

## Press release

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Research results, Transfer of Science or Research  
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## Innovative Wastewater Treatment System Enhances Efficiency and Sustainability

The ULTIMATE Project developed a Joint Control System (JCS) to improve wastewater treatment by coordinating industrial and municipal plants. The system uses data sharing and predictive modeling to optimize aeration, reducing nitrogen concentration by 50%, lowering energy use by 15%, and increasing energy efficiency by 18%. This highlights the potential of collaborative, data-driven solutions for sustainable wastewater treatment.

A novel approach to wastewater treatment has been developed, aiming to improve efficiency and sustainability. Within the ULTIMATE Project, researchers from the Berlin Centre of Competence for Water (KWB), Novonesis and Kalundborg Forsynin have introduced a system that implements a joint control system for two interconnected wastewater treatment plants. This system is designed to provide a cost-effective and environmentally sustainable solution.

The Joint Control System (JCS) facilitates a coordinated operation of an industrial and a municipal wastewater treatment plant (WWTP). The industrial WWTP releases pre-treated wastewater from the biotech industry to the municipal WWTP, which treats in addition also municipal wastewater. By enabling data sharing, the JCS optimizes the wastewater treatment process of the municipal WWTP. The JCS allows for improved efficiency of the aeration process, particularly in predicting nitrogen loads coming from the industrial WWTP, a critical parameter in wastewater treatment on which the aeration intensity depends and that can pose environmental risks if not managed effectively.

Nitrogen control was addressed using a predictive equation to estimate nitrogen loads in order to control the aeration process in the municipal WWTP. This method provides an early warning mechanism, enabling municipal plants to adjust their processes accordingly. Additionally, advanced computer simulations were employed to optimize the system, ensuring accurate oxygen delivery to treatment tanks and enhancing nitrogen removal. Experimental testing demonstrated measurable results. The nitrogen concentration in the municipal WWTP effluent was reduced by 50%, and the municipal plant achieved a 15% reduction in the energy consumption of the total plant per kg nitrogen removed. For nitrogen removal specifically, energy efficiency increased by 18%.

Our study highlights the role of collaborative frameworks and data-driven technologies in addressing environmental challenges. Further research is required to evaluate the long-term performance under varying and extreme conditions, but the findings indicate a practical avenue for advancing wastewater treatment methodologies.

URL for press release: <https://www.kompetenz-wasser.de/en/newsroom/news/wastewater-treatment-system>

Attachment 140125\_Press release\_ULTIMATE\_publication\_en <http://idw-online.de/en/attachment108541>