Transforming wastewater into valuable resources

eLitre, a new EU-funded project, will develop technology to convert excess nitrogen pollutants in water into valuable products, such as ammonia and sustainable biopolymers.

August 05, 2026

Nitrogen is an essential nutrient for sustaining life on Earth, as plants and animals require it to synthesize amino acids, proteins and nucleic acids. Often, agricultural professionals use nitrogen fertilizers to boost crop growth and production. However, the overuse of these fertilizers saturates soils with nitrogen compounds, which leach into water streams and together with industrial wastewater and urban sewage, accumulate in water and end up n our rivers and lakes. This excess of nitrogen in water causes eutrophica ion, damaging aquatic ecosystems and reducing water q ality. Today, nitrogen deposition exceeds critical loads in almost all European countries, and only 37% of Europe's surface water bodies have good ecological status[1]. To address this challenge, the eLitre project aims to develop sustainable technologies to recover th s nitrogen from wastewater and use it to produce valuable products such as ammonia a

d sustainable biopolymers

Funded under the Water4All partnership with 1.1M?, eLitre will run over the next 3 years. he project brings together ICFO, the universities of Galway, TU Delft, and Lodz University of Technology, and the industrial partner Sorigue.

A two-step integrated approach

The project combines renewable energy with advanced electrochemical processes. i¿½Firs , we selectively convert the nitrites and nitrates dissolved in the water into ammonia, usi g direct electrolysisi¿½, explains **Marcelo Chavez**, postdoctoral researcher at ICFO's CO2 Mitigation Accelerated by Photons group, directed by Prof Pelayo Garcia de Arquer. i¿½We then purify this ammonia so it can be reused, either as a fertilizer or as feedstock for other chemical processesi¿½. Additionally, part of the recovered ammonia will also be us d to optimize nutrient balances in photobioreactors, where microorganisms pro uce sustainable biopolymer

. Throughout the project, researchers will also evaluate the performance of each step of the process, measuring efficiency, energy consumption, and scalability indicators to ide tify the most promising route towards technological viability. By denitrifying water nd recovering valuable resources, the technology will bring us closer to a mo e circular and resource-effi

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[1] European Environment Agency, June 2025: https://www.eea.europa.eu/en/topics/in-depth/water

Electrochemical recovery of nitrogen vectors from wastewater - The eLitre project