

Type of pilot measure:

Pilot-scale testing of nanobubble aeration

Location:

Næstved, Denmark

Site:

Næstved Wastewater Treatment Plant

Applied solution:

Nanobubble generator as the sole aeration method for biological wastewater treatment

Pilot setup:

Three IBC tanks, each with a maximum capacity of 1 m³

Utilisation:

Testing oxygen transfer efficiency and biological wastewater treatment performance

Responsible: Envafors

A pilot-scale wastewater treatment plant was installed at Næstved WWTP, Denmark, to test whether nanobubble technology could provide aeration for biological wastewater treatment. The experimental system consisted of three tanks for raw wastewater, biological treatment and treated wastewater. The tests were intended to assess the technology before potential full-scale implementation at Vallensved WWTP.

The tests demonstrated efficient oxygen transfer and showed that nanobubbles could support the removal of nitrogen and chemical oxygen demand (COD). However, the tested system required considerable energy for water pumping and partially disrupted activated-sludge flocs, increasing suspended solids in the treated effluent.

Because of these limitations, the technology was not implemented at full scale as originally planned. Further tests with an alternative nanobubble generator – a rotating disk membrane – showed lower energy consumption and less disruption of activated sludge, indicating potential for the technology after further optimisation.



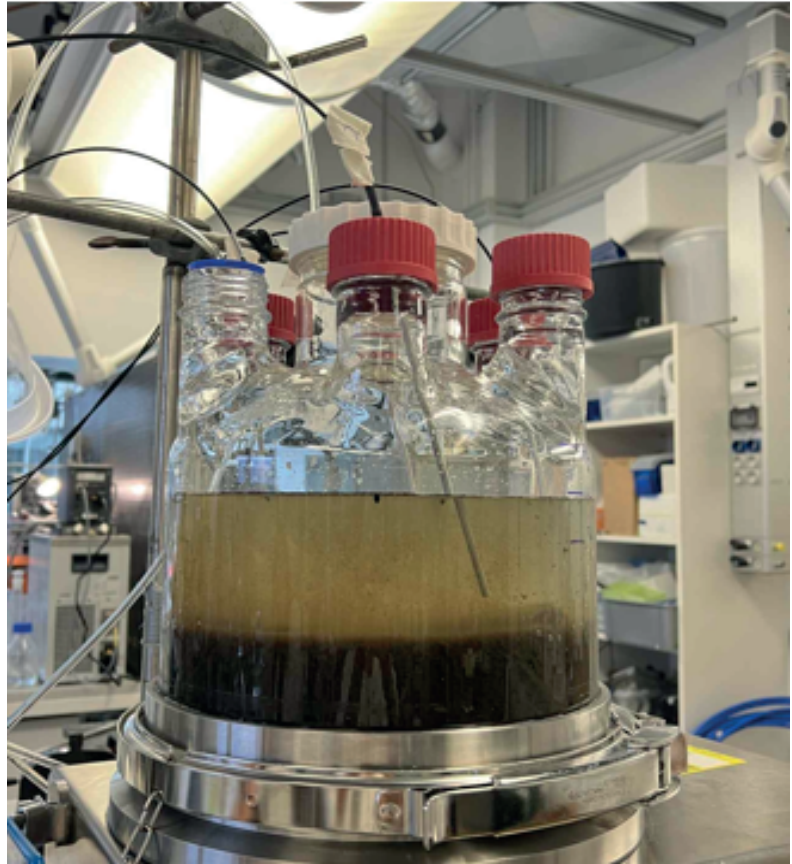
Pilot plant to test nano bubble technology

Gas flow	Up to 1.25 L/min at a pressure of 2 bars
Water flow	15 – 50 L/min
Recommended pump	0.06 – 0.1 kW
Carbon ceramic dimension	220 mm x 35 mm x 13 mm
Material	Transparent PVC
O-ring packing	Viton GS 170
Connection method	Adhesion or R3/4
Pipe outer diameter	20 mm

Specification for the nanobubble generator unit



Nanobubble generator and setup



Alternative nano-bubble generator, Rotating disk

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