LIFE PHARMA DETOX

5TH NEWSLETTER

Demonstration of an innovative method for the detoxification of pharmaceutical wastewater from pharmaceutical facilities

Co-funded by the European Union
LIFE20 ENV/CY/000615

Project Technical Progress

First Demonstration Phase Completed: LIFE PharmaDetox at Medochemie, Cyprus

The first demonstration phase of the LIFE PharmaDetox project has been successfully completed at Medochemie's facilities in Limassol, Cyprus. Over approximately 8 months of real-world operation, the pilot system treated actual production wastewater from the Oral Penicillin and Injectable Penicillin manufacturing units, with amoxicillin as the predominant active pharmaceutical ingredient (API).









System Start-Up and Parameter Fine-Tuning

Initial operation allowed the NTUA team to characterise the wastewater matrix and calibrate operating parameters across all treatment stages. Wastewater variability driven by different production schedules and cleaning procedures required repeated adjustments to establish stable performance conditions.

Co-funded by the European Union
LIFE20 ENV/CY/000615

Coagulation Pre-Treatment: A Critical Challenge Solved

High turbidity due to elevated excipient and surfactant concentrations posed a significant operational challenge, causing membrane fouling and catalyst deactivation in early runs. After systematic testing of different reagents, polyaluminium chloride (PAC) combined with polyelectrolyte was established as the optimal pre-treatment protocol, achieving effective suspended solids removal without affecting dissolved API concentrations.



Treatment Performance

Under optimised operating conditions, the system demonstrated strong and consistent performance across all stages. The RO unit achieved 88% amoxicillin removal at 66% water recovery. The produced permeate was assessed against Regulation (EU) 2020/741 (Category A) the most stringent water reuse class, applicable to crops consumed raw and areas of high public exposure — and met all required microbiological and physicochemical criteria. Ecotoxicological testing confirmed very low acute toxicity (<10 TU) and negligible phytotoxicity in the permeate, with shoot growth inhibition values well below thresholds of concern across all tested plant species, confirming its safety for irrigation reuse.

The catalytic reactor further treated the RO concentrate, achieving 97% amoxicillin removal under standard conditions, with several individual runs exceeding 99% and reaching concentrations below the analytical detection limit. The treated effluent showed a reduction in acute toxicity to 14.4 TU — an 88% decrease compared to the raw influent — and residual phytotoxicity of ≤21%, a level considered acceptable for secondary uses such as facility cleaning. Together, these results confirm that both output streams of the system are environmentally safe and suitable for their intended reuse applications.

Co-funded by the European Union
LIFE20 ENV/CY/000615

What's Next: Second Demonstration Phase — FAL, the Netherlands

Following the successful completion of the Cyprus phase, the PharmaDetox system has been relocated to Farmaceutisch Analytisch Laboratorium (FAL) Duiven B.V. in the Netherlands. Installation and commissioning took place in early May 2026, with Medochemie and NTUA leading the initial operation and optimisation activities at this new site.

In this second demonstration phase, the system is being tested against a broad range of different APIs, with the aim of expanding its proven operational field beyond penicillin. Operating the system at a different pharmaceutical facility with distinct wastewater compositions and operational conditions is a critical step for validating the adaptability and robustness of the PharmaDetox technology across diverse industrial settings.







Co-funded by the European Union
LIFE20 ENV/CY/000615

Events & Dissemination

LIFE & Close-to-Market (C2M) Coaching Session

The LIFE PHARMA-DETOX consortium participated in an individual coaching session organised by the LIFE & Close-to-Market (C2M) team, attended by Mrs. Sophia Papageorgiou from the LIFE Programme external monitoring team. The session provided valuable feedback and strategic guidance on the next steps toward commercialisation of the project's innovative treatment process, including the development of the business plan roadmap.

VERDE.TEC 2026 — 8th International Exhibition, Athens, Greece

LIFE PHARMA-DETOX was presented at the 8th International Exhibition VERDE.TEC, held at the Mediterranean Exhibition Center (MEC) in Paiania, Attica. VERDE.TEC is the leading meeting point in Greece for professionals and organisations active in Environmental Technologies, Circular Economy, and Smart Cities, offering an important platform for disseminating the project's outcomes to a national audience.

3rd Project Meeting — University of Catania, 20 April 2026

The 3rd Project Meeting of LIFE PHARMA-DETOX was hosted by the University of Catania at the Palazzo Sangiuliano, bringing together all project partners for a full day of collaboration and progress sharing. Discussions focused on the advancement of the project's technical actions, the environmental and socio-economic impact assessment, and the planning of activities for the next six months.



Co-funded by the European Union
LIFE20 ENV/CY/000615

Events & Dissemination

Technical Visit to LIAA — University of Catania, 21 April 2026



On the second day in Catania, the project partners were hosted at the Environmental and Food Hygiene Laboratories (LIAA) of the University of Catania, under the direction of Professor Margherita Ferrante. The LIAA is a leading research hub in environmental, food, and health monitoring, with strong expertise in risk assessment and the links between environmental factors and human health. Of particular interest to the consortium was the laboratory's innovative work on microplastics detection, an area increasingly relevant to pharmaceutical wastewater management.

2nd Stakeholder Event & ECOMED Round Table — Catania, 22 April 2026



The 2nd Stakeholder Event of LIFE PHARMA-DETOX was held on 22 April 2026 at the ECOMED Green Expo del Mediterraneo, Sicily Fiera Exhibition Meeting Hub, Catania. The event brought together researchers, industry professionals, and policymakers for an open discussion on pharmaceutical wastewater treatment and the transition toward more sustainable industrial practices. Through a dedicated Round Table session, participants explored topics including sustainable wastewater management, innovative treatment technologies, strengthening companies' green footprint, and alignment with emerging European environmental regulations.

Co-funded by the European Union
LIFE20 ENV/CY/000615

Events & Dissemination

2nd Stakeholder Event & ECOMED Round Table — Catania, 22 April 2026



13th International Conference on Sustainable Waste Management Kos, Greece, 24–28 June 2026



LIFE PHARMA-DETOX was presented at the 13th International Conference on Sustainable Waste Management in Kos, Greece, one of the largest events in the field, featuring 550 oral presentations, 192 posters, 10 keynote speakers and 950 participants both in-person and online. The project was presented during the LIFE 2026 Info Day session chaired by N. Psimmenos and D. Banousis from the Hellenic Green Fund and M. Papastavrou from the Cyprus Ministry of Environment. NTUA researcher and PhD candidate Eleni-Alexia Giouni shared the latest pilot-scale results from the project's innovative treatment system for pharmaceutical manufacturing wastewater combining membrane separation with catalytic detoxification to eliminate active pharmaceutical ingredients (APIs) before discharge.



Life PHARMA DETOX
5TH NEWSLETTER

Co-funded by the European Union
LIFE20 ENV/CY/000615

Events & Dissemination

European Congress on Circular Economy and Clean Technologies Berlin, Germany, 29–30 June 2026

LIFE PHARMA-DETOX was presented by NTUA researcher and PhD candidate Eleni-Alexia Giouni at the first edition of the European Congress on Circular Economy and Clean Technologies in Berlin. The research-focused congress brought together scientists, professors and innovators working at the frontier of circular economy and clean technologies, offering an excellent setting to introduce the project to a new community.





COORDINATING BENEFICIARY

MEDOCHEMIE

ASSOCIATED BENEFICIARIES

AARHUS UNIVERSITY

NEVIS

UNIVERSITÀ degli STUDI di CATANIA

Stay Updated on PHARMA DETOX News and Events

Visit our website www.pharmadetox.eu

Connect with us on Social Media

LinkedIn

Twitter

The contents of this publication are the sole responsibility of Life PHARMA DETOX beneficiaries and do not necessarily reflect the opinion of the European Union.

Co-funded by the European Union
LIFE20 ENV/CY/000615