

Innovative solution via biofiltration for the abatement of VOCs and odours in waste treatment plants

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Abstract

In the EU, approximately 2,000 tons of non-methane volatile organic compounds (NMVOC) were emitted into the atmosphere by the waste management sector, specifically from mechanical-biological treatment (MBT) plants in 2025^{1,2}. These NMVOC significantly contribute to air pollution and pose health risks in urban areas, which highlights the urgent need to develop efficient and environmentally friendly treatment technologies.

Current emission control strategies in MBT facilities primarily rely on end-of-pipe technologies such as thermal oxidation and biofiltration. However, these systems are often associated with high operational costs, substantial energy consumption, and a significant CO₂ footprint. To address these limitations, we have designed an innovative process approach that combines a pre-concentration stage using a zeolite-filled rotoconcentrator with the biological treatment of the concentrated VOC stream in a novel two-phase biotrickling filter.

Within the framework of the LIFE ABATE project (LIFE22-ENV-ES-LIFE-ABATE/101113838), this technology is being demonstrated at industrial pilot scale, treating 20,000 m³/h of real gaseous emissions from the Ecoparc 3 waste treatment plant (Barcelona, Spain). The ABATE solution aims to achieve a significant reduction in VOC and odour emissions while lowering energy requirements (both natural gas and electricity consumption) and overall operating costs in MBT plants. The first performance results from the industrial demonstration will be presented at the NOSE 2026 conference.

¹Database of Waste Management Technologies, *MBT 1-7: Advanced Recycling/Composting of the organic fraction*, Waste-C-Control (LIFE09 ENV/GR/000294), EPEM.gr website. [Visited 12/02/2026]

²Desotec, *Removing odours at mechanical-biological treatment facilities*, Desotec.com website. [Visited 12/02/2026]