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**Experience with UASB Technology for Municipal Wastewater Treatment  
in India**

**Eng. Nadeem Khalil**

Department of Applied Mechanics, Indian Institute of Technology Delhi, New Delhi  
110016 India

Department of Civil Engineering, Aligarh Muslim University Aligarh 202002 UP  
India

Email: Nadeem.Khalil [at] mail2.iitd.ac.in, nadeemkhalil [at] rediffmail.com

**Mr. Rajeev Sinha**

National River Conservation Directorate,  
Ministry of Environment & Forests,  
New Delhi, 110003 India

Email: rsinha54 [at] yahoo.com

**Ms. Mubashra Khan**

UrbanPlan Consulting & Engineering Private Limited,  
4-448 Baitul Khalil Dodhpur, Aligarh 202002 India

Email: urbanplanpvtltd [at] gmail.com

India has taken an edge over the other developing countries having similar climatic and economic conditions in the use of UASB (Upflow Anaerobic Sludge Blanket) technology for municipal wastewater (sewage) treatment. Study revealed that low investment cost, simple & low operation and maintenance cost, resource recovery in the form of biogas, better efficiency without any energy input are some of the appealing factors that led to wide implementation in the use of this technology in India. At present, about 23 full-scale UASB plants are in operation at various places in India with total installed capacity of about 9,85,000  $m^3/day$  (985 mld) and about 12 number are in pipeline which are likely to be commissioned within next 3-4 years. With financial assistance from JBIC (Japan Bank for International Corporation), the centralized nodal agency National River Conservation Directorate (NRCD) under the Ministry of Environment & Forests (MoEF), Government of India (GoI), formulated and launched a comprehensive action plan project for conservation of the river Yamuna under which 16 UASB sewage treatment plants (STPs) were commissioned in the period of 1999-2002. Experience shows that the present UASB reactor design and construction is quite different from the very first module of 5 mld treatment capacity that was constructed as a demonstration plant at Kanpur, India under the Ganga Action Plan (GAP) in late 80's. Except for plants under GAP, modular approach has been adopted for UASB reactors, which offers flexibility in operation. The discrepancies in the initial UASB plants were recorded and now a new breed of UASB reactor is available with respect to the design, operation and maintenance, and materials of construction. Initially, most of the UASB plants were provided with final polishing

ponds as post-treatment unit, but now other options for the same are being explored. With stringent regulations that have come up, the post-treatment issue is yet to be addressed in these and upcoming plants. New alternatives like combination of UASB and constructed wetlands, membrane bioreactor etc. are being investigated to improve the water quality for organic pollution, solids and newly introduced coliforms parameter. This paper reviews the overall experience and implications of UASB technology in India. Institutional framework, technical aspects, design considerations, performance, operation and maintenance with special reference to the Yamuna Action Plan are discussed in this paper.

**Full Abstract**