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Insights on Interplay between Major Industries and Wastewater Management in the Quest for UN Sustainable Development Goals

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INTRODUCTION

Water plays a central role in sustainable development, influencing crucial aspects such as public health, food security, economic prosperity, and environmental balance. Its effective management is vital in addressing global challenges and ensuring long-term sustainability. Access to clean water and efficient sanitation systems directly impact human well-being, reducing disease and promoting healthier communities. Additionally, water is a key factor in agricultural productivity, supporting food supply chains and reducing hunger. Beyond human needs, water is essential for maintaining biodiversity and healthy ecosystems, contributing to climate resilience by regulating weather patterns and mitigating the effects of natural disasters such as floods and droughts. Sustainable water management is therefore fundamental to achieving the United Nations Sustainable Development Goals (SDGs), particularly those focused on clean water and sanitation (SDG 6), climate action (SDG 13), and the protection of life on land (SDG 15) and below water (SDG 14). Ensuring equitable access to clean water, investing in water conservation technologies, and adopting policies that promote responsible water usage are all critical steps toward a more sustainable and resilient future (Wipro Water, 2025).

Water waste management is an essential aspect of sustainable development, ensuring the efficient use and recycling of water resources. Effective management of wastewater not only protects the environment but also supports public health, economic growth, and climate resilience.

Importance of Water Waste Management

Water waste management plays a vital role in promoting sustainability, protecting public health, and preserving the environment. With increasing global water demand and pollution concerns, efficient wastewater management is essential for ensuring clean water access, reducing waterborne diseases, and mitigating climate change. Below are the key reasons why water waste management is crucial:

Fig. 1 Importance of Water Waste Management

Water waste management is a crucial concern across various industries due to its environmental, economic, and regulatory implications (NetSol Water, 2025b). Below are major industries and their key water waste management interventions, along with a case study for each.

Table 1: Major Industries and their Water Waste Management Interventions

SI. No.	Company	Technology Corner Stone	URL
1.	VA Tech Wabag	Tertiary Treatment Reverse Osmosis (TTRO)	Koyambedu Water Reuse Plant - For Pure Water, Think WABAG!
2.	Thermax India	Water Treatment with Thermax Tulsion Resins	Enhancing Industrial Water Treatment with Thermax Tulsion® Resins
3.	Netsol Water Solutions	Effluent Treatment Plant	https://www.netsolwater.com/
4.	Siemens India	Seawater Desalination	Water Industry - Siemens IN
5.	Voltas Limited	Moving Bed Biofilm Reactors	Water

		(MBBR) and Sequencing Batch Reactors (SBR)	
6.	UEM India Pvt Ltd	Zero Liquid Discharge (ZLD)	History - Toshiba Water Solutions
7.	WOG	Moblie Water Treatment	https://woggroup.com/
8.	Hindustan Dorr-Oliver Limited	RO-DM & CPU Plant	https://hdo.in/
9.	SFC Environmental Technologies Private Limited	C-TECH Technology	https://sfcenvironment.com/
10.	Ion Exchange India Ltd	INDION Membrane Bioreactor (MBR)	https://ionexchangeglobal.com/

1. VA Tech Wabag: VA Tech Wabag, headquartered in Chennai, is a global leader in water and wastewater treatment, operating across four continents and 20 countries. In 2005, the company successfully orchestrated the management-led acquisition of WABAG India, strengthening its position as an independent entity in the industry in the field of waste water management.

Case Study: The Nemmeli Desalination Plant, built by VA Tech Wabag, supplies 100 MLD of potable water to Chennai, addressing acute water shortages. Using advanced seawater reverse osmosis (SWRO) technology, it ensures sustainable water management (VA Tech Wabag, 2025). The plant reduces groundwater dependency and enhances water security for the city's growing population.

2. Thermax India: Thermax Limited, headquartered in Pune, India, is a leading company in the energy and environment sector. Established in 1980, it offers integrated solutions in heating, cooling, power generation, water and wastewater treatment, air pollution control, and specialty chemicals, focusing on clean air, energy, and water.

Case Study: A leading global polyester supplier faced boiler water quality issues, resulting in red discoloration—a sign of corrosion and scaling. Thermax implemented a specialized boiler chemical program, effectively improving water quality and ensuring optimal boiler performance (Thermax, 2025).

3. Netsol Water Solutions: A prominent Indian company specializing in water and wastewater treatment. Based in Delhi NCR, they design and manufacture advanced systems, including compact sewage treatment plants and commercial reverse osmosis (RO) plants, to conserve water resources and promote environmental sustainability.

Case Study: A medical college and hospital in Delhi NCR faced wastewater management challenges due to contaminants like organic matter, pathogens, and pharmaceuticals. Netsol Water installed a 50,000 LPD Effluent Treatment Plant (ETP) with screening, grit removal, anaerobic digestion, activated sludge, and tertiary treatment. The system ensured compliance with environmental regulations, enabling safe discharge or reuse of treated water (NetSol Water, 2025a).

4. Siemens India: Water Technologies: Established in 1847, Siemens is a global technology leader offering innovative water management solutions (Siemens, 2022). In India, Siemens has implemented advanced

wastewater treatment plants, such as a facility with a 65,000-liter capacity, producing water clean enough for irrigation purposes.

Case Study: Siemens' Vadodara facility in India, where 650 employees manufacture steam turbines and capacitors, faced significant water management challenges due to extreme seasonal variations. The region experiences intense monsoons with up to 100mm of rainfall in an hour, followed by prolonged dry seasons, depleting groundwater reserves. Recognizing the urgency of sustainable water management, Siemens employees implemented innovative strategies to optimize water usage and reduce dependency on groundwater.

5. Voltas Limited: Voltas Limited, established in 1954, has been a leader in sustainable water management for over 40 years. The company offers comprehensive solutions, including Water Treatment Plants, Sewage Treatment Plants, and Effluent Treatment Plants, aiming to reduce wastage and enhance water reuse.

Case Study: Agra, a historic city, faced challenges in providing clean and safe drinking water due to an aging, defunct 50-year-old water treatment plant. The outdated facility required urgent modernization to meet growing water demands and comply with Bureau of Indian Standards (BIS) norms. A complete rehabilitation transformed the plant into a state-of-the-art automated Water Treatment Centre with a capacity to treat 144 MLD per day. Equipped with advanced technologies, the revamped facility ensures efficient water purification, significantly improving water quality and supply reliability in Agra (Voltas, 2025).

6. UEM India Pvt Ltd: Toshiba Water Solutions (TWS), formerly UEM Group, has been a key player in water and wastewater management since its establishment in 1973. Renamed in 2019, with a focus on sustainable solutions, TWS integrates advanced technologies such as membrane bioreactors, reverse osmosis, and Zero Liquid Discharge (ZLD) systems to ensure efficient water reuse and conservation. Its expertise spans municipal, industrial, and infrastructure sectors, contributing to global water sustainability.

Case Study: In 2015, Toshiba acquired a 54% stake in UEM India, strengthening its position in water management. With over 40 years of expertise, Toshiba aimed to enhance India's water treatment infrastructure, addressing challenges in water supply, wastewater treatment, and recycling. By integrating Toshiba's advanced Japanese R&D with UEM's wastewater expertise, the company delivers end-to-end solutions, including sewerage systems, desalination, and industrial water treatment (Toshiba India, 2025).

7. WOG: WOG Group specializes in water and wastewater treatment solutions. The company offers comprehensive services, including industrial process water treatment, waste-to-energy plants, and effluent wastewater treatment. Their innovative, eco-friendly technologies aim to ensure efficient water management and environmental sustainability.

Case Study: Phuket faced water scarcity, prompting W.O.G Group to implement a 25,000 m^3/day wastewater recycling project using advanced treatment processes like reverse osmosis and ultrafiltration (WOG Group, 2025). Under a 30-year Build-Operate-Transfer agreement, the project reduced wastewater discharge, provided affordable clean water, and created local jobs.

8. Hindustan Dorr-Oliver Limited: Hindustan Dorr-Oliver Limited (HDO), established in 1974, is a pioneer in India's water and wastewater treatment sector. With over seven decades of experience, HDO provides comprehensive solutions for

industrial and municipal applications, ensuring sustainable resource management. Their expertise includes designing and executing effluent treatment plants, such as the 9 MLD facility for Bharat Oman Refineries Ltd., aiming for zero liquid discharge.

Case Study: Hindustan Dorr-Oliver Limited (HDO) executed a ₹300 crore water management project for Guru Gobind Singh Refinery, Bhatinda, ensuring efficient water use. The project included a Raw Water Treatment Plant, Effluent Treatment Plant, and RO-DM & CPU Plant to provide clean water for operations. By implementing advanced eco-friendly technologies, HDO enhanced refinery efficiency, ensured compliance with environmental regulations, and contributed to sustainable industrial water management in Punjab.

9. SFC Environmental Technologies Private Limited: Established in 2005, SFC Environmental Technologies specializes in wastewater treatment, offering comprehensive services from design to commissioning. With over 608 installations, their C-Tech technology holds an 80% market share in India's sequencing batch reactor (SBR) sector, treating approximately 14,812.86 million liters of wastewater daily.

Case Study: Navi Mumbai required an efficient sewage treatment solution to manage wastewater and enable reuse for agriculture and industry. Traditional methods were inefficient in meeting stringent discharge norms. The city implemented C-TECH technology, a cyclic activated sludge process operating in batch mode with fill-aeration, aeration, settling, and decanting sequences. This advanced system achieved complete nitrogen removal.

10. Ion Exchange India Ltd: Established in 1964, Ion Exchange India Limited has over five decades of expertise in water and wastewater treatment. They offer comprehensive solutions, including recycling, zero liquid discharge, and pollutant removal, catering to industries, homes, and communities, ensuring safe drinking water and environmental sustainability.

Case Study: Ion Exchange introduced the INDION Membrane Bioreactor (MBR), an advanced biological treatment technology that produces high-quality treated water with minimal chemical use. This system integrates submerged membrane filtration within the biological process, effectively removing contaminants from both domestic and industrial wastewater (Ion Exchange, 2025). Benefits include reduced land usage, lower power and chemical requirements, and decreased operating costs.

CONCLUSION

In conclusion, water is a fundamental pillar of sustainable development, influencing public health, food security, economic stability, and environmental resilience. Effective water and wastewater management, including industrial responsibility in reducing pollution and recycling water, are crucial for achieving global sustainability goals. Investing in conservation, equitable access, and responsible policies ensures a resilient future where water resources are preserved for generations, supporting both human well-being and the planet’s long-term health.

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