CASE STUDY

Recycle/Reuse-Based Effluent Treatment Plant for ENGRO FOODS LIMITED

Location: Sahiwal Unit, Punjab, Pakistan

Capacity: 1850 m³/day

Industry: Food & Beverage

PROJECT OVERVIEW

WOG Technologies successfully designed and implemented a 1850 m³/day Recycle/Reuse-Based Effluent Treatment Plant (ETP) for Engro Foods Limited at their Sahiwal Unit, Punjab, Pakistan. The project, commissioned in 2015, aimed to treat critical effluent and ensure water recovery through advanced filtration and reverse osmosis (RO) technology.

CLIENT OVERVIEW

Engro Foods Limited is one of Pakistan's leading food and beverage companies. Committed to sustainable practices, the company required an efficient wastewater treatment solution to recycle and reuse effluent, minimizing water waste and environmental impact.

OUR COMPREHENSIVE SOLUTIONS

WOG Technologies delivered a tailored, multi-stage effluent treatment solution that included equalization, bio-polishing filtration, ultrafiltration for removing suspended solids and pathogens, and reverse osmosis to reduce TDS from 1350 ppm to below 50 ppm. This compact, high-efficiency system ensured reliable water recycling and full compliance with environmental standards.

CHALLENGES

Despite being a leading name in the food and beverage industry, Engro Foods faced growing challenges in managing its wastewater sustainably. With rising environmental regulations and the need for efficient water reuse, their existing setup fell short—resulting in operational inefficiencies and increased freshwater dependency.

High Total Dissolved Solids (TDS): The effluent contained 1350 ppm TDS, requiring advanced purification.

Organic Contaminants: Presence of Chemical Oxygen Demand (COD) up to 8 ppm, necessitating effective filtration.

Scaling & Fouling Risks: The wastewater had silica (14 ppm) and sodium (594 ppm), which could damage membranes if untreated.

Strict Compliance Needs: The project had to meet regulatory requirements while maximizing water recovery.

SOLUTIONS

WOG Technologies implemented a multi-stage effluent treatment system, including:

EQUALIZATION TANK –

To balance pollutant loads and ensure consistent treatment.

The equalization tank helps to regulate the flow rate and homogenize the characteristics of the incoming effluent. It is essential for buffering hydraulic and organic load fluctuations, ensuring steady-state conditions for downstream biological and membrane processes. This improves the overall treatment efficiency and protects sensitive equipment from shock loading.

Parameters	Unit	Inlet	Outlet
Flow	M3/day	1850	1387.5
TDS	ppm	1350	<50

BIO-POLISHING FILTER

Enhancing organic removal before membrane filtration.

The bio-polishing filter reduces residual biochemical oxygen demand (BOD) and suspended solids using a biologically active media bed. It enhances the final polishing of the effluent post-primary treatment and prepares the feed water for membrane filtration by lowering organic loading, which minimizes membrane fouling.

ULTRA-FILTRATION (UF) SYSTEM –

The UF system employs hollow-fiber or flat-sheet membranes with pore sizes in the range of 0.01–0.1 microns. It is highly effective in removing suspended solids, colloidal particles, bacteria, and viruses. This stage ensures a low silt density index (SDI), which is critical for protecting and extending the life of the downstream reverse osmosis membranes.

REVERSE OSMOSIS (RO) SYSTEM –

The RO system operates under high pressure to remove dissolved salts, heavy metals, and other inorganic compounds. It is highly effective in reducing Total Dissolved Solids (TDS) from 1350 ppm to below 50 ppm. This system is ideal for generating high-purity permeate suitable for reuse in non-potable industrial applications, thereby reducing freshwater dependency.

CASE STUDY

Design Feed Flow Rate: 1850 m³/day
Plant Operation: 24/7 Continuous Process

RESULTS

Our solution delivered measurable success, achieving a 75% reduction in freshwater consumption, a 75% recovery rate of treated water, and full compliance with environmental discharge norms—resulting in significantly lower operational costs and enhanced sustainability within just a few months of implementation.

Significantly Improved Water Quality: The treated water had TDS <50 ppm, making it suitable for reuse.

High Recovery Rate: The plant successfully recovered 1387.5 m^3/day of treated water, minimizing discharge.

Sustainable Operations: Reduced environmental footprint through water recycling.

IMPACT

- **Environmental Sustainability:** Decreased freshwater consumption by reusing treated water.
- **Regulatory Compliance:** Met environmental standards with minimized industrial discharge.
- **Cost Efficiency:** Reduced operational expenses by cutting water intake and disposal costs.
- **Operational Reliability:** Ensured uninterrupted plant operations with an effective and scalable treatment system.

THANK YOU!

WOG
WATER • OIL • GAS

This project showcases our expertise in designing and implementing advanced effluent treatment and water recycling solutions, enabling sustainable water management within the food and beverage industry.

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