

Project Technical Progress

1. Installation of the Pilot Unit

The initial installation of some parts of the pilot wastewater treatment unit was successfully completed at **Medochemie's premises in Limassol** in February 2025. The catalytic reactor, the remaining part of the pilot unit, will be installed in mid-July. The pilot system consists of a containerized unit housing the catalytic reactor, as well as the Reverse Osmosis (RO) unit.

The container is specially designed and divided into two distinct functional areas:

- The **first area** hosts the reverse osmosis unit, where wastewater is treated for the removal of suspended solids and other physicochemical contaminants.
- The **second area** is specially configured for the operation of the catalytic reactor. This section also houses the water electrolysis system, which produces gaseous hydrogen. The hydrogen feeds the reactor, where detoxification of active pharmaceutical ingredients (APIs) from the wastewater takes place. This area is built according to **ATEX** specifications, ensuring safe operation in environments where explosive atmospheres may be present due to the use of hydrogen gas.








2. Commissioning & Initial Testing

The RO unit was commissioned and tested using real wastewater collected from Medochemie's production lines (Ampoule Injectable, Oral Penicillin, and Injectable Penicillin facilities). Initial tests helped fine-tune the system's parameters, and early results showed effective removal of turbidity from the inlet stream to permeate stream, confirming the filtration efficiency.



RO Unit

The three streams of the RO unit are:

-  the inlet
-  the concentrate, which contains APIs and is driven to the catalytic reactor and
-  the permeate, which is ready for reuse.



3. Laboratory Analysis of Samples

Samples from the three streams of RO unit were analysed in the NTUA laboratory for physicochemical parameters and antibiotic concentration. These analyses aimed to evaluate the RO unit's treatment efficiency and to characterize each stream (feed, permeate, and concentrate) based on performance indicators.

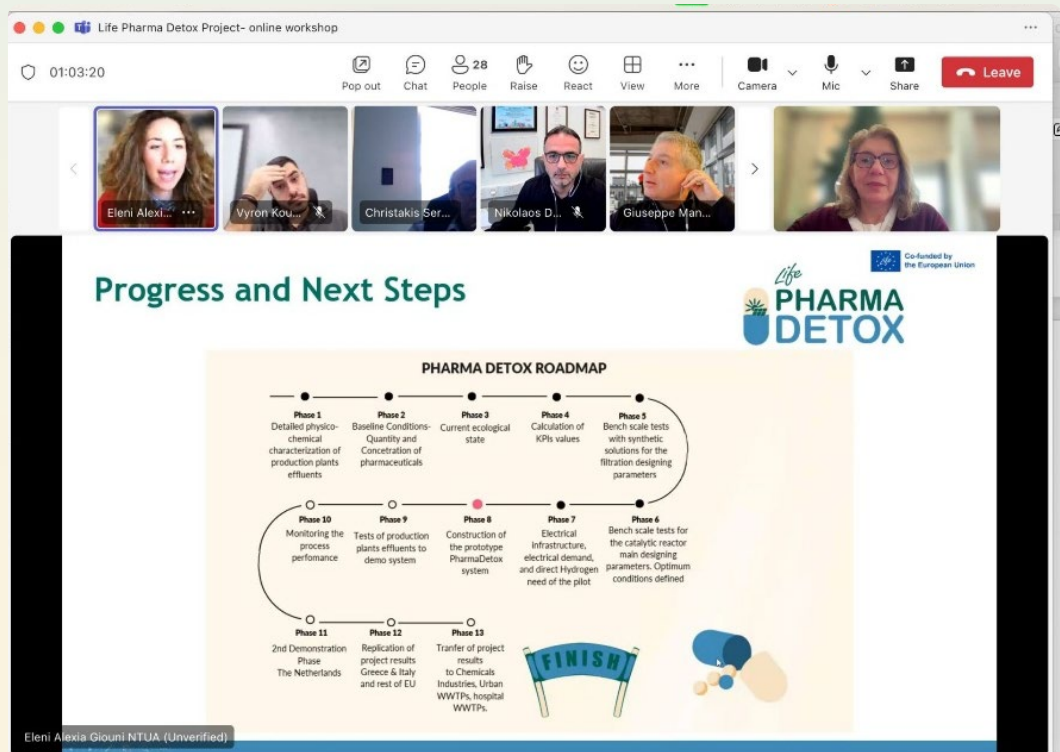
This data will be used to optimize system operation and validate the overall treatment efficacy. The results appear promising: **the quality of the permeate stream** was found to be **improved**, with a **decreased concentration of antibiotics**. The produced water **fully complies with EU Regulation 2020/741** on minimum requirements for water reuse. This confirms the unit's potential for the safe and sustainable recycling of water.

Project Events & Highlights

1st online workshop of the LIFE Pharma Detox project

January 17th, 2025:

The 1st online workshop of the LIFE Pharma Detox project was successfully held virtually, bringing together 32 participants from various fields to explore innovative solutions for tackling contaminants in wastewater. Participants included researchers and professors from universities in Greece, Cyprus and Italy, as well as representatives from the oil refining sector, soil regeneration companies, pharmaceutical companies, water technology centres and wastewater treatment plants. Their active participation highlighted the growing urgency of addressing pharmaceutical contaminants, and AntiMicrobial Resistance (AMR), microplastics and other contaminants of emerging concern (CECs) in water systems to protect ecosystems and public health.



The screenshot shows a Zoom meeting interface for the 'Life Pharma Detox Project - online workshop'. The meeting duration is 01:03:20. The top toolbar includes icons for Pop out, Chat, People (28), Raise, React, View, More, Camera, Mic, Share, and Leave. Below the toolbar, several video thumbnails are visible, including participants Eleni Alexi..., Vyron Kou..., Christakis Ser..., Nikolaos D..., and Giuseppe Man....

The main content is a presentation slide titled 'Progress and Next Steps' with the 'Life PHARMA DETOX' logo and 'Co-funded by the European Union' text. The slide features a 'PHARMA DETOX ROADMAP' diagram with 13 phases:

- Phase 1:** Detailed physico-chemical characterization of production plants effluents
- Phase 2:** Baseline Conditions-Quantity and Concentration of pharmaceuticals
- Phase 3:** Current ecological state
- Phase 4:** Calculation of KPIs values
- Phase 5:** Bench scale tests with synthetic solutions for the filtration designing parameters
- Phase 6:** Bench scale tests for the catalytic reactor main designing parameters. Optimum conditions defined
- Phase 7:** Electrical infrastructure, electrical demand, and direct Hydrogen need of the pilot
- Phase 8:** Construction of the prototype PharmaDetox system
- Phase 9:** Tests of production plants effluents to demo system
- Phase 10:** Monitoring the process performance
- Phase 11:** 2nd Demonstration Phase The Netherlands
- Phase 12:** Replication of project results Greece & Italy and rest of EU
- Phase 13:** Transfer of project results to Chemicals Industries, Urban WWTPs, hospital WWTPs

The roadmap concludes with a 'FINISH' banner and a graphic of a blue pill. A name tag for 'Eleni Alexia Giouni NTUA. (Unverified)' is visible at the bottom left of the slide.

Project Events & Highlights

NTUA team at VerdeTec 2025 exhibition in Greece

February 21-23rd, 2025

The LIFE PHARMA-DETOX project was presented at Verde.tec in M.E.C. Paiania, Greece as an innovative solution for the detoxification of pharmaceutical wastewater, addressing a critical environmental challenge. Experts, researchers, and industry professionals gathered to discuss the project's role in eliminating pharmaceutical pollutants from



wastewater, ensuring safer and more sustainable water management. The discussions highlighted the urgent need for advanced wastewater treatment technologies in the pharmaceutical sector. As LIFE PHARMA-DETOX continues to drive innovation, it reinforces the importance of sustainability and responsible waste management in the pharmaceutical industry.

CINEA Monitoring Visit at MEDOCHEMIE premises, CYPRUS2025

March 10th, 2025



CINEA representative, project manager Mrs. Malgorzata Piecha from the European Commission and LIFE monitoring team project expert Mrs. Sofia Papageorgiou visited the Medochemie premises in Cyprus for the second monitoring visit. The purpose of the meeting was to discuss the progress of the project and visit the installed pilot unit.

The visit included a detailed walkthrough of the system setup, discussions on the preliminary results from the RO unit operation, and an exchange of feedback regarding system performance and next steps.

Project Events & Highlights

Presentation at the 12th International Conference on Sustainable Solid Waste Management, CYPRUS2025

June 26th, 2025

The LIFE PHARMADETOX project was presented by NTUA researcher and PhD candidate E. Giouni during a dedicated session on LIFE projects chaired by the Green Fund representatives Mr. Psimmenos and Mr. Banousis and Mrs. Papastavrou from the Cyprus Ministry of Environment. Ms. Giouni emphasized the project's contribution to safeguarding aquatic ecosystems and public health, as well as its alignment with EU environmental priorities and the Zero Pollution Action Plan. The session provided a constructive platform for exploring synergies among LIFE projects tackling water quality and pollution mitigation.



This international conference, which attracted more than 600 participants, offered a hybrid experience with physical presence and remote speakers as it attracted scientists, government representatives, industry executives, private organizations and academic institutions, providing an important opportunity to exchange innovative ideas, methodologies and best practices in the field of solid and liquid waste management.



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