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BITS Pilani develops sustainable tech to convert biopharma wastewater into reusable water & clean energy

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Biopharmaceutical fermentation wastewater is among the most difficult industrial effluents to treat



Scientists at BITS Pilani, Hyderabad have developed an integrated and low-energy technology for wastewater treatment. It can provide a sustainable solution to the management of one of the most problematic wastewater streams in the biopharmaceutical industry.

Researchers have successfully demonstrated the technology at the laboratory scale, the research team is now working with Biological E. Limited, one of India's leading vaccine manufacturers based in Genome Valley, Hyderabad, to scaling the system for industrial deployment.

The innovative system replaces conventional chemical- and steam-based sterilisation with Pulsed Electric Field (PEF) technology. It enables biopharmaceutical fermentation wastewater to be safely disinfected while recovering reusable water and methane-rich biogas.

The technology could be applied to other pharmaceutical and vaccine production facilities and high-strength industrial wastewaters, to benefit industries with water-saving, energy-recovery and environmentally friendly integrated solutions.

The project is supported by the Department of Science and Technology (DST), Government of India, through its 'Water Technology Initiative' of the Optimum Water Use in Industrial Sectors programme. The core disinfection technology has been filed for an Indian patent.

Biopharmaceutical fermentation wastewater is among the most difficult industrial effluents to treat because it contains millions of live production microorganisms, residual antibiotics, and antibiotic resistance genes. Owing to the associated biosafety risks, industries currently rely on chemical treatment followed by steam-based autoclaving before disposal—a process that is both energy-intensive and expensive.