

# Innovative technologies are redefining wastewater management

*Evolving regulations have led to more stringent effluent discharge standards for industries to invest in advanced wastewater technologies.*

**S**ubhash Sethi, Chairman of SPML Infra Limited, discusses the dynamic drivers moving India's wastewater treatment business forward in an exclusive interview, emphasising new technologies and investment potential.

## What investment opportunities exist for innovative technologies in this segment?

Rapid population growth, enhanced commercial activities, and faster urbanisation have increased water demands. As a result, water stress has become a big problem in most Indian cities. Water utilities are grappling with the challenge of meeting this growing water demand while promoting sustainable use of water resources. As they seek innovative alternatives to freshwater, the reuse of treated wastewater is gaining attention and being promoted at the state and municipal levels. In addition to the environmental, health, and social benefits of treating wastewater, treated wastewater can become a reliable water source for industrial users, freeing up freshwater resources that help address water scarcity.

The wastewater treatment industry offers lucrative investment opportunities for innovative technologies. As environmental concerns grow and regulations become stricter, more efficient, cost-effective, and eco-friendly wastewater treatment solutions can be crucial for effective treatment and sustainable water management



**Subhash Sethi,**  
Chairman,  
SPML Infra Limited.

solutions. When considering investment opportunities, assessing the technology's feasibility, scalability, regulatory compliance, potential impact, and the team's expertise is important to implement it properly.

## How do emerging technologies shape wastewater treatment processes?

New-age wastewater treatment technologies like membrane filtration, advanced oxidation, biological nutrients, and ion exchange systems offer more efficient and sustainable ways to treat and manage wastewater. They are significantly shaping the landscape of wastewater treatment processes by effectively removing contaminants like heavy metals, chemicals, and microplastics and reclaiming water for reuse.

Membrane filtration can remove particles, bacteria, viruses, and dissolved substances like organic matter, nutrients, and salts. This treatment system is ideal for constructing decentralised treatment facilities as it requires less space than traditional sedimentation methods, making it suitable for urban and space-constrained environments. Membrane technologies, particularly reverse osmosis, play a vital role in desalination processes, converting seawater into freshwater.

Advanced oxidation, such as ozone treatment, UV/H<sub>2</sub>O<sub>2</sub>, and photocatalysis, is ideal for removing organic and inorganic pollutants from wastewater using chemical processes. It is gaining prominence due to its efficacy and environmental benefits. It can effectively inactivate pathogens, improving treated wastewater's safety for safe reuse.

Biological nutrient removal processes remove nutrients such as nitrogen and phosphorus from wastewater. This helps prevent excessive nutrient discharge into water bodies, thus helping with the water's ecological balance. Stricter regulations on nutrient levels in wastewater effluents drive the adoption of biological nutrient removal processes while generating energy-rich byproducts such as biogas, contributing to energy recovery. SPML Infra Limited has executed several wastewater treatment projects with a biogas facility helping generate power to fulfil the plant's requirements.



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**How do evolving environmental regulations influence the adoption of more efficient and sustainable technologies?**

Untreated sewage discharge is one of the major causes of surface water pollution in India. The Water (Prevention and Control of Pollution) Act of 1974 was the first legislative measure to address this issue directly. It was complemented by the Water (Prevention and Control of Pollution) Cess Act of 1977. It augments the financial resources for the Central and State Boards established under the Water Act by levying taxes. The Act further incentivises the installation of wastewater treatment plants by granting a rebate of 25 percent on the payable cess. Like the Water Act, the Environment (Protection) Act of 1986 empowers the Central Government to prescribe

sewage and effluent discharge standards, investigate and ensure compliance, and conduct research. The National Water Policy 2022 aims to promote treating wastewater for non-potable purposes such as irrigation, industrial cooling, and other similar uses. The policy also envisages promoting the use of treated wastewater for potable purposes after appropriate treatment and disinfection.

Evolving regulations have led to more stringent effluent discharge standards for industries, which has compelled them to invest in advanced wastewater treatment technologies to meet these standards. Non-compliance with regulations can result in fines and penalties. To avoid these financial consequences, industries are motivated to upgrade their wastewater treatment facilities with more efficient and sustainable technologies.

**How is the wastewater treatment industry integrating circular economy principles?**

As environmental awareness grows and the cost of resources and energy

fluctuates, the wastewater treatment industry increasingly recognises the potential benefits of integrating circular economy principles and resource recovery technologies. These approaches align with sustainability goals and can lead to cost savings, new revenue streams, and reduced environmental impact. Integrating these principles involves minimising waste, optimising resource utilisation, and creating a more sustainable and closed-loop approach to wastewater treatment.

The advanced technologies being adopted and implemented by industries and municipal authorities are helping in the recovery of nutrients like nitrogen and phosphorus, methane, sludge, and biogas that help generate electricity and biofuel. Research and innovation play a crucial role in identifying new ways to recover resources from wastewater. Various start-ups, research institutions, and companies are continually working on developing novel technologies and processes to maximise resource recovery and minimise waste.

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**Tel** +91- 07104-232211, 237232    **Mobile** +91 942 280 8860    **Email** sales@weldfast.in    **Web** www.weldfast.in