

Zymatic SMART Demonstration

Pharem Biotech AB

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Executive summary of the project

The Zymatic SMART Demonstration project has successfully demonstrated Pharem Biotech AB's innovative enzyme-based technology for the removal of organic micropollutants (OMPs) from municipal wastewater. The project was implemented at Bergkvara Reningsverk in Torsås Municipality, a representative wastewater treatment plant (WWTP) discharging directly into the Baltic Sea.

The primary objective was to validate Zymatic as a cost-efficient, scalable, and easy-to-operate quaternary treatment solution capable of meeting the new EU Urban Wastewater Treatment Directive (UWWTD) requirements. The technology utilises proprietary enzymes immobilised on a porous granular carrier material (Zymatic Sand) to degrade pharmaceutical residues and other hazardous micropollutants. The demonstration aimed to prove high removal efficiency, low energy consumption, operational simplicity, and commercial readiness at full scale (TRL 9).

A strategic partnership with Nordic Water and their DynaSand moving-bed technology, representing a significant upgrade from previous fixed-bed configurations. The installation was sized for approximately 3 000 person equivalents (pe), covering the full flow of the plant for most of the year. Following an extensive stress-testing phase (January–August 2025), the system entered full performance monitoring from November 2025 to April 2026.

Key Results

- **Treatment Performance:** The optimised Zymatic system consistently achieved 80–86 % removal of target micropollutants during the main performance period, thereby meeting and exceeding the 80 % removal target set by the UWWTD.
- **Operational Stability:** No unplanned downtime occurred. The system proved easy to operate by regular WWTP personnel.
- **Energy Efficiency:** Zymatic requires no additional energy for the enzymatic reaction itself. Total energy consumption (primarily for DynaSand operation) was competitive or lower than alternative advanced treatment technologies (ozonation, activated carbon, etc.).
- **Technical Advancement:** Successful transition to moving-bed technology eliminated previous challenges with channelling and clogging, significantly improving hydraulic performance and long-term material lifetime.

The project has delivered a measurable reduction of hazardous substances entering the Baltic Sea, directly supporting the HELCOM Baltic Sea Action Plan (BSAP) objectives regarding hazardous substances and good environmental status. By aligning with the EU revised UWWTD, the demonstration provides a practical, cost-effective solution for municipalities across the Baltic Sea region.

The project also strengthened Pharem's commercial position through:

- Established partnerships with Nordic Water (installation & operation) and Brenntag Nordic AB (global distribution).
- Multiple site visits and strong interest from several Swedish water utilities.
- Presentation at Vatten 2025 and CPHI 2025, generating over 400 business contacts.