintenance)

In "Table 1" the following aspects can be observed:

1. The average operating cost of the Electrocoagulation Treatment Plant is ***1.19 USD for each cubic meter*** of wastewater treated per day.

1.- Cuantificación de lodos por m3 efluente

Fecha recojo lodo	Kg lodo húmedo	Kg Stock(No llevado)	Lectura (m3)
17/07/2021	4.899	0	97.247
26/07/2021	4.849	x	100.596
05/08/2021	4.867	xx	106.304
20/08/2021	4.987	xxx	yyy
28/08/2021	4.834	x	yyyy
03/09/2021	4.480	xx	yy
10/09/2021	4.880	2400	124.302

Kg of Sludge produced per m^3 treated

	Kg Lodo	m3 Tratados	Kg Lodo/m3
Del 17/07 al 26/07	4.849	3.349	1,45
Del 17/07 al 05/08	**9.716**	**9.057**	**1,07**
Del 17/07 al 10/09	**31.296**	**27.055**	**1,16** Kg Lodo/m3

Con % Húmedad 75 %

Costo disposición de lodo	**0,60**	**Soles/Kg lodo**
	0,70	**Soles/m3**

TABLE 2 – Total Sludge Production

In "Table 2" we can observe the following data:

1. The total amount of sludge produced is ***1.16 Kg per m^3 treated per day.***

2. It is essential to keep in mind that the sludge produced by the electrocoagulation plant is of the **Toxic Type;** This sludge must be handled as "special waste" and delivered to expert companies for disposal.

REAL Operating Costs of an IDROSISTEM Biological Treatment and Ozone Decoloration Plant

Below is the summary table that describes the REAL operating costs borne by the ***Biological + IDROSISTEM Ozone Decoloration system:***

TOTAL COSTS	USD/m3
ELECTRIC ENERGY	0,156
CHEMICAL PRODUCTS	0,151
SLUDGE	0,058
LABOR (OPERATOR)	0,031
CONSUMABLE MATERIAL	0,009
TOTAL OPERATING COSTS	**0,4042**

Sludge production (25% dry): ***0,4 kg/m³***

In the table above, you can see these important aspects:

1. The average operating cost of an IDROSISTEM Biological system is ***0.40 USD for each cubic meter*** of wastewater treated per day.

2. The total production of sludge from an IDROSISTEM Biological system is ***0.4 kg for each cubic meter*** of wastewater treated per day. It must be considered, that the Ozone Decoloration system **DOES NOT PRODUCE SLUDGE.**

3. It is essential to keep in mind that the sludge produced by the IDROSISTEM plant is of the **BIOLOGICAL type (NON-TOXIC);** this sludge can be used as fertilizer for the fields, without having to be managed as "special waste" and thus reducing costs per their disposal.

Examples of Electrocoagulation plants (no longer operating), that have now been replaced by Complete Biological Systems

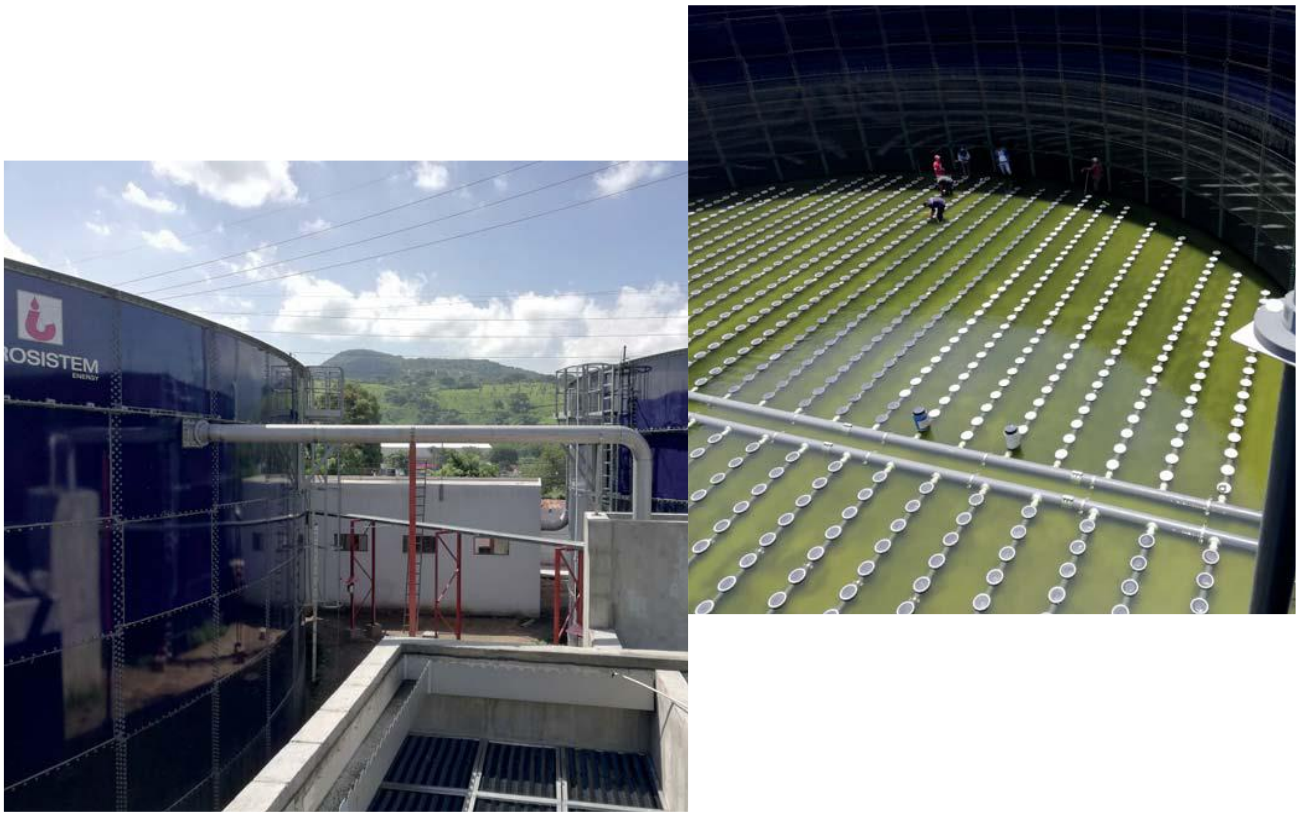
- ***VICUHNA ECUADOR –*** Denim Dyeing House - Q=1000m3/d

BEFORE: With an Electrocoagulation system

AFTER: 100% Biological treatment Plant by IDROSISTEM

- ***LIZTEX GUATEMALA –*** Cotton Dyeing House - Q=5000 m3/d

BEFORE: With an Electrocoagulation system



AFTER: 100% Biological treatment Plant by IDROSISTEM

Conclusions

Based on the data indicated in the previous tables, we can establish the following conclusions:

1. The operating cost of an Electrocoagulation system is approximately **3 times higher** than that of a Biological and Ozone Decoloration system.

2. The sludge production of an Electrocoagulation system is approximately **3 times higher** than that of a Biological and Ozone Decoloration system.

3. The sludge produced by the **Electrocoagulation** plant is of the Toxic Type, so it must be handled as "special waste" and delivered to expert companies for disposal.

4. The sludge produced by the Biological and Ozone Discoloration system is of the **BIOLOGICAL type (NON-TOXIC)** that can be used as fertilizer for the fields, without having to be managed as "special waste" and thus reducing costs for the disposal of them.

5. In the operating costs of an Electrocoagulation system are also included the expenses for the replacement of Activated Carbon (additional process necessary to reduce the parameters of COD and BOD5 to levels that respect local laws). A filtration with ***Activated Carbon IS NOT NECESSARY*** in the presence of a Biological system with Ozone Decoloration thanks to the greater efficiency of this type of system.

For further information, please contact:
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