HgSBR For Wastewater Treatment

Advanced Biological Treatment

H20 Dynamics India Limited, Goa

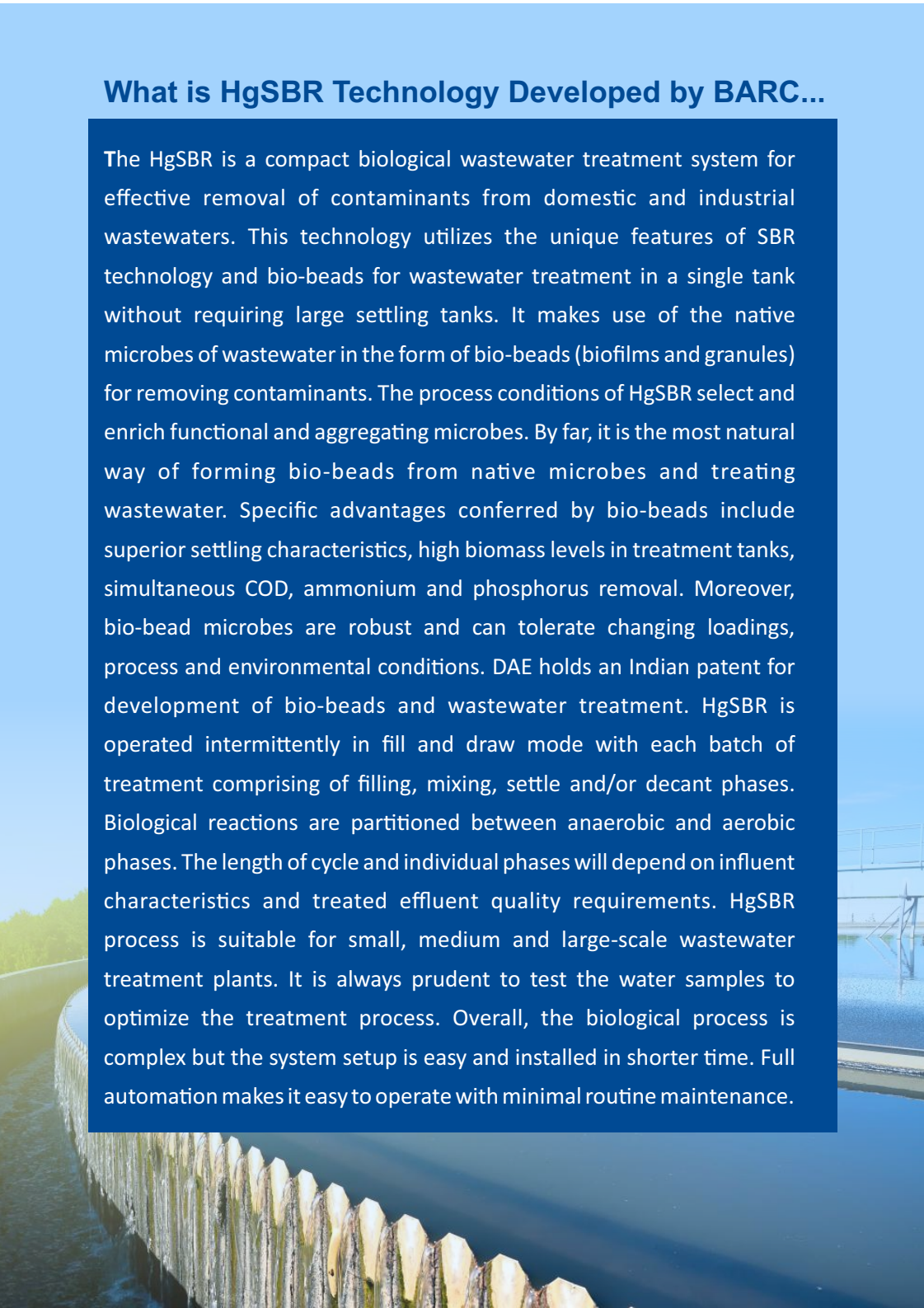
Licensee & Technology Partner

Bhabha Atomic Research Centre

Dept. of Atomic Energy, Govt. of India

What is HgSBR Technology Developed by BARC...

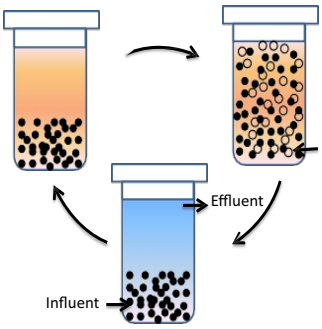
The HgSBR is a compact biological wastewater treatment system for effective removal of contaminants from domestic and industrial wastewaters. This technology utilizes the unique features of SBR technology and bio-beads for wastewater treatment in a single tank without requiring large settling tanks. It makes use of the native microbes of wastewater in the form of bio-beads (biofilms and granules) for removing contaminants. The process conditions of HgSBR select and enrich functional and aggregating microbes. By far, it is the most natural way of forming bio-beads from native microbes and treating wastewater. Specific advantages conferred by bio-beads include superior settling characteristics, high biomass levels in treatment tanks, simultaneous COD, ammonium and phosphorus removal. Moreover, bio-bead microbes are robust and can tolerate changing loadings, process and environmental conditions. DAE holds an Indian patent for development of bio-beads and wastewater treatment. HgSBR is operated intermittently in fill and draw mode with each batch of treatment comprising of filling, mixing, settle and/or decant phases. Biological reactions are partitioned between anaerobic and aerobic phases. The length of cycle and individual phases will depend on influent characteristics and treated effluent quality requirements. HgSBR process is suitable for small, medium and large-scale wastewater treatment plants. It is always prudent to test the water samples to optimize the treatment process. Overall, the biological process is complex but the system setup is easy and installed in shorter time. Full automation makes it easy to operate with minimal routine maintenance.



HgSBR Technology and Salient Features

Parameters	Sewage Values	HgSBR Treated	As Per CPCB (2025) Guidelines
COD (mg/l)	200-600	<10	≤ 50
BOD (mg/l), 5th day	150-250	<10	≤ 10
Nh_4^+-N(mg/l)	10-30	<1	≤ 5
TN(mg/l)	30	<5	≤ 5
TP (mg/l)	3-6	<2	≤ 2
TSS (mg/l)	100-200	<10	≤ 10
FC (100/ml), MPN	10^6	<200	≤ 1000
pH	7-8	7-8.5	6.5-9.0

Operation Cycle of HgSBR

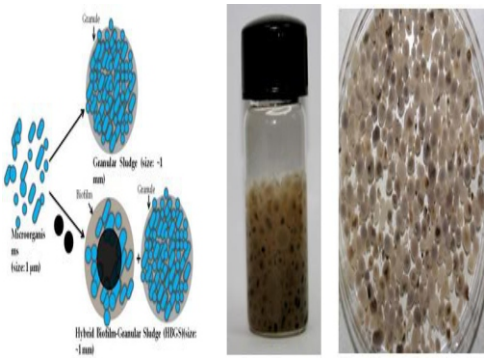


The whole treatment process is carried out in single Bio-tank with aeration and non-aeration cycles extending from 4 to 6 hours in total. Final disinfection is carried out by Ozone / UV depending on use of the treated water. Low temperature areas require special attention to maintain temperature of Bio0Tank around 25^0C for optimum bio- activity required for the treatment. Before putting the facility all the requirements need to be fulfilled for successful implementation of the technology.

Waste Water / Sewage Treatment in India...

Sewage treatment in India is growing slowly for meeting the standards of a developed country. India generates about 52000 MLD of sewage out of which less than half is treated before discharging into water bodies. The complex biological processes, extensive maintenance, large area requirement, poor drainage system in many unplanned cities and urban areas are some of the reasons for deficient sewage treatment. Decentralization is one of the important ways by which this problem could be tackled to some extent. Installation of advanced Smaller Sewage Treatment plants (STPS) from 100 JKLD to 5 MLD could be useful in avoiding high capex oriented larger STP. Even Cleanest city of India, Indore, has about 50% pit-based toilets and treating fecal sludge is another issue. Bhabha Atomic Research Centre developed Bio Beads system to treat sewage and fecal sludge in a modular way to which H20 Dynamic's advanced it to practical systems. effluents of organic nature

HgSBR Dense Bio-Beads for waste Water/Sewage Treatment



DAE Patent No. & Date 381341, 08/11/2021
Title: Method for bio-beads development for normal and saline wastewater treatment

Sewage (L)and Ttreated sewage(R)

H2O Dynamics has set up several such systems in Government and private sector including Kumbh Mela 2025, Shirdi Sai Sansthan, Railway Colony, Delhi, Army Camp Kupwara, Dhruv International school, Maharashtra etc. The Technology can be also deployed for treating pharmaceutical waste water, hospital waste water and other industrial effluents of organic nature

HgSBR Technology Key Benefits

Parameter	HgSBR	SBR
Process Benefits		
Sludge Generation	0.07 to 0.26 kg/kgCOD	0.27 to 0.35 kg/kgCOD
Partitions in Tank	Not Required	Not Required
Decanter	Not Required	Not Required
Bio-Tank Volume	370 m^3/mld	~450 m^3/mld for SBR
Bio-Tank Footprint	70 m^2/mld	~100 m^2/mld for SBR
Cost	2 Cr/mld; (20% lower)	2.5 Cr/mld for SBR
Energy (Kwh/m^3)	0.48; (20% lower)	0.6 for SBR

The heart of the technology is Bio-beads which are made from consortium of natural bacteria taken from sewage/saline water. Aerobic and anaerobic biochemical reaction takes place in presence or absence of air during the treatment phases in the same tank. The dense granular structure makes Bio-beads more resistant to fluctuation in chemical environment during the treatment process and thus helping in treatment of some industrial effluent too. After the treatment the bio-beads settle down quickly and no decanter is required. With minimal moving parts the process becomes easy and lower on electricity bills.

Some Operating Projects

S.No.	Capacity	Location	Project status
1	150 KLD	Kalpakkam, TN	Operation.
2	1500 KLD	Kalpakkam, TN	Operation.
3	10 KLD	Madurai, TN	Operation.
4	40 KLD	New Delhi	Operation.
5	10 KLD	Delhi	Commissioned.
6	150 KLD	Surat, Gujarat	Operation.
7	150 KLD	Mumbai, MH	Commissioning.
8	5 KLD	Pondicherry	Commissioned.
9	500 KLD	Tiruchirappalli, TN	Operation.
10	50 KLD	Kalpakkam, TN	Tendering.
11	50 KLD	Shirdi, MH	Operation.
12	200, 300, 500 KLD	Shirdi, MH	Operation
14	20 KLD	Vadodara, Gujarat	Operation
15	120 KLD	Ghaziabad, UP	Operation
16	3 x 500 KLD	Prayagaraj, UP	Operation
17	3 x 50 KLD	Gurgaon, Haryana	Installation
18	200 & 300 KLD	Shirdi Sansthan	Operation


120 KLD Gaziabad 2024


300 KLD Shirdi


500 KLD Kumbh mela Prayagraj 2025

Maha Kumbh Mela 2025, Prayagraj

H2O Dynamics India Limited, Goa, implemented its advanced wastewater treatment technology at the Maha Kumbh Mela 2025 in Prayagraj, using its Hybrid Granular Sequential Batch Reactor (HgSBR) Technology to treat septage from public toilets made near river Ganga bed. This technology initially developed by BARC was scaled up and enhanced by H2O Dynamics for the massive event treating 1.5 MLD of wastewater every day. The system effectively converts waste water into manageable sludge and utilizes Ozone for disinfection to produce safe water for discharge. The facilities were erected at three places from where number of trucks carried septage to the treatment plants. After treatment the treated sewage meeting CPCB norms was discharged into the river.

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